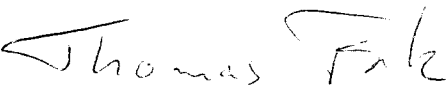


PAZ SAR Processor

SAR Level 1b Product Format Specification for PAZ SAR Processor

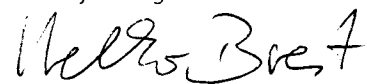
MF – Remote Sensing Technology Institute

prepared:

 22.02.2019

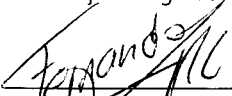
T. Fritz
PSP Project Engineer
Date

reviewed:

 22.02.2019

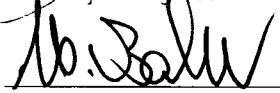
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DISTRIBUTION

This document is stored on the PSP Information Server:

<http://psp.terrasar-x.dlr.de/>

It is accessible to all participants of the PSP Project as well as to the PSP Customer and the Space Segment Contractor, via administered access list.

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Custodian of this document is: T. Fritz

DOCUMENT CHANGE CONTROL

This document is under configuration control. Latest changes to the document are listed first.

Issue	Date	Chapter	Changes
1.1	22.02.2019		Document access classification changed from "project internal" to "public" by request of INTA. Re-formatting of XML annotation description.
1.0	01.10.2010	All	First issue

Note: Verify that this is the correct revision before use. Check the document server for the latest version. Hardcopies of distributed documents are not updated automatically.

TABLE OF CONTENTS

1	Introduction.....	5
1.1	Purpose	5
1.2	Scope	5
2	References	6
2.1	Applicable documents	6
2.2	Reference documents	6
3	Terms, definitions and abbreviations	7
3.1	Terms and Definitions	7
3.2	Abbreviations	7
4	Level 1b Product Format Rationale	9
5	Product Delivery Package	10
5.1	Product Structure and File Names	10
6	SAR Image Raster Files.....	14
6.1	Detected and Geocoded Products.....	14
6.2	Complex Products	16
7	Further Product Components	25
7.1	Auxiliary Raster Files.....	25
7.1.1	Projected Products	25
7.1.2	EEC Geocoded Products	26
7.1.3	Common Files	26
7.2	Image Preview Files.....	26
7.2.1	Quicklook Images.....	26
7.2.2	Map Plot.....	26
8	Level 1b Product Annotation.....	27
8.1	Main Annotation Component.....	28
8.2	Georeferencing Annotation Component.....	286
8.3	Antenna Phase Pattern Annotation Component.....	324
9	How to Use the Annotated Information	327

1 Introduction

1.1 Purpose

This document defines the format of the level 1b product components as generated by the PAZ SAR Processor PSP. In that sense it details the image file and preview data representation and gives a comprehensive list of the product annotation parameters of the main output product.

This document is structured as follows:

Chapter 1 introduces to the structure and scope of the document.

Chapter 4 gives an overview of the level 1b product format.

Chapter 5 describes the structure of the delivered level 1b products.

Chapter 6 describes the binary data format of the image components (GeoTIFF and COSAR).

Chapter 7 lists further product components (e.g. quicklooks, auxiliary raster files).

Chapter 8 details the parameter annotation components.

Chapter 9 provides some examples on how to use the annotation parameters.

1.2 Scope

The document at hand specifies the format details of products generated by the PSP, it does not make any assumptions on the availability of certain modes, product variants or calibration parameters for the PAZ system listed herein. It is also not a specification of any SAR product performance parameters. The annotation format specification is thus not restricted to the nominal products and may hence comprise parameter enumeration values which exceed the variants of the SAR products generated by the PSP. These are kept for completeness, tests and in order to allow future extensions without recoding of product readers.

This specification is restricted to the main level 1b product component generated by the PSP. Any additional files – e.g. for administrative or workflow control purposes which may be generated and/or delivered along with it are beyond its scope. A prerequisite for the validity of this specification for the PSP level 1b products is nominal PSP SAR processing based the provision of its interface files and products in compliance with the [R6].

This document is derived from the TerraSAR-X level 1b product format specification written by the same author. It is intended to maintain full compatibility of PAZ and TerraSAR-X level 1b product formats for product readers. This is however limited by the necessary extension of names, enumeration types and optional parameters to new parameter ranges.

2 References

2.1 Applicable documents

N/A

2.2 Reference documents

The following documents, though not formally part of this document, amplify or clarify its content.

	Document ID	Document Title	Issue
[R1]		GeoTIFF Format Specification GeoTIFF Revision 1.0, Specification Version 1.8.1 N. Ritter and M. Ruth; 1995	
[R2]		TIFF Revision 6.0 Specification Final – June 3 1992	
[R3]	TX-GS-DD-3302	TerraSAR-X Basic Product Specification	1.6
[R4]	TX-GS-DD-3303	TerraSAR-X Experimental Product Description	1.4
[R5]	TX-GS-DD-3307	TerraSAR-X Level 1b Product Format Specification	1.3
[R6]	PZ-DLR-ID-3001	PAZ SAR Processor Interface Control Document	1.0
[R7]	PZ-DLR-ID-3004	Orbit and Attitude Interface Specification for PAZ SAR Processor	1.0
[R8]	PZ-DLR-ID-3002	SAR Level 0 Product Interface Specification for PAZ SAR Processor	1.0
[R9]	PZ-DLR-ID-0001	DLR Product and Data Conventions for PAZ	1.0
[R10]	PZ-DLR-ID-3005	Auxiliary Product Specification for PAZ SAR Processor	1.0

3 Terms, definitions and abbreviations

Note: Terms, definitions and abbreviations with relevance to the overall project are to be entered into the central project glossary maintained on the “PSP Information Server” under “Terms”.

Terms, definitions and abbreviations with no relevance to the overall project, but necessary to understand the document on hand, may be listed below.

3.1 Terms and Definitions

N/A

3.2 Abbreviations

Abbreviation	Meaning
ADC	Analog to Digital Converter
D	Dual Polarization
DAC	Direct Access Customer
DEM	Digital Elevation Model
DRA	Dual Receive Antenna
DTAR	Distributed Target Ambiguity Ratio
EEC	Enhanced Ellipsoid Corrected
EWP	Echo Window Position
GEC	Geocoded Ellipsoid Corrected
GTC	Geocoded Terrain Corrected
H	Horizontal Polarization
HS	High Resolution Spotlight Mode
ID	Identifier
IOCS	Instrument Operational Characterization Set (for PSP)
ISLR	Integrated Sidelobe Ratio
IRF	Impulse Response Function
L0	Level 0 Product
L1b	Level 1b Product
MGD	Multi Look Ground Range Detected
N/A	Not Applicable
PRF	Pulse Repetition Frequency
PSLR	Peak Sidelobe Ratio
PSP	PAZ SAR Processor
PTR	Point Target Response
Q	Quad Polarization
RAW	Raw Data
S	Single Polarization
SAAR	Signal Azimuth Ambiguity Ratio

SC	ScanSAR Mode
SL	Spotlight Mode
SM	Stripmap Mode
SRA	Single Receive Antenna
SRTM	Shuttle Radar Topography Mission
SSC	Single Look Slant Range Complex
T	Twin Polarization
TBC	to be confirmed
TBD	to be defined
TIFF	Tagged Image File Format
UPS	Universal Polar Stereographic
UTM	Universal Transverse Mercator
V	Vertical Polarization
XML	Extensible Markup Language

4 Level 1b Product Format Rationale

The variety of level 1b product types generated by the PSP (complex, detected, geocoded, ...) requires product annotation in an extensible and dynamic format. The Extensible Markup Language (XML – see <http://w3.org/XML>) is such a format and has therefore been selected. In chapter 8 the parameters are given in a XML formatted annotation closely following the one of TerraSAR-X and similar to the one implemented for Radarsat-2 and to the one proposed for Sentinel-1. The PAZ SAR product annotation is however much more comprehensive due to variable imaging modes and additional instrument capabilities. Nevertheless, one branch of the main product annotation component contains all the basic information on the delivered product as uniform as possible for all product types.

Further annotation and pointers to additional annotation components generated by the archiving system or post processing steps like look-up-tables, map projection or propagation correction can simply be added to the existing XML files. In general, new generated data components like enumeration matrices for map projection or binary masks can be directly included in the product directory. The product annotation comprises detailed parameters on the actual format of the binary product components (e.g. bits per pixel, byte order, ...). These are however fixed for all product components contained in this specification and are given for informative purposes in those cases. Additional components can be described easily this way. Parameters like size or pixel spacing of the image data are obviously variable from product to product. Some annotation parameters are extracted or derived from the instruments auxiliary product, the orbit product and the attitude product used for processing. Details on those products can be found in [R7], [R10].

The image data consists of one or more polarimetric channel files in separate binary data matrices. In detected (MGD) and geocoded products (GEC, EEC) the polarimetric (and DRA channel) image layers are stored in individual GeoTIFF files. This format is used in many remote sensing and GIS applications and for TerraSAR-X and Radarsat-2. It allows annotating map projection parameters as TIFF tags in the image layers. Details are given in chapter 6. Quicklooks are provided in the common TIFF format.

In complex products (SSCs), the individual bursts of each ScanSAR beam are stored together in one individual binary file for each beam. The stripmap and spotlight SSCs are equivalent with a one beam / one burst ScanSAR product in this context. This format also contains image raster positioning annotation in the binary file which facilitates data handling and interferometric data processing. Thus the “*COMplex SAR*” (COSAR) format is defined for the complex PSP image data of all modes. The structure and content of such a COSAR file, containing complex focused ScanSAR bursts of one beam, is described in chapter 6.

The COSAR file is in a plain binary raster file since formats which could serve as a container hosting complex SAR data (e.g. GeoTIFF) are using 4 byte offsets and are thus limited in file size to 4 GB. The quicklooks of complex products however use the same TIFF format as the ones of detected or geocoded products.

5 Product Delivery Package

This chapter describes the delivered product package. The package directory structure and the file naming conventions are given. Note that the Level 1b Product as specified in this document is self-contained and that all product components are referenced in the “productComponents” section of the main annotation file. *The paths and file names (except for the one of the main annotation file) described here may thus be extended or even made obsolete by the annotated ones.*

5.1 Product Structure and File Names

Upon delivery, the level 1b products may be packed or supplemented by additional administrative information. These packages and the delivery mechanisms are not specified in this document.

The folders hosting the level 1b products are conveniently named using a fixed product naming convention. The directory structure and components of the level 1b product itself are indicated in Figure 5-1. Table 5-1 gives an overview of the relevant file name constituents.

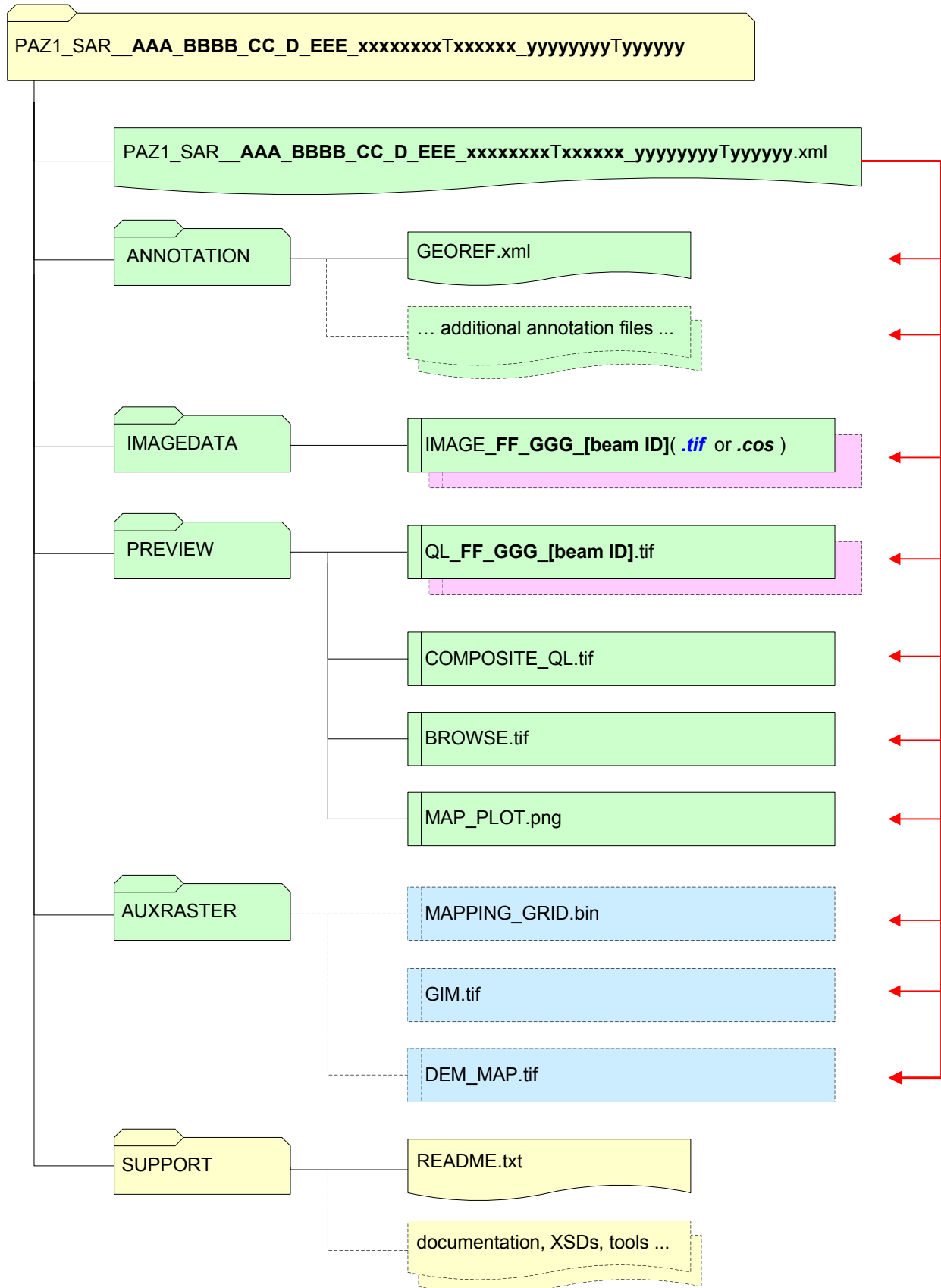


Figure 5-1: Directory structure and files of the PAZ Level 1b Product.

In Figure 5-1, the yellow color indicates components of the product directory which may include some documentation on the delivered product (e.g. the XML schema files in the versions valid at time of the product generation). The other objects are the specified level 1b product components. Optional or supplemental components are marked with dashed lines. Additional image layers (e.g. polarimetric channels) are colored magenta. The components which exist only for projected or geocoded products are indicated with blue color. Additional files not included in this figure may also be present. Relevant for each individual product is always the product components index in the main annotation file.

The main annotation file in the product directory carries the product name with the extension “.xml”. The file naming scheme is outlined here using constituents (e.g. **AAA**) which are separated by under-scores (“_”). Note again that only the main annotation file / product naming follows the specified convention and that the components may be named and located differently as referenced in the relevant “productComponents” annotation section (indicated by the red arrows in the figure).

Constituent ID	Constituent Name	Values	Remark
L1b product names:			
-	mission & satellite ID	PAZ1	
-	sensor	SAR_	fixed
AAA	product variant	SSC, MGD, GEC, EEC	product class
BBBB	resolution variant	SE__, RE__	product sub-class: spatially or radiometrically enhanced. No entry (__) for SSCs.
CC	imaging mode	SM, SC, SL, HS	example: HS for High-Resolution SpotLight
D	polarisation mode	S, D, T, Q	example: D for Dual polarization mode
EEE	antenna receive configuration	SRA, DRA	SRA for single-receive antenna DRA for dual-receive antenna
xxxxxxxxTxxxxxx	UTC start time	-	format: YYYYMMDDThhmmss
yyyyyyyyTyyyyyy	UTC stop time	-	same
Variable parts of the product component file names:			
FF	polarization channel image layer	HH, HV, VH, VV	TxRx polarization
GGG	geometric (antenna receive channel) image layer	SRA, FWD, AFT	geometric layers for DRA/ATI mode (forward and after). QuadPol data is processed with the “SRA” geometric

			phase center offset (thus 0).
[beam ID]	elevation beam configuration ID	e.g. strip_007, scan_009, ...	Identifying the different image layers for each subswath of (complex) ScanSAR products (e.g. strip_009, strip_010, strip_011 and strip_012).

Table 5-1: File name constituents.

The file name extensions used are:

- “.xml” for the annotation files following the schema definitions in this document
- “.tif” for TIFF and GeoTIFF images with different depths and representations
- “.cos” for the COSAR image format specified herein
- “.bin” for a binary raster file
- “.png, .txt” for standard PNG and text files.

6 SAR Image Raster Files

6.1 Detected and Geocoded Products

The individual polarization layers of the image data of projected products are given as separate files in the GeoTIFF file format in unsigned 16 bit representation and a subset of commonly used tags.

GeoTIFF is an extension of the TIFF (Tagged Image File Format) standard which defines additional tags concerning map projection information. It is readable with standard image processing and GIS software packages (see <http://www.remotesensing.org/geotiff/geotiff.html>). Large files which would exceed the 4GB limit are compressed using the standard TIFF packbits algorithm.

The GeoTIFF format version 1, key revision 1.0 as specified in [R1] with a very limited number of tags and keys is used for the detected and projected image data. The projection tags and GeoTIFF keys set by the PSP are listed in Table 5-1 using the conventions of [R1]. The TIFF Revision 6.0 tags used are given in Table 6-2 (see [R2]).

GeoTIFFs main information, the transformation of the raster coordinate system to the target model coordinate system, is given by a 4x4 transformation matrix which can be evaluated by every standard GeoTIFF reader. The result is referenced to WGS84. UTM zones and UPS projection are annotated.

GeoTIFF Tags and Keys	Content / Example
ModelTransformationTag	4x4 transformation matrix between raster and model "space" (only 2 dimensions used)
GTModelTypeGeoKey	This GeoKey defines the general type of model coordinate system to which the raster will be transformed: e.g. ModelTypeProjected
GTRasterTypeGeoKey	The raster space coordinate system used; either a pixel is a point or an area: e.g. RasterPixelIsPoint
GeographicTypeGeoKey	Specifies the code for the geographic coordinate system (GCS) used to map lat-long coordinates onto a specific earth ellipsoid: e.g. GCS_WGS_84
GeogLinearUnitsGeoKey	Geocentric linear units for the defined GCS: e.g. Linear_Meter
GeogAngularUnitsGeoKey	Geocentric linear units for the defined GCS: e.g. Angular_Degree
<i>Annotation for UTM / UPS Projection</i>	

ProjectedCSTypeGeoKey	The number of the UTM zone with N or S for North and South: e.g. PCS_WGS84_UTM_zone_30N
ProjCoordTransGeoKey	e.g. CT_TransverseMercator or CT_PolarStereographic
ProjectedCSCitationGeoKey	ASCII string e.g. "UTM Zone 32 N with WGS84" or "UPS N"
ProjNatOriginLongGeoKey	(-177...177 deg)
ProjNatOriginLatGeoKey	e.g. 0.000000 deg (0d 0' 0.00"N)
ProjScaleAtNatOriginGeoKey	e.g. 0.9996 for UTM
ProjFalseEastingGeoKey	e.g. 500000.0 m
ProjFalseNorthingGeoKey	e.g. 0.0 m
Reference System	code / value
GCS	4326/WGS 84
Datum	6326/World Geodetic System 1984
Ellipsoid	7030/WGS 84 (6378137.00,6356752.31)
Prime Meridian	8901/Greenwich (0.000000/ 0d 0' 0.00"E)

Table 6-1: GeoTIFF tags and keys

TIFF Tags and Keys	Value Code / Example
ImageWidth	image width
ImageLength	image length
Orientation	TOPLEFT
Compression	e.g. NONE or DEFLATE (the gzip compression)
SamplesPerPixel	1 sample for one layer
BitsPerSample	16 bit for the detected images
RowsPerStrip	1 = line by line
PlanarConfiguration	1 (required although only 1 layer present)
PhotometricInterpretation	1 = minimum is black (grey value)

Table 6-2: TIFF tags and keys

6.2 Complex Products

One COSAR (COmplex SAR) file contains all focused complex SAR data of one beam in a burst by burst order *together* with sample validity and position annotation. Note that stripmap and spotlight images consist of one burst in that sense.

The focused complex SAR data of one beam (or swath) are stored in one beam file. That way, the focused complex SAR data of a ScanSAR configuration with n beams is stored in n beam files. There are 1 to 4 files for each of the polarization channels in the a full polarimetric data set. In the simplest case of a SSC stripmap with one polarization channel, the user will obtain a product with 1 image data file.

The bursts are not merged with each other and all valid data of each focused burst are preserved. The valid (thus all completely correlated) data can be stored in a rectangular matrix this way. This matrix has the range extent of the widest burst. The “invalid data” are simply filling the matrix to compensate the different burst width and also the smaller azimuth extent in near range of each burst. For a system which uses the Total Zero Doppler Steering, the excess in storage space is marginal. The SAR data sample validity and position annotation is interspersed in a way that a simple visualization of the entire file as a rectangular matrix is not spoiled by the misinterpretation of the annotation data as SAR data.

The SAR data samples are stored in the same order as they are recorded by the SAR instrument, range line by range line, near range sample first.

The following figures give an overview of the COSAR file format. Figure 6-1 outlines the storage of the bursts in one matrix. Figure 6-2 and Figure 6-3 detail the sample validity and position annotation for an azimuth column and a range line of a burst respectively. The annotation and structure of each burst is depicted in Figure 6-4. Figure 6-5 shows the actual storage order of the entire file. Figure 6-6 and Figure 6-7 illustrate the advantages of skewed versus deskewed data storage for squinted SAR imaging. The positioning and validity annotation in the COSAR file is put in relation to the product annotation of a stripmap SSC in Figure 6-8. Figure 6-9 sketches the interrelation of COSAR positioning information and product annotation for a complex ScanSAR product.

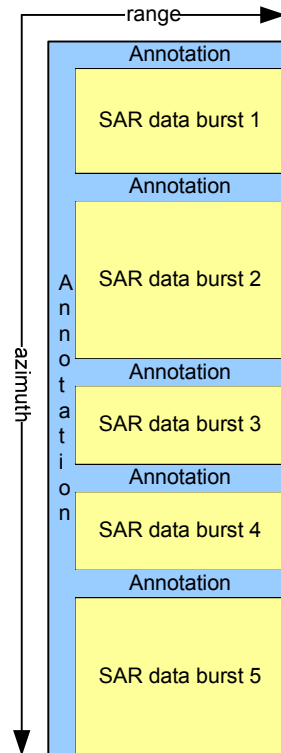


Figure 6-1: Visualization of the image and annotation data of a COSAR file as a rectangular matrix

Azimuth Annotation

The beam file format allows either to store the focused complex burst images deskewed in azimuth (Doppler-zero geometry) or skewed in azimuth, which saves storage space in the case of a squinted SAR imaging geometry. In both cases, deskewed or skewed, the number of samples in azimuth direction must be constant within one burst. Since the number of valid azimuth samples in one azimuth column may vary with range, the azimuth columns have to be zero-padded in order to keep the number of samples per azimuth column constant with range.

Each azimuth column is annotated by three parameters:

- **ASRI** = Azimuth Sample Relative Index: An azimuth index, giving the location of the first sample of the actual azimuth column relative to the Doppler-zero location of the reference sample in the intermediate raster. This index not only locates the individual bursts but also allows a "compressed" skewed image data storage.
- **ASFV** = Azimuth Sample First Valid: An azimuth index, starting with 1 and indicating the first valid azimuth sample with respect to the first azimuth sample of the actual azimuth column.
- **ASLV** = Azimuth Sample Last Valid: An azimuth index, starting with 1 and indicating the last valid azimuth sample with respect to the first azimuth sample of the actual azimuth column.

Thus the deskewed location of the start of a column of valid azimuth samples of one burst results from $ASRI + ASFV$. In case of a deskewed storage, ASRI is constant for all columns of a burst.

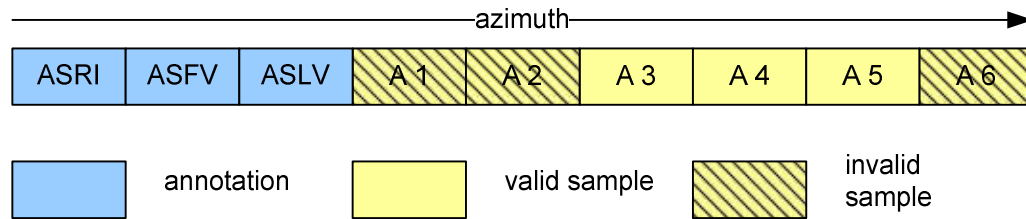


Figure 6-2: Annotation and optional zero-padding of an azimuth column

Range Annotation

In order to ensure a correct azimuth annotation of all samples within one burst, potential echo window start time (echo window position EWP) shifts within one burst - which are not foreseen for ScanSAR but are likely present in a stripmap "burst" – have to be considered. In the focussed burst, the zero-padding in the course of EWP change adjustments has to be tracked within the annotation part of each range line. Thus, the range delay time of the first sample of each range line within one burst is constant and the valid range data are indicated.

Each range line is annotated by two parameters:

- **RSFV** = Range Sample First Valid: A range index, starting with 1 and indicating the first valid range sample with respect to the first range sample of the actual range line.
- **RSLV** = Range Sample Last Valid: A range index, starting with 1 and indicating the last valid range sample with respect to the first range sample of the actual range line.

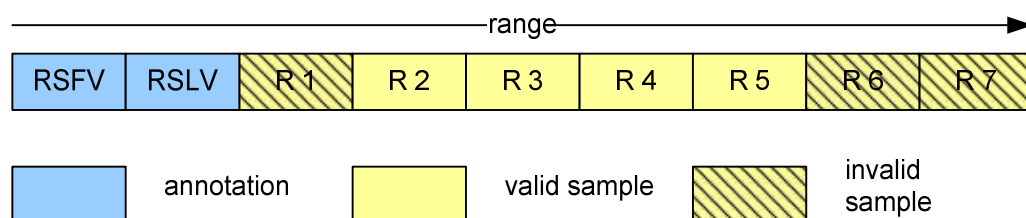


Figure 6-3: Annotation and optional zero-padding of a range line

Compared to the number of samples in one azimuth column, which may vary from burst to burst, the number of samples in one range line has to be the same for each burst in one beam file. While EWP changes within one burst / block have to be adjusted, EWP changes from burst to burst need not to be physically compensated. If these changes are adjusted from burst to burst, range zero-padding has to ensure that the number of samples for all range lines is kept constant for the entire beam file.

Burst Annotation

The annotation of a burst consists of the range line and azimuth column annotation supplemented by an additional annotation line giving information about the burst as well as about the complete file.

1. The number of bytes in the actual burst (**BIB = Bytes In Burst**). Including the annotation and valid only for ScanSAR bursts.
2. A range index, giving the relative range location on a virtual common raster with the ADC sampling (its rate is approx. 330MHz) of the bursts first range sample with respect to the reference value (**RSRI = Range Sample Relative Index**).
3. The length of a range line given in samples. This value has to be same for all bursts and is repeated at every burst (**RS = Range Samples**).
4. The length of an azimuth column of the actual burst given in samples. This value may vary from burst to burst (**AS = Azimuth Samples**).
5. The index number of the burst (**BI = Burst Index**).
6. The total number of bytes in a line in range direction (the “width” of the entire file including the annotation bytes). As the TNL, this parameter is given only once in the first line of the file (**RTNB = Rangeline Total Number of Bytes**).
7. The extent in azimuth direction (the “height” of the entire file including the annotation lines). This parameter is given only once in the first line of the file in order to facilitate the reading of the file and replaced by the special filler value for the other bursts (**TNL = Total Number of Lines**). The file size can be derived from RTNB times TNL.
8. For the convenience of multi-format reader software the following 2 samples identify the file format (not visible in Figure 6-4). The first sample reads hex. 43534152 which is the ASCII string CSAR and the second sample gives a version number.
9. The following sample gives the oversampling factor of the RSRI sample position with respect to the current range sampling (1 for 330MHz, 2 for 165MHz or 3 for 110MHz).
10. The following *two* samples contain the 8-byte floating point value (MSB order) of the inverse SPECAN scaling rate $1/k$ applied in processing of the burst. This information may facilitate interferometric processing but it is not meaningful for Stripmap modes ($1/k \rightarrow 0$).
11. The next samples of the annotation line of each burst are reserved for processor internal use and may contain in the future further imaging mode dependant information useful for interferometric processing of complex ScanSAR (and SpotLight) data. They are not contained in Figure 6-4. If unset, the filler value is used here as for the rest of the line.

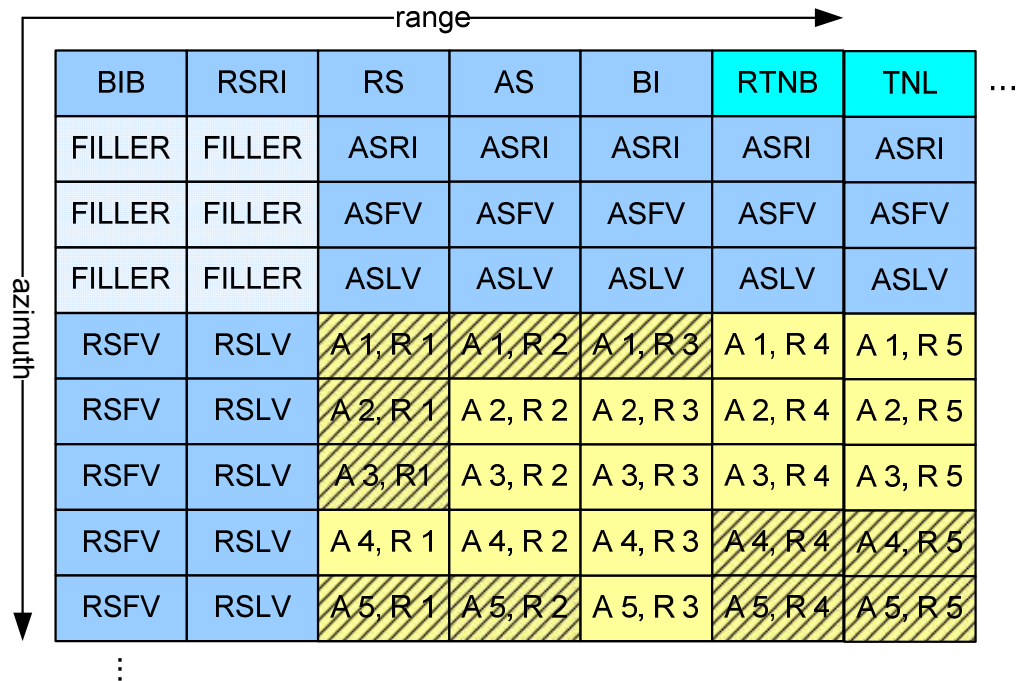


Figure 6-4: Burst annotation

A SAR image sample is regarded invalid either if it lies outside of the interval of valid range samples, indicated by RSFV and RSLV, or outside the interval of valid azimuth samples, indicated by ASFV and ASLV, or outside of both intervals. Image samples are marked as invalid *only* by the validity annotation. They do not necessarily contain the filler or any other special value.

Those fields within the burst annotation area (rectangular 2-D burst representation) which are not needed for annotation purposes are filled with the special filler value.

Binary File Format

The complex SAR image samples are stored as 16 bit / 16 bit complex integer (4 bytes). The byte order is big-endian (most significant byte (MSB) first). All annotation values are stored as 32 bit integer (4 bytes). The filler value is a 32 bit integer with a constant value of hex. 7F7F7F7F.

That way, an annotation or filler value requires the same storage size as an image sample. Now, any visualization software, which is able to display 16 bit / 16 bit complex integer data, is allowed to “misinterpret” the annotation values as complex samples and will display the image data. In the case, that the amplitude of the complex samples is displayed, the filler data will show up as a white line separating the burst images. The 32 bit items are stored in range line by range line order, see Figure 6-5.

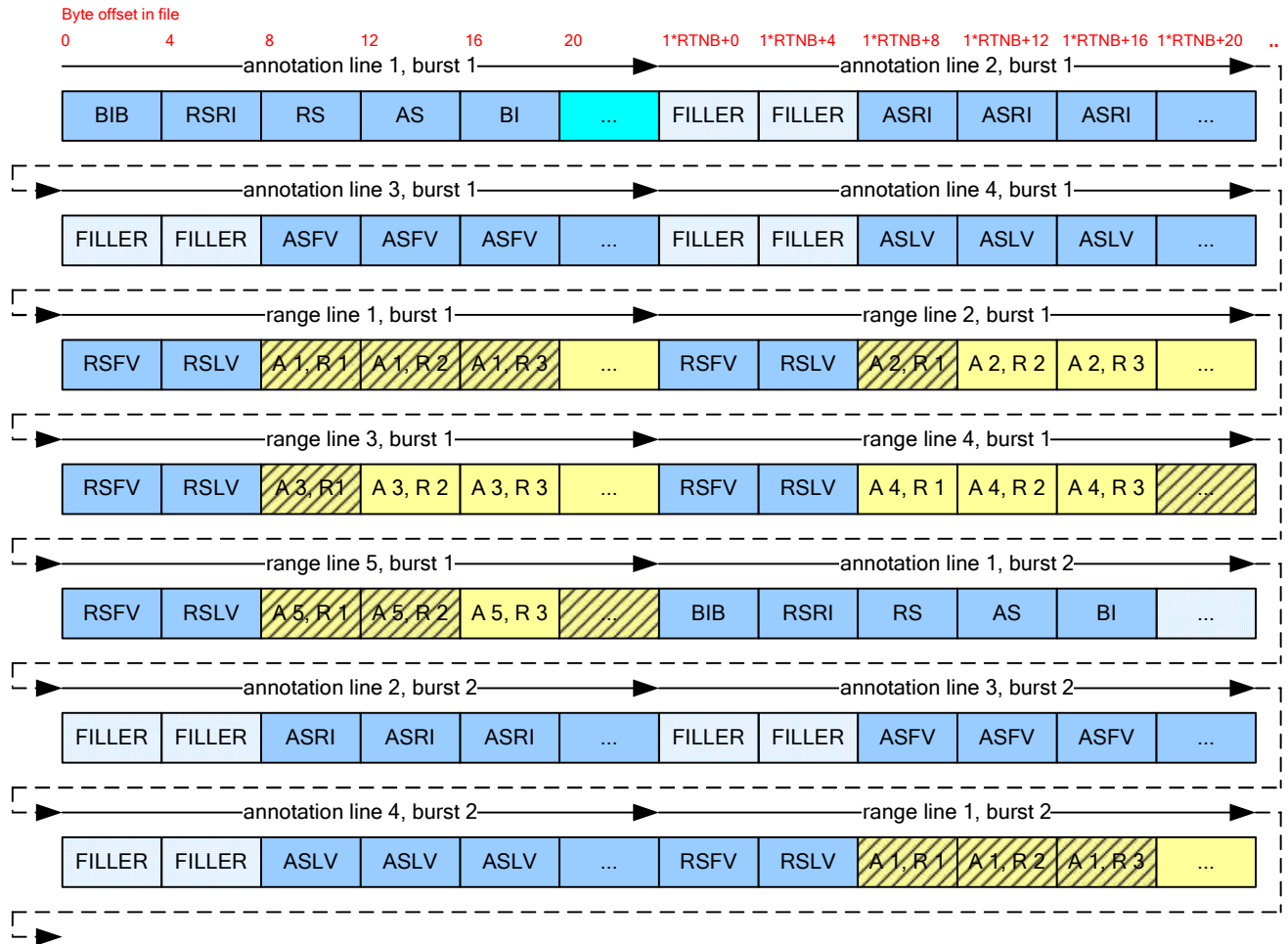


Figure 6-5: Beam file storage order

Skewed Versus Deskewed Storage Organization

In the case of a squinted SAR imaging geometry the size of the beam file can be significantly reduced, if the SAR image data is organized in skewed geometry (see Figure 6-6).

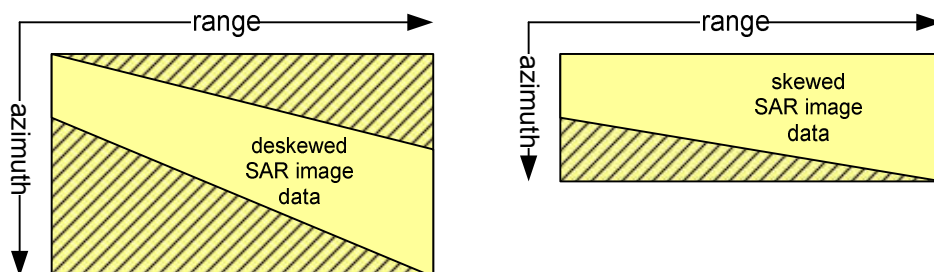


Figure 6-6: Deskewed versus skewed storage organization in the case of a squinted SAR imaging geometry

In the case of yaw steered or zero-Doppler steered SAR instruments the saving of storage space is marginal or even zero. Thus, for convenience the SAR image data is generally stored in a deskewed geometry (see Figure 6-7).

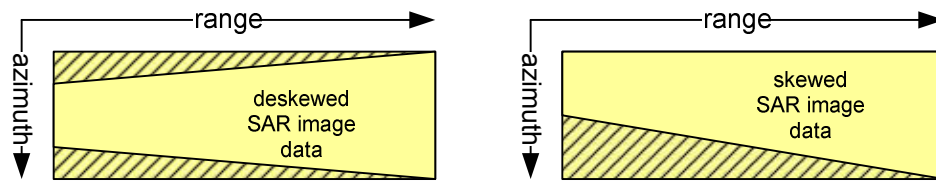


Figure 6-7: Deskewed versus skewed storage organization for total zero-Doppler steered SAR instruments.

COSAR Image Coordinates and Geolocation

Figure 6-8 sketches the relation of the localization information given in the product annotation in relation to the image positions in the COSAR frame for a deskewed complex Stripmap product with echo window position shifts. The annotated scene coordinates are indicated with *blue dots*. Only a part of the geo-grid annotation (*red dots*) of the scene (*yellow*) is shown here in order to keep the figure readable.

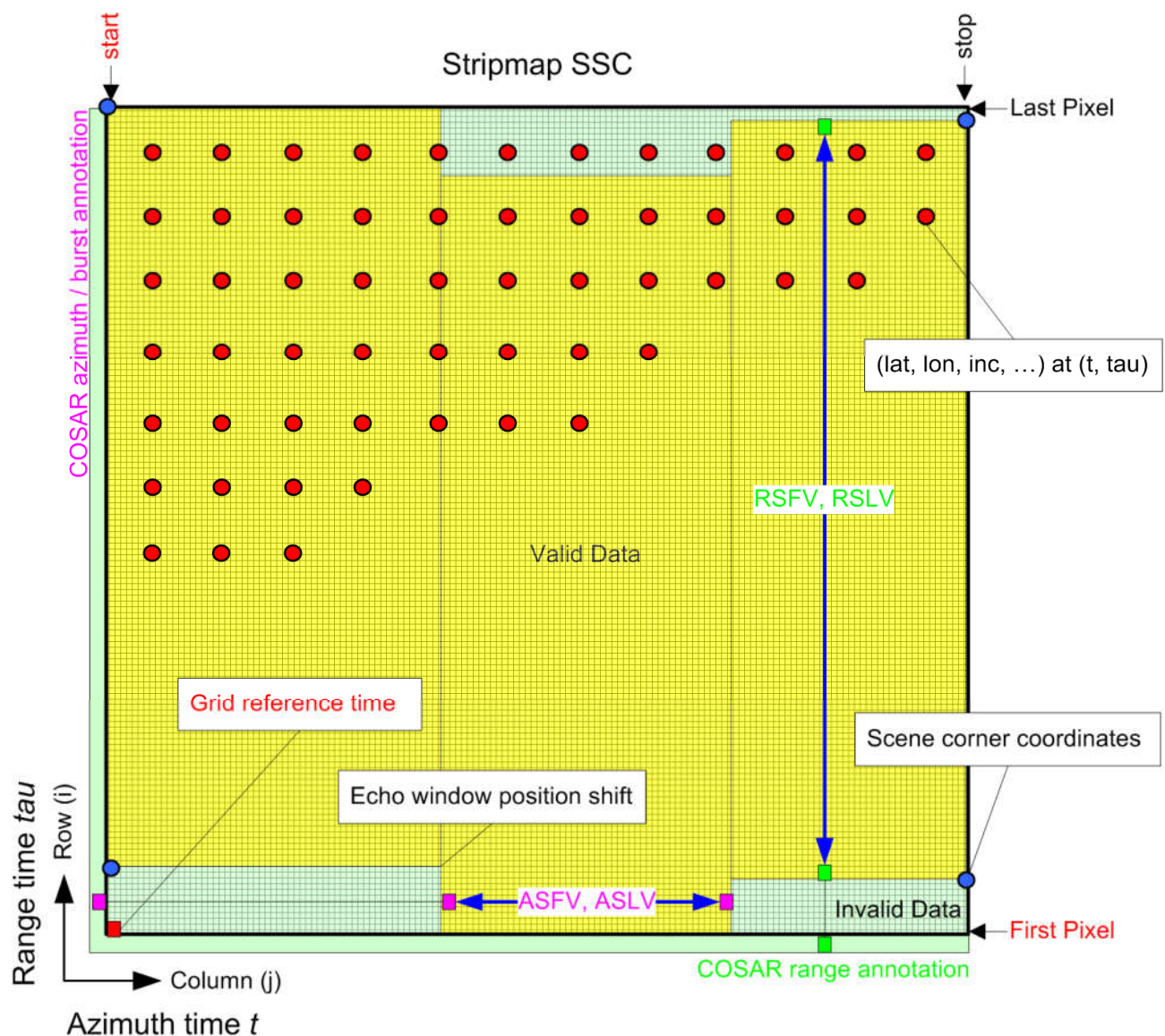


Figure 6-8: Geo-grid, scene coordinates and COSAR image raster for SSCs.

Figure 6-9 outlines the positioning of 4 deskewed bursts without squint of 2 beams of a ScanSAR sequence onto a virtual common raster which covers the entire “scene” using the COSAR burst annotation. The annotated coordinates and the geolocation grid (only partly drawn) of the product refer to the whole scene. This sketch gives of course only a very rough idea of how the ScanSAR beam stitching/burst concatenation and multi-looking works and the true beam/burst offsets and overlaps will depend on the actual commanded ScanSAR cycle and the corresponding processing parameters.

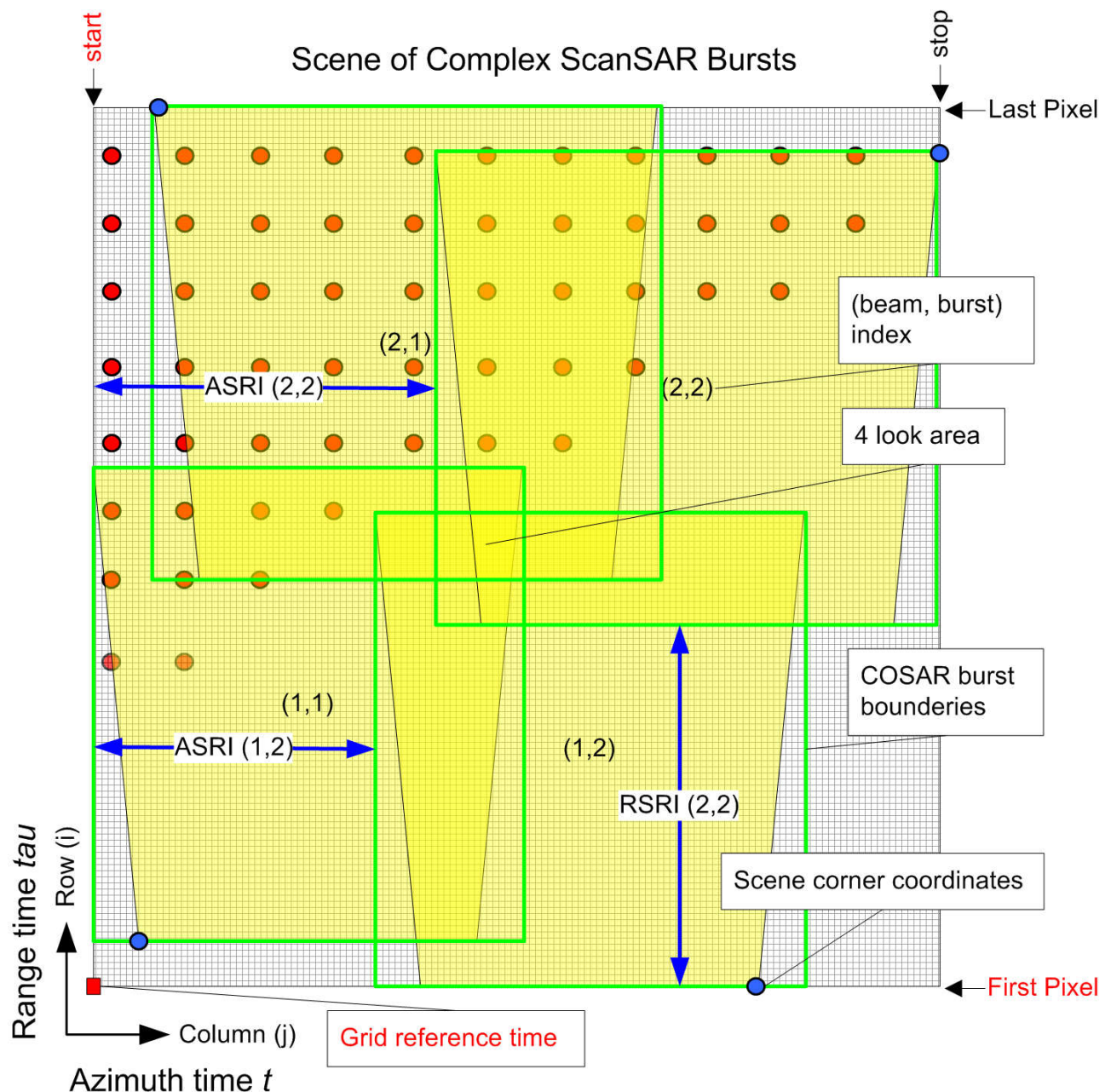


Figure 6-9: Hypothetical ScanSAR SSC burst positions from COSAR annotation on a (virtual) common raster.

7 Further Product Components

7.1 Auxiliary Raster Files

7.1.1 Projected Products

Detected and geocoded products comprise a mapping grid which gives the azimuth and range times for a coarse grid of equidistantly sampled GeoTIFF frame pixels. Thus, all parameters annotated in slant-range geometry can be related to the projected image geometry. It is e.g. possible to trace (or reverse) the calibration corrections which were applied in slant-range geometry for the detected products. The mapping grid is in given plain binary format with two 32 bit floating point values for each sample. Details (e.g. extent, spacing) will be annotated in the mappingGridInfo section of the actual product. Figure 7-1 depicts the relation between the geo-grid annotation (*red dots*) of the scene (*yellow*) and the mapping grid (*green dots*) of the GeoTIFF image frame for projected and geocoded products.

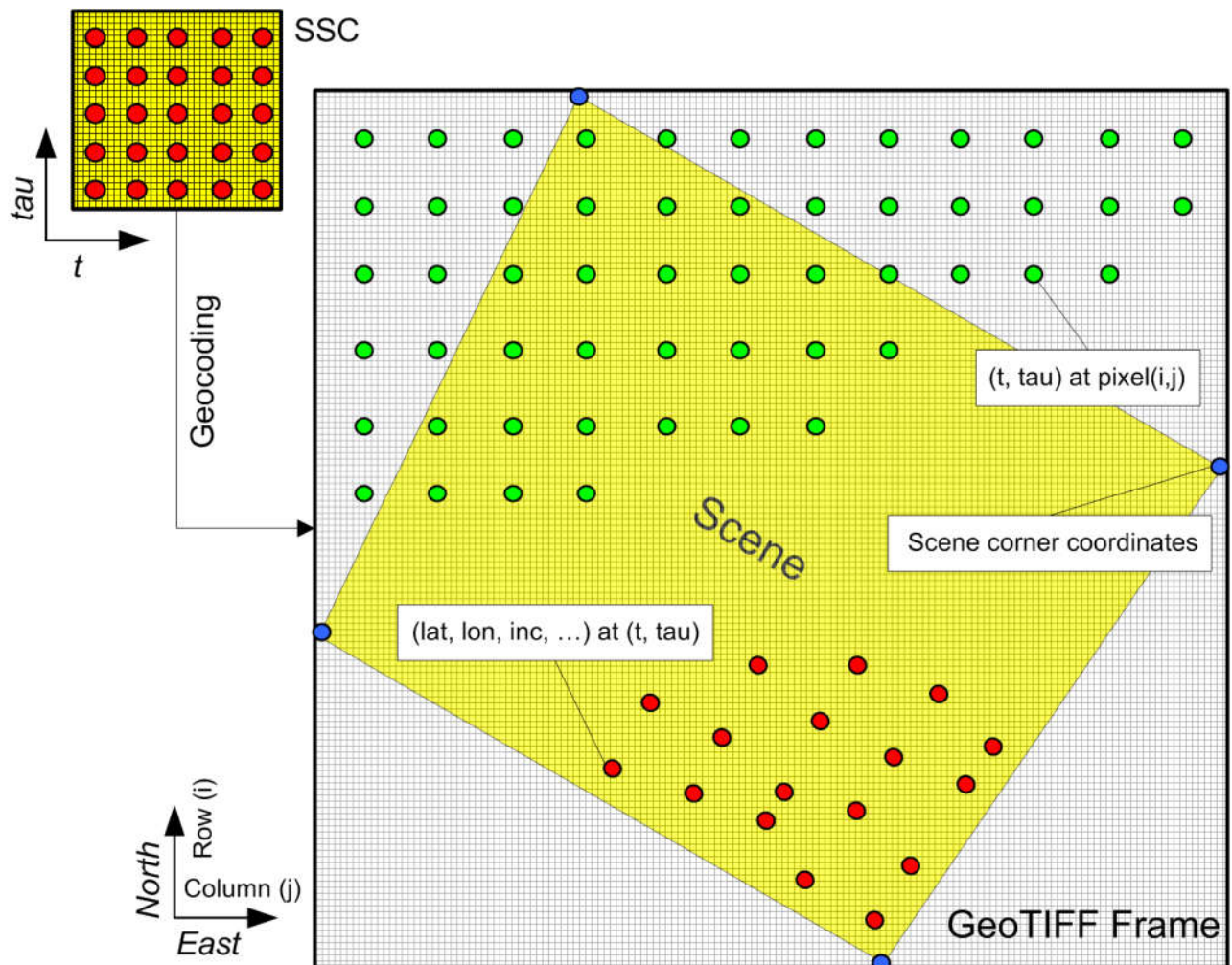


Figure 7-1: Mapping grid, geo-grid, scene and image frame raster.

7.1.2 EEC Geocoded Products

The geocoded incidence angle mask (GIM) and the DEM map for EEC products contain the slope dependent local incidence angle for each image pixel (including a flag indicating shadow or layover conditions as detailed in [R3]) and the reference to the DEM used during geocoding of this pixel.

The GIM is formatted the same way as the individual image layers (i.e. in GeoTIFF format) with identical resolution using a 16 bit integer representation.

The DEM map format and its extent are also identical to the image files (GeoTIFF). The resolution of the DEM coverage map depends on the best available DEM for the geocoding (e.g. 1 arcsec for SRTM X-band DEM). Each cell of the matrix contains an index that identifies the name(s) of the DEM(s). A lookup table, which describes the index, is added as a textfile in the SUPPORT directory. The DEM map data depth is 16bit.

7.1.3 Common Files

The PSP products contain RGB 24bit colour composite files which visualize the image speckle statistics, a 8bit quicklook which is scaled to an absolute amplitude value (i.e. a “calibrated” quicklook) and the standard deviation of the image data in 16bit. All these are provided as GeoTIFF and accompanied by kml files. For ScanSAR data, these files are generated for each beam separately. For geocoded SE product variants, the statistic visualization image may reach up to approx. 100MB in file size – depending on the mode.

7.2 Image Preview Files

7.2.1 Quicklook Images

One image quicklook rescaled to a height of approximately 2000 pixels (depending on the imaging mode and product size) is provided for each image layer in TIFF format, thus readable with common display tools. Targeted pixel spacings for detected products are approx. 25m for Stripmap, 10m for SpotLight and 50m for ScanSAR. The quicklooks use an unsigned 16 bit per sample greyscale representation.

The composite colour coded quicklook for polarimetric acquisitions uses a true colour 24bit TIFF format. For convenience, it is also present for single polarization acquisitions representing the image channel with the same information in each of the three color channels. Thus resulting in a greyscale representation with an effective depth of 8 bit only.

A smaller browse color image bitmap (in TIFF format) with approx. 1000 pixels size derived from the composite quicklook is additionally contained for cataloguing purposes.

7.2.2 Map Plot

A coarse geographical map showing the footprint of the scene as a low resolution image.

8 Level 1b Product Annotation

Data types, valid entries and allowed attributes (e.g. units) are defined in detail for each element in the following description of the XSD schema files (the files themselves are also available to the user). Since XML is ASCII based and readable by common tools (e.g. a web browser or simple text editors) and not a binary format, the indicated data types (strings, integers, doubles, ...) for most of the annotation are the intrinsic default types. Some data types are restricted (e.g. in string length or in the validity range). The delivered *XML* files themselves do not contain information on these restrictions – they can only be derived from the *XSD* schema files which will be included in the delivered product packages.

The hierarchy level is as flat as possible to facilitate the interpretation of the product annotation. In the diagrams, blocks of annotation which are repeated a number of times (depending e.g. on the number of ScanSAR bursts or orbit state vectors), are underlaid with a second frame and the minimal and maximal occurrence (infinity for unbound elements) is listed. Optional elements (e.g. annotation for geo-coded products only) are indicated by dashed lines. Some items may contain different elements depending on the product variant (e.g. ScanSAR or Spotlight parameters). Those alternatives are denoted by the “choice” symbol. XML sample sequences resulting from the given schemes are then

```
<productInfo>
  <missionInfo>
    <mission>PAZ-1</mission>
    ...
  </missionInfo>
  <acquisitionInfo>
    ...
  </acquisitionInfo>
  ...
</productInfo>

<platform>
  <orbit>
    ...
    <stateVec num="95" qualInd="1" maneuver="NO">
      ...
    </stateVec>
    <stateVec ...>
      ...
    </stateVec>
    ...
  </orbit>
  ...
</platform>
```

8.1 Main Annotation Component

level1Product	
generalHeader	
general header of XML files	
productComponents	
annotation, imageData, auxRasterFiles, quicklooks, compositeQuicklook, browseImage, mapPlot	pointers to the listed product components.
productInfo	
generationInfo	key parameters of the product generation and delivery
missionInfo	mission and orbit parameters at start of scene
acquisitionInfo	SAR sensor configuration and instrument modes during acquisition
productVariantInfo	product type and variant description
imageDataInfo	image layer format
sceneInfo	time and scene location information
previewInfo	quicklook information
productSpecific	
complexImageInfo, projectedImageInfo, geocodedImageInfo	specific information for SSCs, detected and geocoded products (e.g. image frames and coordinates).
setup	
orderInfo, inputData, processingSteps	screening and processing chain setup and control parameters, input data and relevant software used.
processing	
signalDataAnalysis	datatake structure, cal- & noise pulse and raw data analysis and correction results
geometry	geometric parameters for focussing
doppler	Doppler centroid estimates and derived parameters
processingParameter	range and azimuth processing parameters
processingFlags	flags indicating which processing steps have been performed
instrument	
radarParameters, settings	sensor specific parameters at the time of the data acquisition
calibration	
calibrationData	input parameters used for calibration of this product
nominalGeometricPerformance	nominal performance parameters for this product variant
calibrationConstant	calibration factors to obtain calibrated data from the digital numbers of the image layers
noise	
polynomials characterizing the expected noise in each image layer	

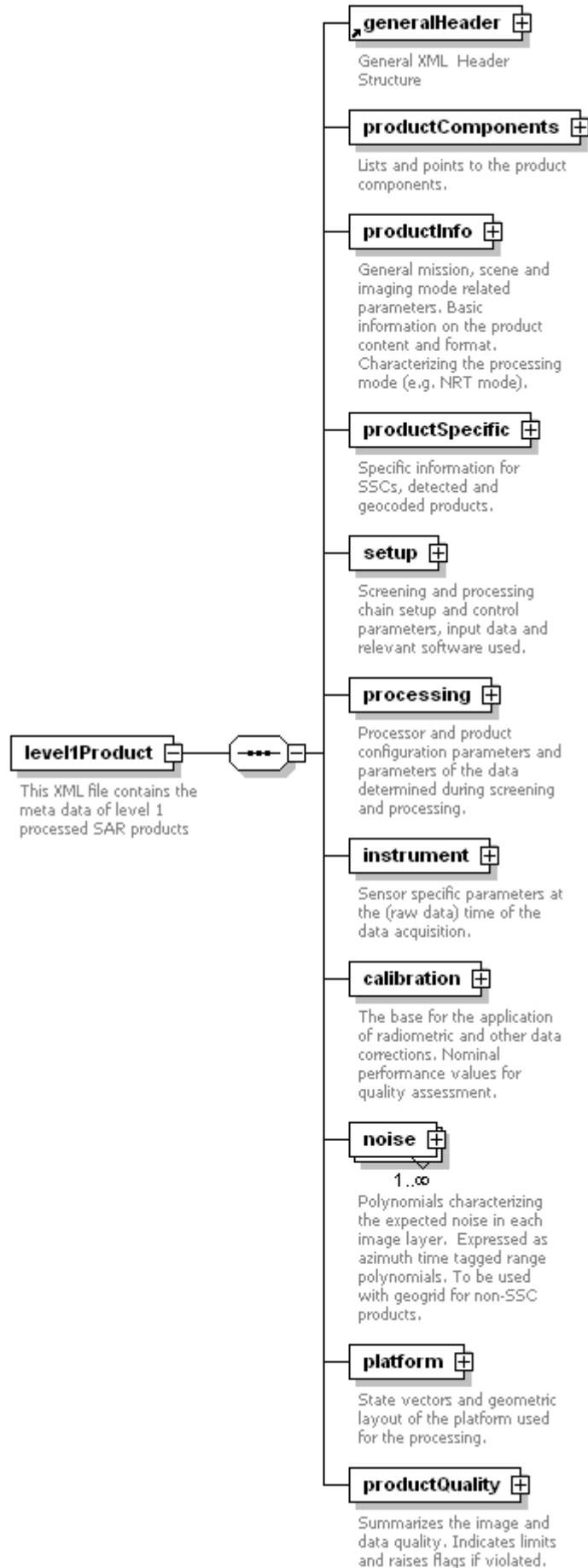
	platform	
	referenceData	geometric layout of the platform
	orbit	mainly relevant segment of the orbit file
	attitude	mainly relevant segment of the attitude file
	productQuality	
	rawDataQuality, auxDataQuality, processingParameterQuality, imageDataQuality, limits	summarize the image and data quality. Indicates limits and raises flags if violated.

Table 8-1: Overview of main segments and hierarchical structure of the main product annotation file

Schema **level1Product.xsd**

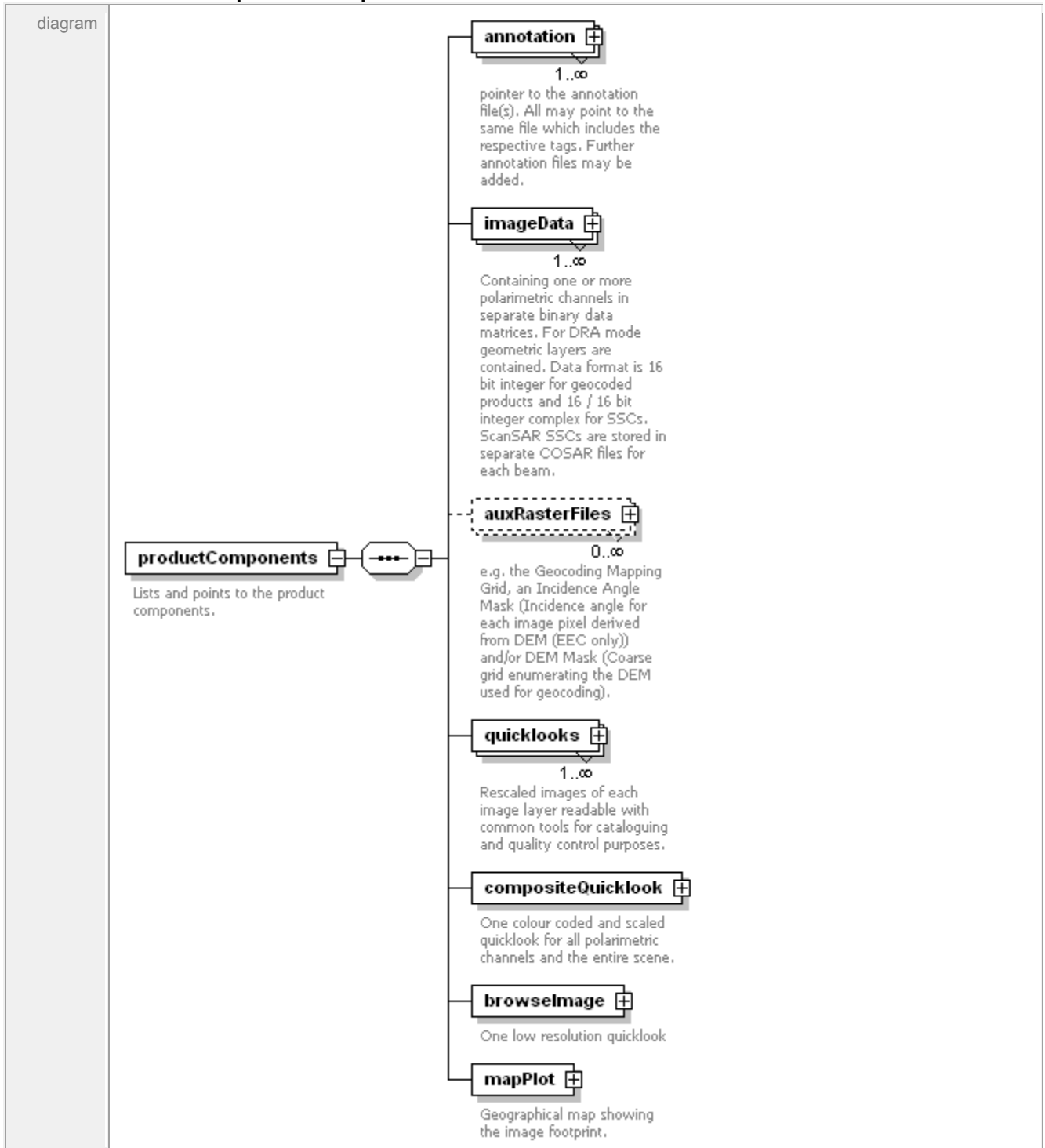
element **level1Product**

diagram



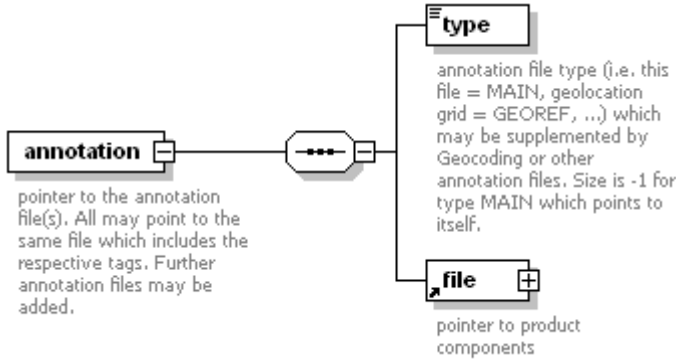
properties	con-com- tent plex
children	<u>generalHeader</u> <u>productComponents</u> <u>productInfo</u> <u>productSpecific</u> <u>setup</u> <u>processing</u> <u>instrument</u> <u>calibration</u> <u>noise</u> <u>platform</u> <u>productQuality</u>
annotation	documentati-This XML file contains the meta data of level 1 processed SAR prod- on ucts

element level1Product/productComponents

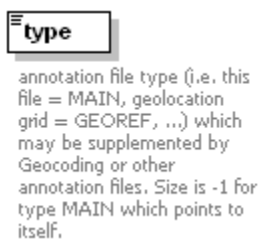


properties	isRef 0 con-com- tent plex
children	<u>annotation</u> <u>imageData</u> <u>auxRasterFiles</u> <u>quicklooks</u> <u>compositeQuicklook</u> <u>browseImage</u> <u>mapPlot</u>
annotation	documentati-Lists and points to the product compo- on nents.

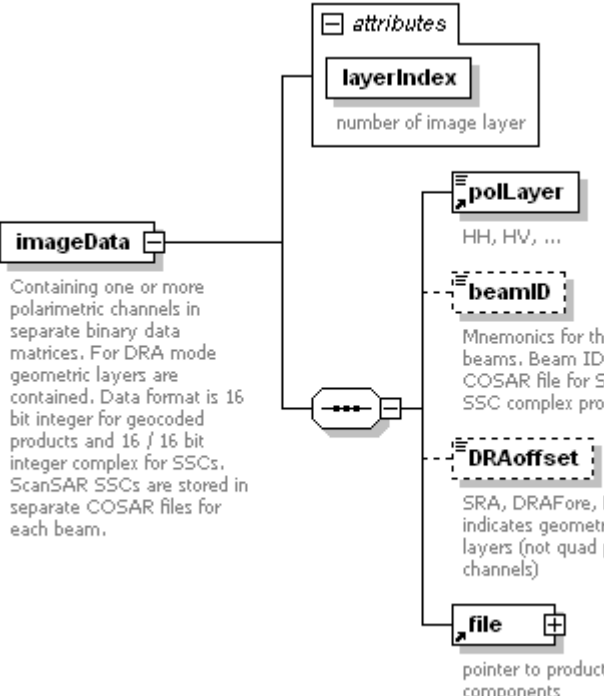
element level1Product/productComponents/annotation

diagram	
properties	isRef 0 con-com- tent plex
children	<u>type</u> <u>file</u>
annotation	documentati-pointer to the annotation file(s). All may point to the same file which includes the respective tags. Further on annotation files may be added.

element level1Product/productComponents/annotation/type

diagram	
type	restriction of <u>string255</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 255 enumerati-MAIN on enumerati-GEOREF on enumerati-GEOCODE on enumerati-OTHER on enumerati-UNDEFINE on D
annotation	documentati-annotation file type (i.e. this file = MAIN, geolocation grid = GEOREF, ...) which may be supplemented by on Geocoding or other annotation files. Size is -1 for type MAIN which points to itself.

element level1Product/productComponents/imageData

diagram						
properties	isRef 0 con-com- tent plex					
children	<u>pollLayer</u> <u>beamID</u> <u>DRAoffset</u> <u>file</u>					
attributes	Name layerIndex	Type xs:unsignedInt	Use required	Default	Fixed	Annotation documentati- on ber of image layer
annotation	documentati-Containing one or more polarimetric channels in separate binary data matrices. For DRA mode geometric on layers are contained. Data format is 16 bit integer for geocoded products and 16 / 16 bit integer complex for SSCs. ScanSAR SSCs are stored in separate COSAR files for each beam.					

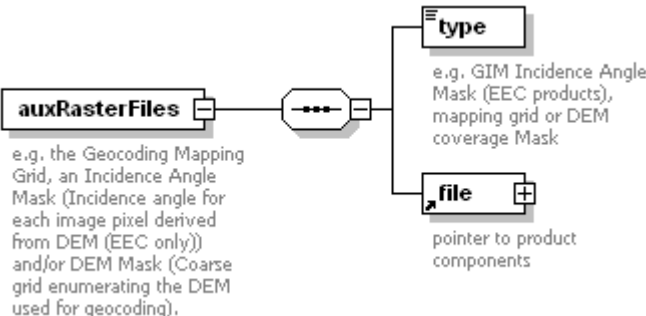
element level1Product/productComponents/imageData/beamID

diagram						
type	<u>string20</u>					
properties	isRef 0 con-simp- tent le					
facets	maxLength 20					
annotation	documentati-Mnemonics for the elevation beams. Beam IDs of each COSAR file for ScanSAR SSC complex product on only.					

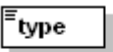
element level1Product/productComponents/imageData/DRAoffset

diagram	 SRA, DRAFore, DRAAft: indicates geometric (ATI) layers (not quad pol channels)
type	restriction of xs:NMTOKENS
properties	isRef 0 con-simp- tent le
facets	enumerati-SRA on enumerati-DRAFore on enumerati-DRAAft on
annotation	documentati-SRA, DRAFore, DRAAft: indicates geometric (ATI) layers (not quad pol chan- on nels)

element level1Product/productComponents/auxRasterFiles

diagram	 e.g. the Geocoding Mapping Grid, an Incidence Angle Mask (Incidence angle for each image pixel derived from DEM (EEC only)) and/or DEM Mask (Coarse grid enumerating the DEM used for geocoding). e.g. GIM Incidence Angle Mask (EEC products), mapping grid or DEM coverage Mask pointer to product components
properties	isRef 0 con-com- tent plex
children	type file
annotation	documentati-e.g. the Geocoding Mapping Grid, an Incidence Angle Mask (Incidence angle for each image pixel derived on from DEM (EEC only)) and/or DEM Mask (Coarse grid enumerating the DEM used for geocoding).

element level1Product/productComponents/auxRasterFiles/type

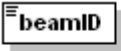
diagram	 e.g. GIM Incidence Angle Mask (EEC products), mapping grid or DEM coverage Mask
type	string255
properties	isRef 0 con-simp- tent le
facets	maxLength 255

annotation	documentati-e.g. GIM Incidence Angle Mask (EEC products), mapping grid or DEM coverage on Mask
------------	--

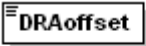
element **level1Product/productComponents/quicklooks**

diagram	quicklooks Rescaled images of each image layer readable with common tools for cataloguing and quality control purposes. attributes layerIndex polLayer HH, HV, ... beamID beam IDs of each COSAR file for ScanSAR SSC Complex Product only DRAoffset SRA, DRAFore, DRAAft indicates geometric (ATI) layers (not quad pol) file pointer to product components												
properties	isRef 0 con-com- tent plex												
children	<u>polLayer</u> <u>beamID</u> <u>DRAoffset</u> <u>file</u>												
attributes	<table><thead><tr><th>Name</th><th>Type</th><th>Use</th><th>Default</th><th>Fixed</th><th>Annotation</th></tr></thead><tbody><tr><td>layerIndex</td><td>xs:unsignedInt</td><td>required</td><td></td><td></td><td></td></tr></tbody></table>	Name	Type	Use	Default	Fixed	Annotation	layerIndex	xs:unsignedInt	required			
Name	Type	Use	Default	Fixed	Annotation								
layerIndex	xs:unsignedInt	required											
annotation	documentati-Rescaled images of each image layer readable with common tools for cataloguing and quality control pur- on poses.												

element **level1Product/productComponents/quicklooks/beamID**

diagram	 beam IDs of each COSAR file for ScanSAR SSC Complex Product only
type	<u>string20</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 20
annotation	documentati-beam IDs of each COSAR file for ScanSAR SSC Complex Product on only

element **level1Product/productComponents/quicklooks/DRAoffset**

diagram	 SRA, DRAFore, DRAAft indicates geometric (ATI) layers (not quad pol)
type	restriction of xs:NMTOKENS
properties	isRef 0 con-sim- tent le
facets	enumerati-SRA on enumerati-DRAFore on enumerati-DRAAft on
annotation	documentati-SRA, DRAFore, DRAAft indicates geometric (ATI) layers (not quad on pol)

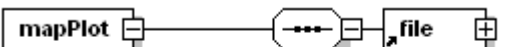
element level1Product/productComponents/compositeQuicklook

diagram	 One colour coded and scaled quicklook for all polarimetric channels and the entire scene. pointer to product components
properties	isRef 0 con-com- tent plex
children	<u>file</u>
annotation	documentati-One colour coded and scaled quicklook for all polarimetric channels and the entire sce- on ne.

element level1Product/productComponents/browseImage

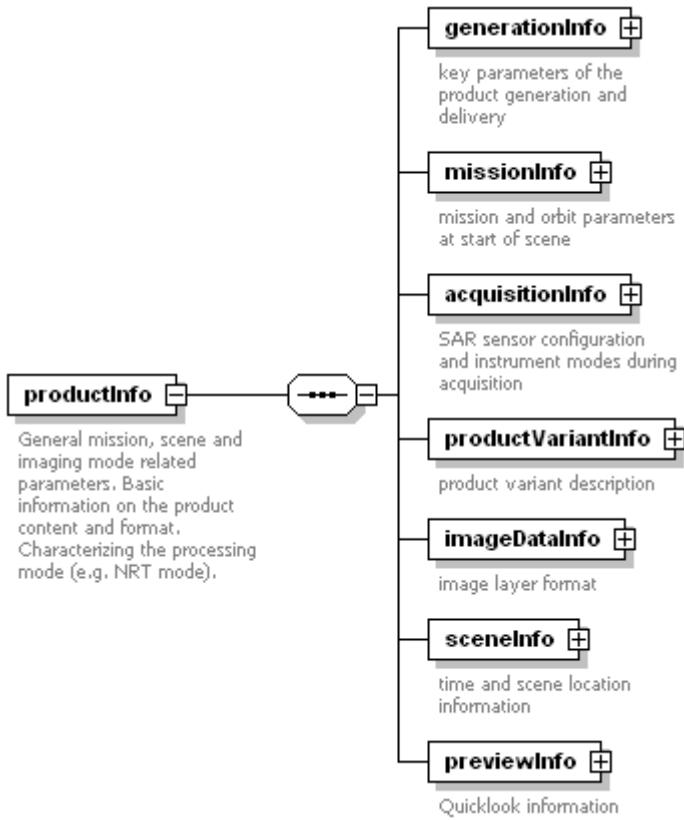
diagram	 One low resolution quicklook pointer to product components
properties	isRef 0 con-com- tent plex
children	<u>file</u>
annotation	documentati-One low resolution quick- on look

element level1Product/productComponents/mapPlot

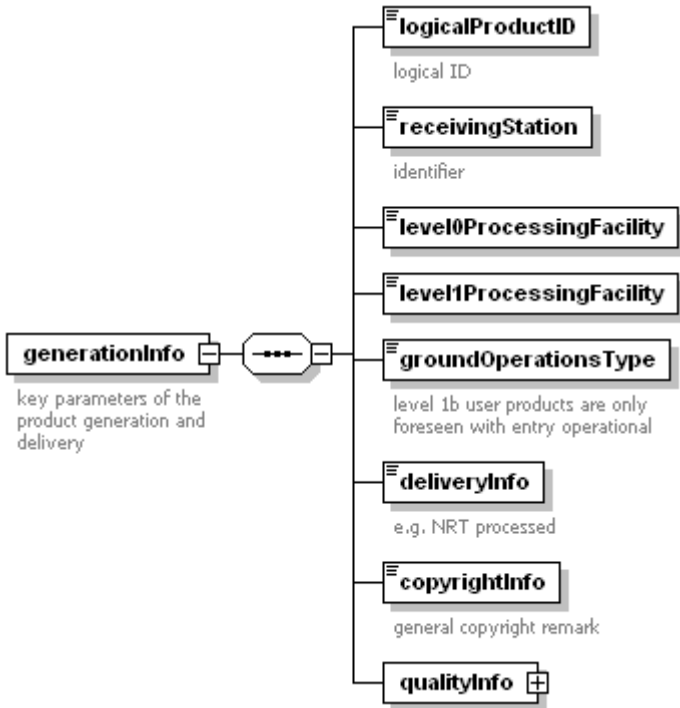
diagram	 Geographical map showing the image footprint. pointer to product components
properties	isRef 0 con-com- tent plex

children	<u>file</u>
annotation	documentati-Geographical map showing the image foot- on print.

element level1Product/productInfo

diagram	 <pre> classDiagram class productInfo { General mission, scene and imaging mode related parameters. Basic information on the product content and format. Characterizing the processing mode (e.g. NRT mode). } class generationInfo { key parameters of the product generation and delivery } class missionInfo { mission and orbit parameters at start of scene } class acquisitionInfo { SAR sensor configuration and instrument modes during acquisition } class productVariantInfo { product variant description } class imageDataInfo { image layer format } class sceneInfo { time and scene location information } class previewInfo { Quicklook information } productInfo "1" -- "7" composition composition -- generationInfo composition -- missionInfo composition -- acquisitionInfo composition -- productVariantInfo composition -- imageDataInfo composition -- sceneInfo composition -- previewInfo </pre>
properties	isRef 0 con-com- tent plex
children	<u>generationInfo</u> <u>missionInfo</u> <u>acquisitionInfo</u> <u>productVariantInfo</u> <u>imageDataInfo</u> <u>sceneInfo</u> <u>previewInfo</u>
annotation	documentati-General mission, scene and imaging mode related parameters. Basic information on the product content on and format. Characterizing the processing mode (e.g. NRT mode).

element level1Product/productInfo/generationInfo

diagram	 The diagram shows the generationInfo element (key parameters of the product generation and delivery) connected to a container (three dots) which then branches into seven sub-elements: logicalProductID (logical ID), receivingStation (identifier), level0ProcessingFacility, level1ProcessingFacility, groundOperationsType (level 1b user products are only foreseen with entry operational), deliveryInfo (e.g. NRT processed), copyrightInfo (general copyright remark), and qualityInfo (with a plus icon).
properties	isRef 0 con-com- tent plex
children	<u>logicalProductID</u> <u>receivingStation</u> <u>level0ProcessingFacility</u> <u>level1ProcessingFacility</u> <u>groundOperationsType</u> <u>deliveryInfo</u> <u>copyrightInfo</u> <u>qualityInfo</u>
annotation	documentati-key parameters of the product generation and deliv- on ery

element **level1Product/productInfo/generationInfo/logicalProductID**

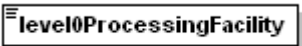
diagram	 The diagram shows the logicalProductID element (logical ID).
type	<u>string1024</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 1024
annotation	documentati-logical on ID

element **level1Product/productInfo/generationInfo/receivingStation**

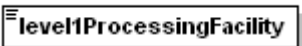
diagram	 The diagram shows the receivingStation element (identifier).
type	<u>string20</u>
properties	isRef 0 con-simp-

	tent le
facets	maxLength 20
annotation	documentati-identifi- on er

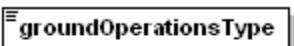
element **level1Product/productInfo/generationInfo/level0ProcessingFacility**

diagram	
type	<u>string20</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 20

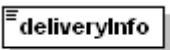
element **level1Product/productInfo/generationInfo/level1ProcessingFacility**

diagram	
type	<u>string20</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 20

element **level1Product/productInfo/generationInfo/groundOperationsType**

diagram	 level 1b user products are only foreseen with entry operational
type	restriction of xs:NMTOKENS
properties	isRef 0 con-simp- tent le
facets	enumerati-onal operational enumerati-onal preoperational enumerati-onal instrument enumerati-onal test enumerati-onal UNDEFINED
annotation	documentati-level 1b user products are only foreseen with entry operation- on al

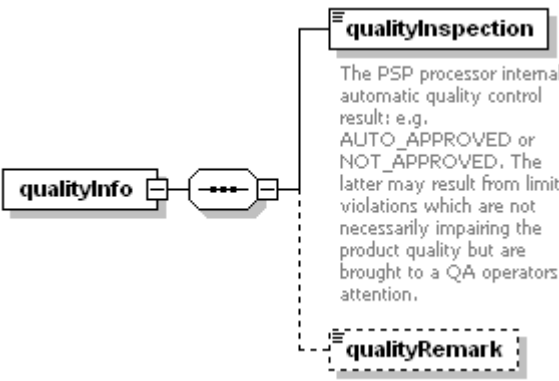
element **level1Product/productInfo/generationInfo/deliveryInfo**

diagram	 e.g. NRT processed
type	<u>string1024</u>
properties	isRef 0 con-sim- tent le
facets	maxLength 1024
annotation	documentati-e.g. NRT proces- on sed

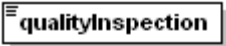
element level1Product/productInfo/generationInfo/copyrightInfo

diagram	 general copyright remark
type	<u>string1024</u>
properties	isRef 0 con-sim- tent le
facets	maxLength 1024
annotation	documentati-general copyright re- on mark

element level1Product/productInfo/generationInfo/qualityInfo

diagram	 The PSP processor internal automatic quality control result: e.g. AUTO_APPROVED or NOT_APPROVED. The latter may result from limit violations which are not necessarily impairing the product quality but are brought to a QA operators attention.
properties	isRef 0 con-com- tent plex
children	<u>qualityInspection</u> <u>qualityRemark</u>

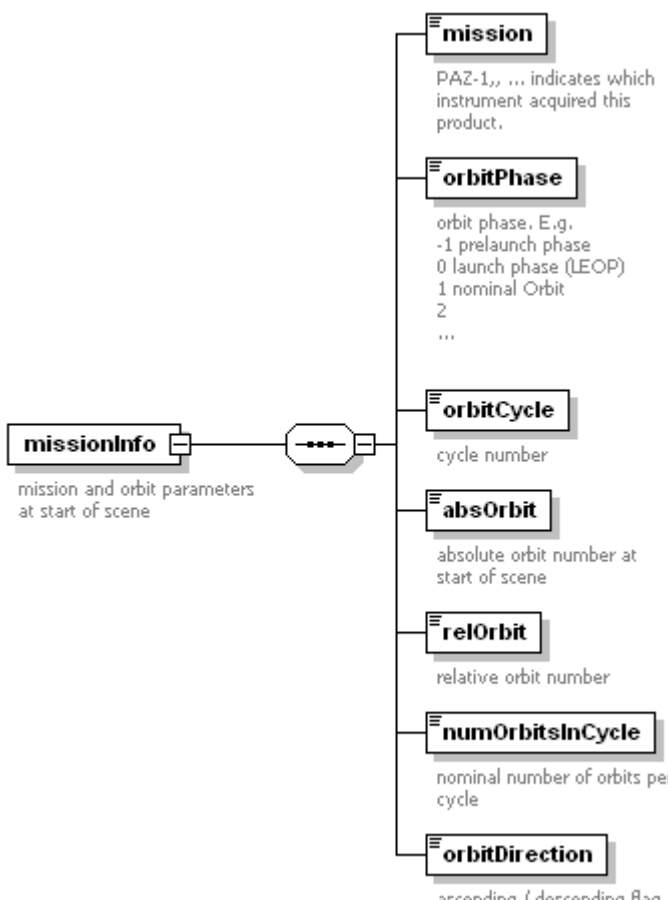
element level1Product/productInfo/generationInfo/qualityInfo/qualityInspection

diagram	 The PSP processor internal automatic quality control result: e.g. AUTO_APPROVED or NOT_APPROVED. The latter may result from limit violations which are not necessarily impairing the product quality but are brought to a QA operators attention.
type	restriction of <u>string255</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 255 enumerati-AUTO_APPROVED on enumerati-OPERATOR_APPROVE on D enumerati-NOT_APPROVED on enumerati-UNDEFINED on
annotation	documentati-The PSP processor internal automatic quality control result: e.g. AUTO_APPROVED or NOT_APPROVED. on The latter may result from limit violations which are not necessarily impairing the product quality but are brought to a QA operators attention.

element **level1Product/productInfo/generationInfo/qualityInfo/qualityRemark**

diagram	
type	<u>string1024</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 1024

element **level1Product/productInfo/missionInfo**

diagram	 <pre> classDiagram class missionInfo { mission and orbit parameters at start of scene } class mission { PAZ-1,, ... indicates which instrument acquired this product. } class orbitPhase { orbit phase. E.g. -1 prelaunch phase 0 launch phase (LEOP) 1 nominal Orbit 2 ... } class orbitCycle { cycle number } class absOrbit { absolute orbit number at start of scene } class relOrbit { relative orbit number } class numOrbitsInCycle { nominal number of orbits per cycle } class orbitDirection { ascending / descending flag } missionInfo --> mission missionInfo --> orbitPhase missionInfo --> orbitCycle missionInfo --> absOrbit missionInfo --> relOrbit missionInfo --> numOrbitsInCycle missionInfo --> orbitDirection </pre>
properties	isRef 0 con-com- tent plex
children	<u>mission</u> <u>orbitPhase</u> <u>orbitCycle</u> <u>absOrbit</u> <u>relOrbit</u> <u>numOrbitsInCycle</u> <u>orbitDirection</u>
annotation	documentati-mission and orbit parameters at start of on scene

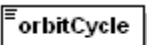
element **level1Product/productInfo/missionInfo/mission**

diagram	 <pre> classDiagram class mission { PAZ-1,, ... indicates which instrument acquired this product. } </pre>
type	<u>string20</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 20
annotation	documentati-PAZ-1,, ... indicates which instrument acquired this prod- on uct.

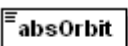
element **level1Product/productInfo/missionInfo/orbitPhase**

diagram	 orbit phase, E.g. -1 prelaunch phase 0 launch phase (LEOP) 1 nominal Orbit 2 ...
type	xs:int
properties	isRef 0 con-simp- tent le
annotation	documentati-orbit phase. E.g. on -1 prelaunch phase 0 launch phase (LEOP) 1 nominal Orbit 2 ...

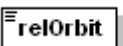
element **level1Product/productInfo/missionInfo/orbitCycle**

diagram	 cycle number
type	xs:int
properties	isRef 0 con-simp- tent le
annotation	documentati-cycle num- on ber

element **level1Product/productInfo/missionInfo/absOrbit**

diagram	 absolute orbit number at start of scene
type	restriction of xs:int
properties	isRef 0 con-simp- tent le
facets	minInclusi--1 ve
annotation	documentati-absolute orbit number at start of on scene

element **level1Product/productInfo/missionInfo/relOrbit**

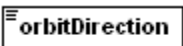
diagram	 relative orbit number
type	xs:int

properties	isRef 0 con-simp- tent le
annotation	documentati-relative orbit num- on ber

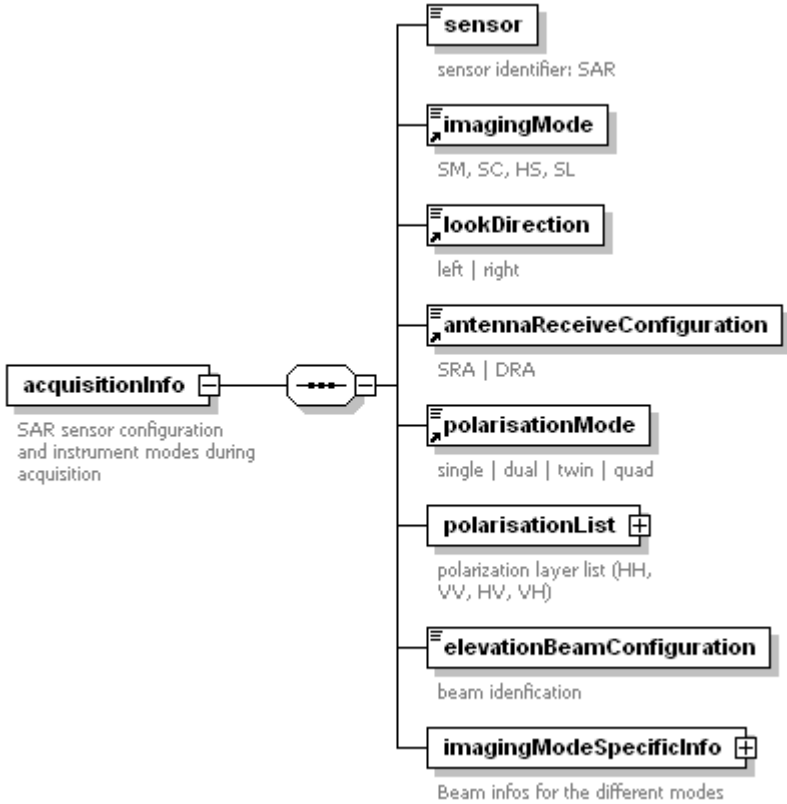
element level1Product/productInfo/missionInfo/numOrbitsInCycle

diagram	 nominal number of orbits per cycle
type	xs:int
properties	isRef 0 con-simp- tent le
annotation	documentati-nominal number of orbits per on cycle

element level1Product/productInfo/missionInfo/orbitDirection

diagram	 ascending / descending flag
type	restriction of xs:NMTOKENS
properties	isRef 0 con-simp- tent le
facets	enumerati-ASCENDING on enumerati-DESCENDIN on G enumerati-UNDEFINED on
annotation	documentati-ascending / descending on flag

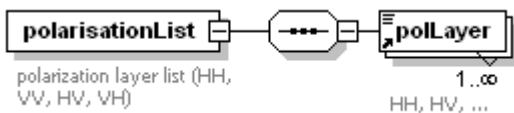
element level1Product/productInfo/acquisitionInfo

diagram	
properties	isRef 0 con-com- tent plex
children	<u>sensor</u> <u>imagingMode</u> <u>lookDirection</u> <u>antennaReceiveConfiguration</u> <u>polarisationMode</u> <u>polarisationList</u> <u>elevation- BeamConfiguration</u> <u>imagingModeSpecificInfo</u>
annotation	documentati-SAR sensor configuration and instrument modes during acquisi- on tion

element level1Product/productInfo/acquisitionInfo/sensor

diagram	
type	<u>string20</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 20
annotation	documentati-sensor identifier: on SAR

element level1Product/productInfo/acquisitionInfo/polarisationList

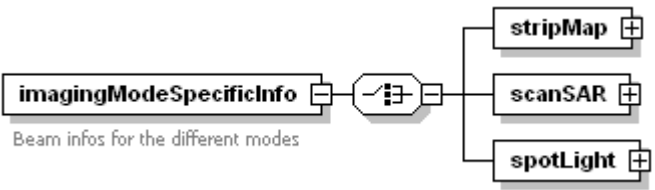
diagram	
---------	---

properties	isRef 0 con-com- tent plex
children	<u>polLayer</u>
annotation	documentati-polarization layer list (HH, VV, HV, on VH)

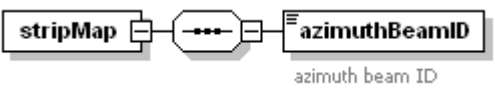
element level1Product/productInfo/acquisitionInfo/elevationBeamConfiguration

diagram	
type	<u>string20</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 20
annotation	documentati-beam identificati- on on

element level1Product/productInfo/acquisitionInfo/imagingModeSpecificInfo

diagram	
properties	isRef 0 con-com- tent plex
children	<u>stripMap</u> <u>scanSAR</u> <u>spotLight</u>
annotation	documentati-Beam infos for the different on modes

element level1Product/productInfo/acquisitionInfo/imagingModeSpecificInfo/stripMap

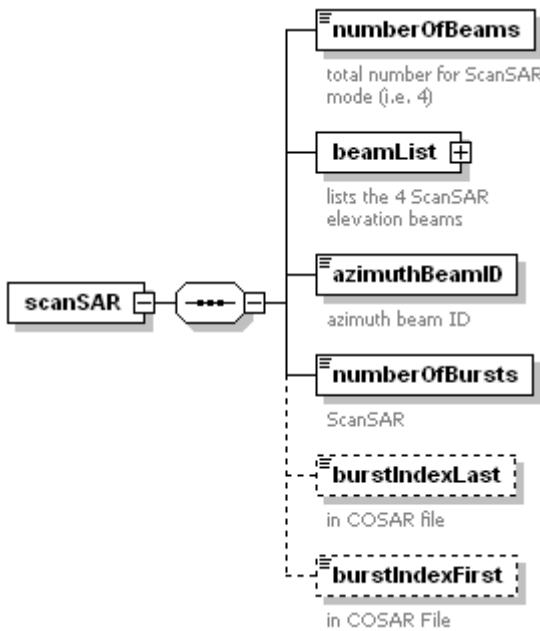
diagram	
properties	isRef 0 con-com- tent plex
children	<u>azimuthBeamID</u>

element level1Product/productInfo/acquisitionInfo/imagingModeSpecificInfo/stripMap/azimuthBeamID

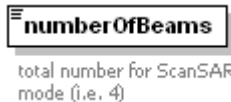
diagram	
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type	string20
properties	isRef 0 con-simp- tent le
facets	maxLength 20
annotation	documentati-azimuth beam on ID

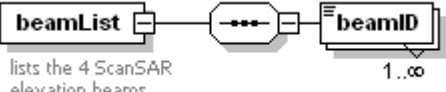
element **level1Product/productInfo/acquisitionInfo/imagingModeSpecificInfo/scanSAR**

diagram	 The diagram shows the structure of the scanSAR element. It is a container element (rectangle with a small square in the top-left corner) connected to a sequence container (oval with three dots). This sequence container is connected to a list of child elements: numberOfBeams (rectangle with a small square in the top-left corner), beamList (rectangle with a small square in the top-left corner and a plus sign in the top-right corner), azimuthBeamID (rectangle with a small square in the top-left corner), numberOfBursts (rectangle with a small square in the top-left corner), burstIndexLast (dashed rectangle with a small square in the top-left corner), and burstIndexFirst (dashed rectangle with a small square in the top-left corner). Descriptions for each element are provided: numberOfBeams is the total number for ScanSAR mode (i.e., 4); beamList lists the 4 ScanSAR elevation beams; azimuthBeamID is the azimuth beam ID; numberOfBursts is ScanSAR; burstIndexLast is in COSAR file; and burstIndexFirst is in COSAR File.
properties	isRef 0 con-com- tent plex
children	numberOfBeams beamList azimuthBeamID numberOfBursts burstIndexLast burstIndexFirst

element **lev-
el1Product/productInfo/acquisitionInfo/imagingModeSpecificInfo/scanSAR/numberOfBeams**

diagram	 The diagram shows the numberOfBeams element as a simple rectangle with a small square in the top-left corner. The description below it states: total number for ScanSAR mode (i.e., 4).
type	xs:int
properties	isRef 0 con-simp- tent le
annotation	documentati-total number for ScanSAR mode (i.e. on 4)

element **level1Product/productInfo/acquisitionInfo/imagingModeSpecificInfo/scanSAR/beamList**

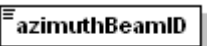
diagram	
properties	isRef 0 con-com- tent plex
children	<u>beamID</u>
annotation	documentati-lists the 4 ScanSAR elevation on beams

element lev-

el1Product/productInfo/acquisitionInfo/imagingModeSpecificInfo/scanSAR/beamList/beamID

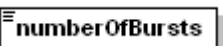
diagram	
type	<u>string20</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 20

element level1Product/productInfo/acquisitionInfo/imagingModeSpecificInfo/scanSAR/azimuthBeamID

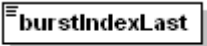
diagram	
type	<u>string20</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 20
annotation	documentati-azimuth beam on ID

element lev-

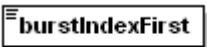
el1Product/productInfo/acquisitionInfo/imagingModeSpecificInfo/scanSAR/numberOfBursts

diagram	
type	xs:int
properties	isRef 0 con-simp- tent le
annotation	documentati-Scan- on SAR

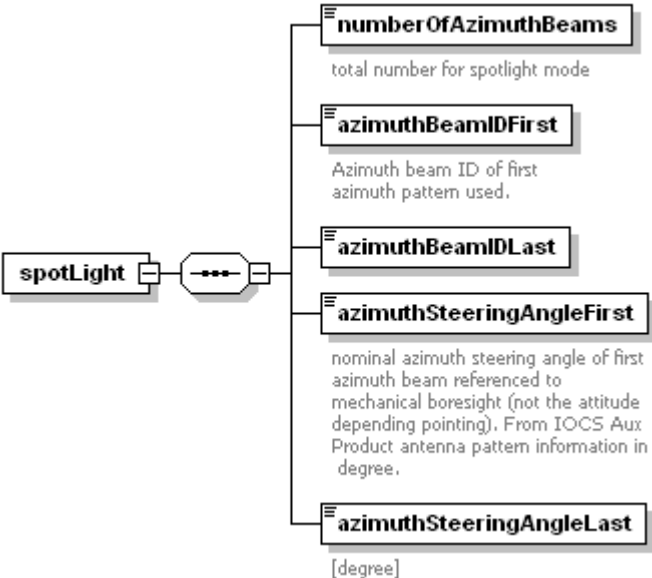
element level1Product/productInfo/acquisitionInfo/imagingModeSpecificInfo/scanSAR/burstIndexLast

diagram	 in COSAR file
type	xs:int
properties	isRef 0 con-sim- tent le
annotation	documentati-in COSAR on file

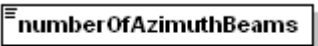
element **level1Product/productInfo/acquisitionInfo/imagingModeSpecificInfo/scanSAR/burstIndexFirst**

diagram	 in COSAR File
type	xs:int
properties	isRef 0 con-sim- tent le
annotation	documentati-in COSAR on File

element **level1Product/productInfo/acquisitionInfo/imagingModeSpecificInfo/spotLight**

diagram	 The diagram shows a 'spotLight' element connected to a container (rectangle with dashed line) which then branches into five sub-elements: 'numberOfAzimuthBeams', 'azimuthBeamIDFirst', 'azimuthBeamIDLast', 'azimuthSteeringAngleFirst', and 'azimuthSteeringAngleLast'. Each sub-element has a descriptive text below it.
properties	isRef 0 con-com- tent plex
children	<u>numberOfAzimuthBeams</u> <u>azimuthBeamIDFirst</u> <u>azimuthBeamIDLast</u> <u>azimuthSteeringAngleFirst</u> <u>azimuthSteeringAngleLast</u>

element **lev-**
el1Product/productInfo/acquisitionInfo/imagingModeSpecificInfo/spotLight/numberOfAzimuthBeams

diagram	 total number for spotlight mode
type	xs:int
properties	isRef 0 con-simp- tent le
annotation	documentati-total number for spotlight on mode

element lev-

el1Product/productInfo/acquisitionInfo/imagingModeSpecificInfo/spotLight/azimuthBeamIDFirst

diagram	 Azimuth beam ID of first azimuth pattern used.
type	<u>string20</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 20
annotation	documentati-Azimuth beam ID of first azimuth pattern on used.

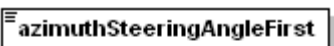
element lev-

el1Product/productInfo/acquisitionInfo/imagingModeSpecificInfo/spotLight/azimuthBeamIDLast

diagram	 Azimuth beam ID of last azimuth pattern used.
type	<u>string20</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 20

element lev-

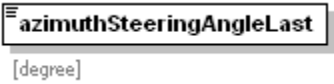
el1Product/productInfo/acquisitionInfo/imagingModeSpecificInfo/spotLight/azimuthSteeringAngleFirst

diagram	 nominal azimuth steering angle of first azimuth beam referenced to mechanical boresight (not the attitude depending pointing). From IOCS Aux Product antenna pattern information in degree.
type	xs:float
properties	isRef 0 con-simp- tent le

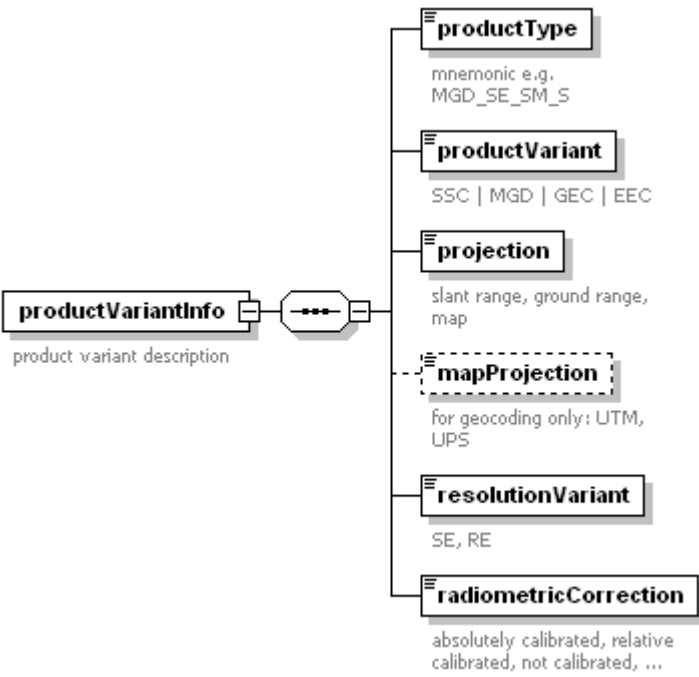
annotation	documentati-nominal azimuth steering angle of first azimuth beam referenced to mechanical boresight (not the attitude on depending pointing). From IOCS Aux Product antenna pattern information in degree.
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element lev-

el1Product/productInfo/acquisitionInfo/imagingModeSpecificInfo/spotLight/azimuthSteeringAngleLast

diagram	 <pre> graph LR azimuthSteeringAngleLast[azimuthSteeringAngleLast] azimuthSteeringAngleLast --- degree[degree] </pre>
type	xs:float
properties	isRef 0 con-simp- tent le
annotation	documentati-[degree] on

element level1Product/productInfo/productVariantInfo

diagram	 <pre> graph LR productVariantInfo[productVariantInfo] --- productType[productType] productVariantInfo --- productVariant[productVariant] productVariantInfo --- projection[projection] productVariantInfo --- mapProjection[mapProjection] productVariantInfo --- resolutionVariant[resolutionVariant] productVariantInfo --- radiometricCorrection[radiometricCorrection] </pre>
properties	isRef 0 con-com- tent plex
children	<u>productType</u> <u>productVariant</u> <u>projection</u> <u>mapProjection</u> <u>resolutionVariant</u> <u>radiometricCorrection</u>
annotation	documentati-product variant descripti- on on

element level1Product/productInfo/productVariantInfo/productType

diagram	 <pre> graph LR productType[productType] productType --- mnemonic[mnemonic e.g. MGD_SE_SM_S] </pre>
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type	string128
properties	isRef 0 con-simp- tent le
facets	maxLength 128
annotation	documentati-mnemonic e.g. on MGD_SE_SM_S

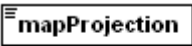
element level1Product/productInfo/productVariantInfo/productVariant

diagram	
type	restriction of xs:NMTOKENS
properties	isRef 0 con-simp- tent le
facets	enumerati-SSC on enumerati-MGD on enumerati-GEC on enumerati-EEC on enumerati-UNDEFINE on D
annotation	documentati-SSC MGD GEC on EEC

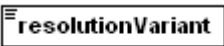
element level1Product/productInfo/productVariantInfo/projection

diagram	
type	restriction of xs:NMTOKENS
properties	isRef 0 con-simp- tent le
facets	enumerati-SLANTRANGE on enumerati-UNDEFINED on enumerati-GROUND RANGE on enumerati-MAP on
annotation	documentati-slant range, ground range, on map

element level1Product/productInfo/productVariantInfo/mapProjection

diagram	 for geocoding only: UTM, UPS
type	restriction of xs:NMTOKENS
properties	isRef 0 con-simp- tent le
facets	enumerati-UTM on enumerati-UPS on enumerati-UNDEFINE on D
annotation	documentati-for geocoding only: UTM, on UPS

element **level1Product/productInfo/productVariantInfo/resolutionVariant**

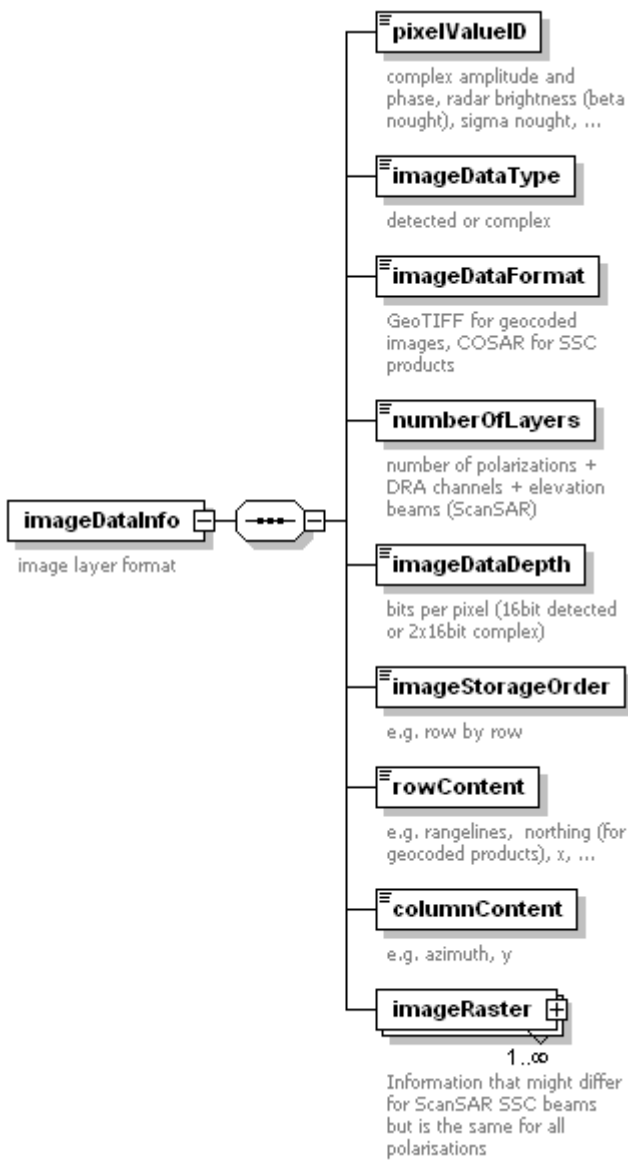
diagram	 SE, RE
type	restriction of xs:NMTOKENS
properties	isRef 0 con-simp- tent le
facets	enumerati-SE on enumerati-RE on enumerati-UNDEFINE on D
annotation	documentati-SE, on RE

element **level1Product/productInfo/productVariantInfo/radiometricCorrection**

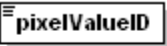
diagram	 absolutely calibrated, relative calibrated, not calibrated, ...
type	restriction of string128
properties	isRef 0 con-simp- tent le
facets	maxLength 128 enumerati-CALIBRATED on enumerati-NOTCALIBRATE on D enumerati-UNDEFINED on enumerati-RELCALIBRATED on
annotation	documentati-absolutely calibrated, relative calibrated, not calibrated,

on ...

element **level1Product/productInfo/imageDataInfo**

diagram	 imageDataInfo image layer format pixelValueID complex amplitude and phase, radar brightness (beta nought), sigma nought, ... imageDataType detected or complex imageDataFormat GeoTIFF for geocoded images, COSAR for SSC products numberOfLayers number of polarizations + DRA channels + elevation beams (ScanSAR) imageDataDepth bits per pixel (16bit detected or 2x16bit complex) imageStorageOrder e.g. row by row rowContent e.g. rangelines, northing (for geocoded products), x, ... columnContent e.g. azimuth, y imageRaster 1..∞ Information that might differ for ScanSAR SSC beams but is the same for all polarisations
properties	isRef 0 con-com- tent plex
children	<u>pixelValueID</u> <u>imageDataType</u> <u>imageDataFormat</u> <u>numberOfLayers</u> <u>imageDataDepth</u> <u>imageStorageOrder</u> <u>rowContent</u> <u>columnContent</u> <u>imageRaster</u>
annotation	documentati-image layer for- on mat

element **level1Product/productInfo/imageDataInfo/pixelValueID**

diagram	 complex amplitude and phase, radar brightness (beta nought), sigma nought, ...
type	<u>string128</u>
properties	isRef 0 con-sim- tent le
facets	maxLength 128
annotation	documentati-complex amplitude and phase, radar brightness (beta nought), sigma nought, on ...

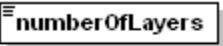
element level1Product/productInfo/imageDataInfo/imageDataType

diagram	 detected or complex
type	restriction of xs:NMTOKENS
properties	isRef 0 con-sim- tent le
facets	enumerati-COMPLEX on enumerati-DETECTE on D
annotation	documentati-detected or com- on plex

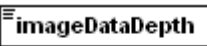
element level1Product/productInfo/imageDataInfo/imageDataFormat

diagram	 GeoTIFF for geocoded images, COSAR for SSC products
type	restriction of <u>string255</u>
properties	isRef 0 con-sim- tent le
facets	maxLength 255 enumerati-GEOTIFF on enumerati-COSAR on enumerati-UNDEFINE on D
annotation	documentati-GeoTIFF for geocoded images, COSAR for SSC prod- on ucts

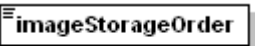
element level1Product/productInfo/imageDataInfo/numberOfLayers

diagram	 number of polarizations + DRA channels + elevation beams (ScanSAR)
type	xs:int
properties	isRef 0 con-simp- tent le
annotation	documentati-number of polarizations + DRA channels + elevation beams (Scan- on SAR)

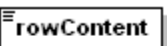
element level1Product/productInfo/imageDataInfo/imageDataDepth

diagram	 bits per pixel (16bit detected or 2x16bit complex)
type	xs:int
properties	isRef 0 con-simp- tent le
annotation	documentati-bits per pixel (16bit detected or 2x16bit com- on plex)

element level1Product/productInfo/imageDataInfo/imageStorageOrder

diagram	 e.g. row by row
type	restriction of xs:NMTOKENS
properties	isRef 0 con-simp- tent le
facets	enumerati-ROWBYRO on W enumerati-COLBYCOL on enumerati-UNDEFINED on
annotation	documentati-e.g. row by row on

element level1Product/productInfo/imageDataInfo/rowContent

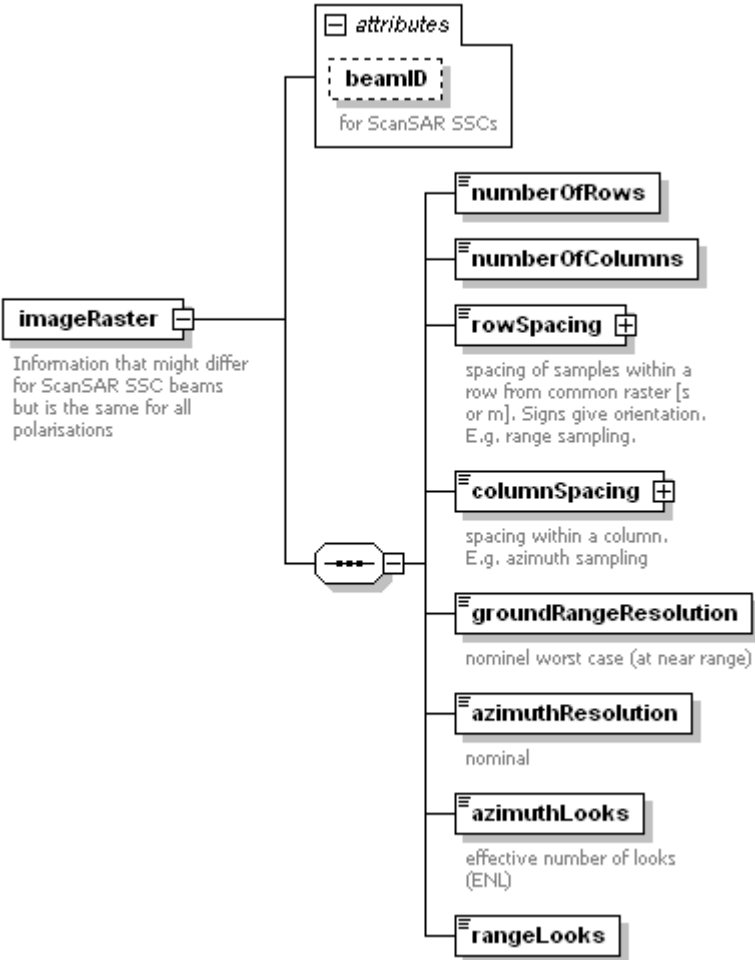
diagram	 e.g. rangelines, nothing (for geocoded products), x, ...
type	<u>string20</u>
properties	isRef 0 con-simp- tent le

facets	maxLength 20
annotation	documentati-e.g. rangelines, northing (for geocoded products), x, on ...

element level1Product/productInfo/imageDataInfo/columnContent

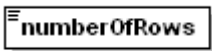
diagram	 e.g. azimuth, y
type	<u>string20</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 20
annotation	documentati-e.g. azimuth, on y

element level1Product/productInfo/imageDataInfo/imageRaster

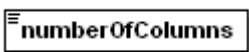
diagram	 imageRaster Information that might differ for ScanSAR SSC beams but is the same for all polarisations attributes beamID for ScanSAR SSCs numberOfRows numberOfColumns rowSpacing + spacing of samples within a row from common raster [s or m]. Signs give orientation. E.g. range sampling. columnSpacing + spacing within a column. E.g. azimuth sampling groundRangeResolution nominal worst case (at near range) azimuthResolution nominal azimuthLooks effective number of looks (ENL) rangeLooks
properties	isRef 0 con-com- tent plex

children	<u>numberOfRows</u> <u>numberOfColumns</u> <u>rowSpacing</u> <u>columnSpacing</u> <u>groundRangeResolution</u> <u>azimuthResolution</u> <u>azimuthLooks</u> <u>rangeLooks</u>					
attributes	Name beamID	Type <u>string20</u>	Use	Default	Fixed	Annotation documentati-for Scan- on Scan- SAR SSCs
annotation	documentati-Information that might differ for ScanSAR SSC beams but is the same for all polarisa- on tions					

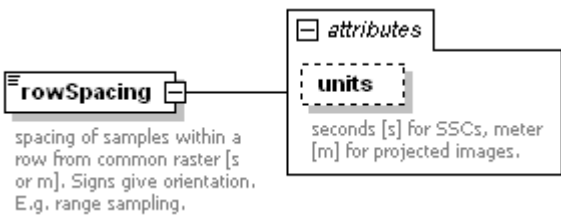
element **level1Product/productInfo/imageDataInfo/imageRaster/numberOfRows**

diagram	
type	xs:int
properties	isRef 0 con-simp- tent le

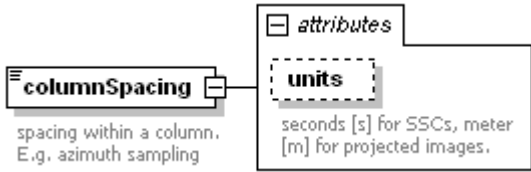
element **level1Product/productInfo/imageDataInfo/imageRaster/numberOfColumns**

diagram	
type	xs:int
properties	isRef 0 con-simp- tent le

element **level1Product/productInfo/imageDataInfo/imageRaster/rowSpacing**

diagram	 spacing of samples within a row from common raster [s or m]. Signs give orientation. E.g. range sampling. seconds [s] for SSCs, meter [m] for projected images.					
type	extension of xs:float					
properties	isRef 0 con-com- tent plex					
attributes	Name units	Type	Use	Default	Fixed	Annotation documentati-seconds on [s] for SSCs, meter [m] for projected images.
annotation	documentati-spacing of samples within a row from common raster [s or m]. Signs give orientation. E.g. range sam- on pling.					

element **level1Product/productInfo/imageDataInfo/imageRaster/columnSpacing**

diagram						
type	extension of xs:float					
properties	isRef 0 con-com- tent plex					
attributes	Name	Type	Use	Default	Fixed	Annotation
	units					documentati-seconds on [s] for SSCs, meter [m] for projected images.
annotation	documentati-spacing within a column. E.g. azimuth sam- on pling					

element level1Product/productInfo/imageDataInfo/imageRaster/groundRangeResolution

diagram						
type	xs:double					
properties	isRef 0 con-simp- tent le					
annotation	documentati-nominal worst case (at near on range)					

element level1Product/productInfo/imageDataInfo/imageRaster/azimuthResolution

diagram						
type	xs:double					
properties	isRef 0 con-simp- tent le					
annotation	documentati-nomi- on nal					

element level1Product/productInfo/imageDataInfo/imageRaster/azimuthLooks

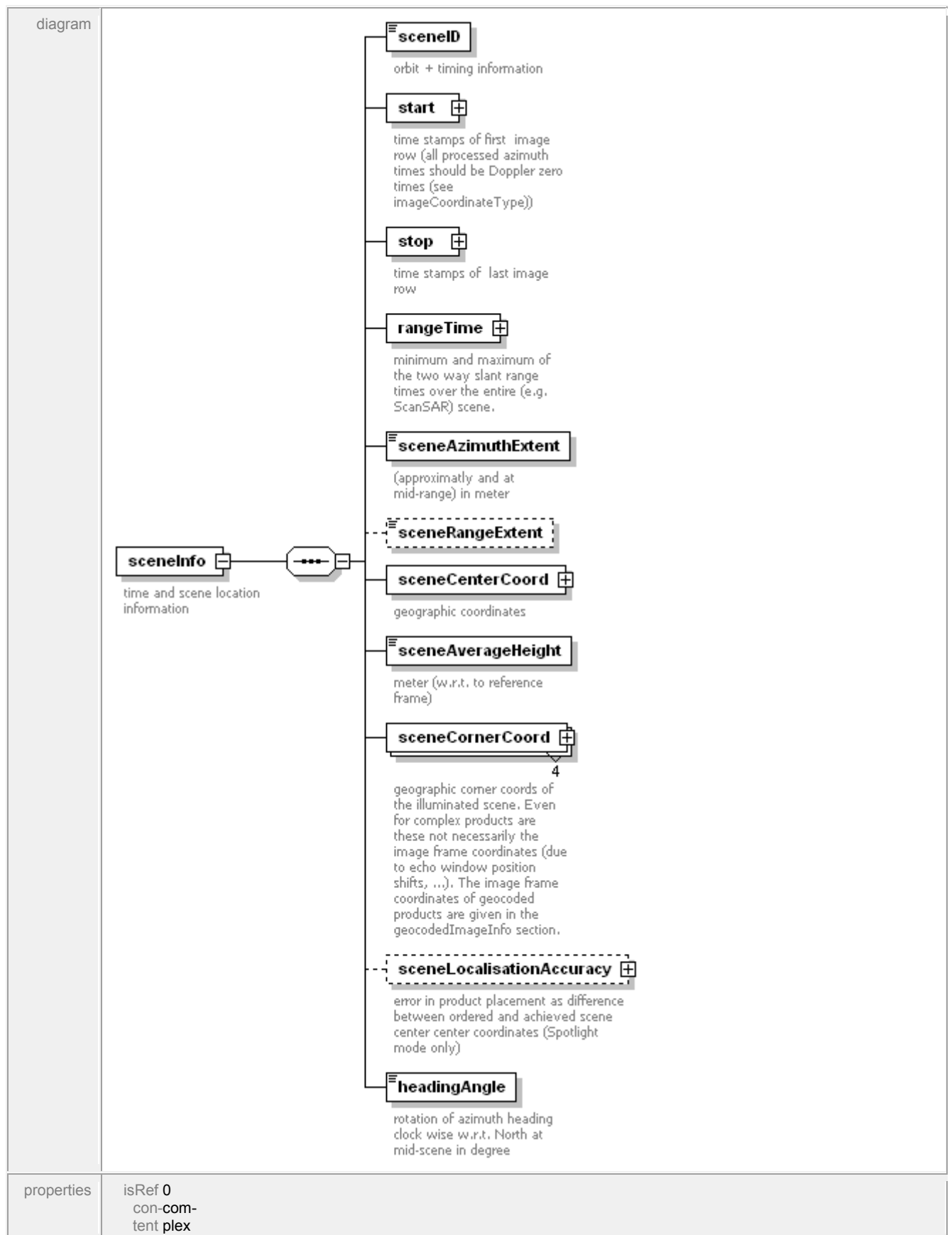
diagram						
type	xs:float					

properties	isRef 0 con-simp- tent le
annotation	documentati-effective number of looks on (ENL)

element **level1Product/productInfo/imageDataInfo/imageRaster/rangeLooks**

diagram	
type	xs:float
properties	isRef 0 con-simp- tent le

element **level1Product/productInfo/sceneInfo**

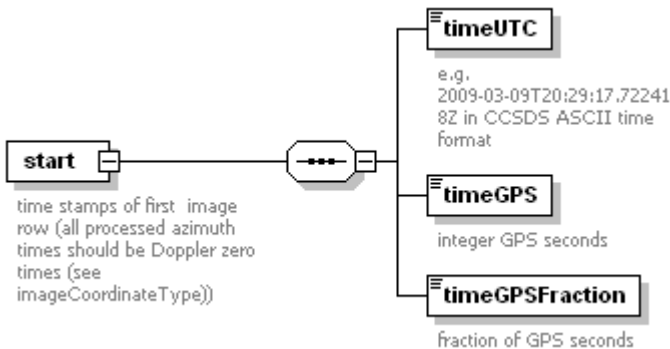


children	<u>sceneID</u> <u>start</u> <u>stop</u> <u>rangeTime</u> <u>sceneAzimuthExtent</u> <u>sceneRangeExtent</u> <u>sceneCenterCoord</u> <u>sceneAverageHeight</u> <u>sceneCornerCoord</u> <u>sceneLocalisationAccuracy</u> <u>headingAngle</u>
annotation	documentati-time and scene location infor- on mation

element **level1Product/productInfo/sceneInfo/sceneID**

diagram	
type	<u>string1024</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 1024
annotation	documentati-orbit + timing informati- on on

element **level1Product/productInfo/sceneInfo/start**

diagram	
properties	isRef 0 con-com- tent plex
children	<u>timeUTC</u> <u>timeGPS</u> <u>timeGPSFraction</u>
annotation	documentati-time stamps of first image row (all processed azimuth times should be Doppler zero times (see imageCo- on ordinateType))

element **level1Product/productInfo/sceneInfo/start/timeUTC**

diagram	
type	xs:dateTime
properties	isRef 0 con-simp- tent le
annotation	documentati-e.g. 2009-03-09T20:29:17.722418Z in CCSDS ASCII time for- on mat

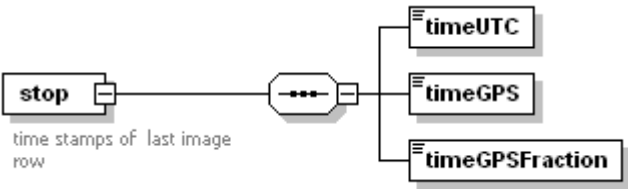
element level1Product/productInfo/sceneInfo/start/timeGPS

diagram	
type	xs:long
properties	isRef 0 con-simp- tent le
annotation	documentati-integer GPS se- on conds

element level1Product/productInfo/sceneInfo/start/timeGPSFraction

diagram	
type	xs:float
properties	isRef 0 con-simp- tent le
annotation	documentati-fraction of GPS se- on conds

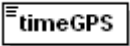
element level1Product/productInfo/sceneInfo/stop

diagram	
properties	isRef 0 con-com- tent plex
children	<u>timeUTC</u> <u>timeGPS</u> <u>timeGPSFraction</u>
annotation	documentati-time stamps of last image on row

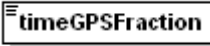
element level1Product/productInfo/sceneInfo/stop/timeUTC

diagram	
type	xs:dateTime
properties	isRef 0 con-simp- tent le

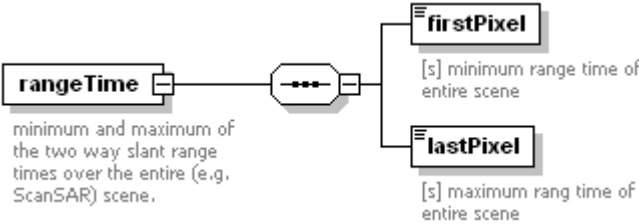
element level1Product/productInfo/sceneInfo/stop/timeGPS

diagram	
type	xs:long
properties	isRef 0 con-simp- tent le

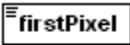
element **level1Product/productInfo/scenInfo/stop/timeGPSFraction**

diagram	
type	xs:float
properties	isRef 0 con-simp- tent le

element **level1Product/productInfo/scenInfo/rangeTime**

diagram	
properties	isRef 0 con-com- tent plex
children	<u>firstPixel</u> <u>lastPixel</u>
annotation	documentati-minimum and maximum of the two way slant range times over the entire (e.g. ScanSAR) sce- on ne.

element **level1Product/productInfo/scenInfo/rangeTime/firstPixel**

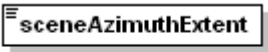
diagram	 [s] minimum range time of entire scene
type	xs:double
properties	isRef 0 con-simp- tent le
annotation	documentati-[s] minimum range time of entire on scene

element **level1Product/productInfo/scenInfo/rangeTime/lastPixel**

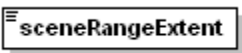
diagram	 [s] maximum rang time of entire scene
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type	xs:double
properties	isRef 0 con-simp- tent le
annotation	documentati-[s] maximum rang time of entire on scene

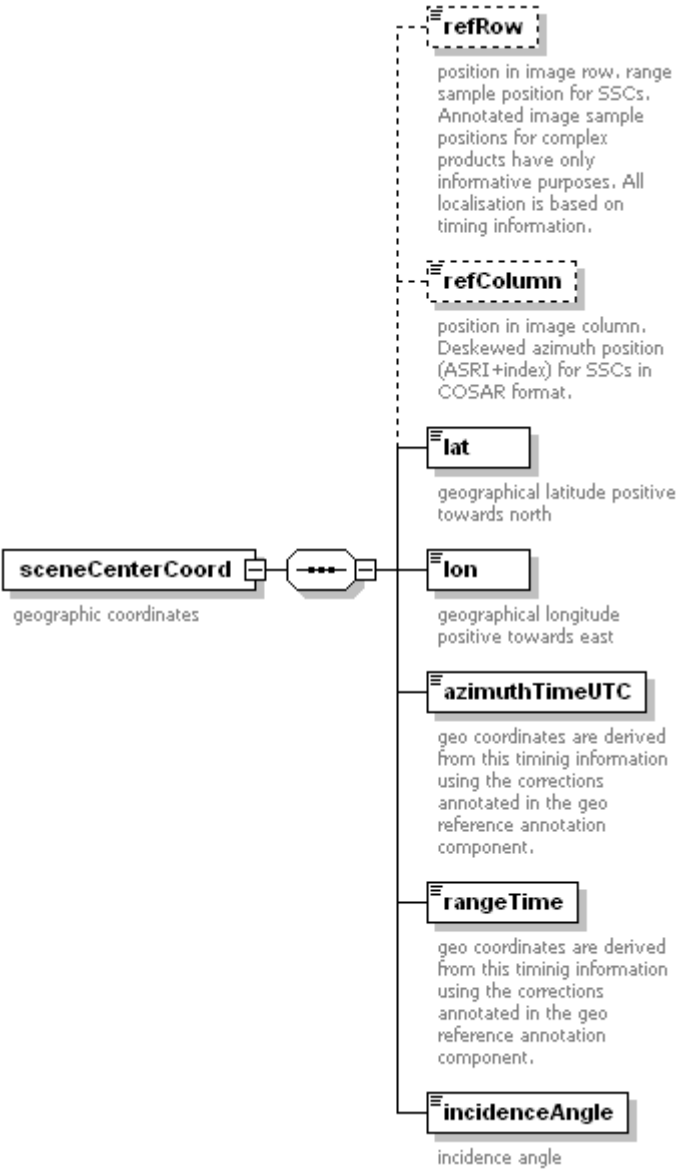
element **level1Product/productInfo/sceneInfo/sceneAzimuthExtent**

diagram	 (approximatly and at mid-range) in meter
type	xs:double
properties	isRef 0 con-simp- tent le
annotation	documentati-(approximatly and at mid-range) in on meter

element **level1Product/productInfo/sceneInfo/sceneRangeExtent**

diagram	
type	xs:double
properties	isRef 0 con-simp- tent le

element **level1Product/productInfo/sceneInfo/sceneCenterCoord**

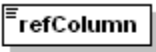
diagram	 The diagram shows a central box labeled sceneCenterCoord with the description "geographic coordinates". To its right is a vertical stack of boxes: lat (geographical latitude positive towards north), lon (geographical longitude positive towards east), azimuthTimeUTC (geo coordinates are derived from this timing information using the corrections annotated in the geo reference annotation component), rangeTime (geo coordinates are derived from this timing information using the corrections annotated in the geo reference annotation component), and incidenceAngle (incidence angle). A dashed line connects the sceneCenterCoord box to the refRow and refColumn boxes, which are positioned at the top of the diagram. refRow is described as "position in image row, range sample position for SSCs. Annotated image sample positions for complex products have only informative purposes. All localisation is based on timing information." refColumn is described as "position in image column. Deskewed azimuth position (ASRI+index) for SSCs in COSAR format."
properties	isRef 0 con- tent plex
children	<u>refRow</u> <u>refColumn</u> <u>lat</u> <u>lon</u> <u>azimuthTimeUTC</u> <u>rangeTime</u> <u>incidenceAngle</u>
annotation	documentati-geographic coordina- on tes

element level1Product/productInfo/scenelInfo/sceneCenterCoord/refRow

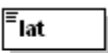
diagram	 The diagram shows a single box labeled refRow with the description "position in image row, range sample position for SSCs. Annotated image sample positions for complex products have only informative purposes. All localisation is based on timing information."
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type	xs:int
properties	isRef 0 con-simp- tent le
annotation	documentati-position in image row. range sample position for SSCs. Annotated image sample positions for complex on products have only informative purposes. All localisation is based on timing information.

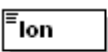
element level1Product/productInfo/sceneInfo/sceneCenterCoord/refColumn

diagram	 position in image column. Deskewed azimuth position (ASRI+index) for SSCs in COSAR format.
type	xs:int
properties	isRef 0 con-simp- tent le
annotation	documentati-position in image column. Deskewed azimuth position (ASRI+index) for SSCs in COSAR for- on mat.

element level1Product/productInfo/sceneInfo/sceneCenterCoord/lat

diagram	 geographical latitude positive towards north
type	<u>latitudeDegType</u>
properties	isRef 0 con-simp- tent le
facets	minInclusive -90 maxInclusi-90 ve
annotation	documentati-geographical latitude positive towards on north

element level1Product/productInfo/sceneInfo/sceneCenterCoord/lon

diagram	 geographical longitude positive towards east
type	<u>longitudeDegType</u>
properties	isRef 0 con-simp- tent le
facets	minInclusive -180 maxInclusi-180 ve
annotation	documentati-geographical longitude positive towards on east

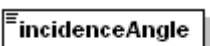
element level1Product/productInfo/sceneInfo/sceneCenterCoord/azimuthTimeUTC

diagram	 geo coordinates are derived from this timing information using the corrections annotated in the geo reference annotation component.
type	xs:dateTime
properties	isRef 0 con-sim- tent le
annotation	documentati-geo coordinates are derived from this timing information using the corrections annotated in the geo refer- on ence annotation component.

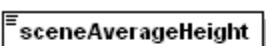
element level1Product/productInfo/sceneInfo/sceneCenterCoord/rangeTime

diagram	 geo coordinates are derived from this timing information using the corrections annotated in the geo reference annotation component.
type	xs:double
properties	isRef 0 con-sim- tent le
annotation	documentati-geo coordinates are derived from this timing information using the corrections annotated in the geo refer- on ence annotation component.

element level1Product/productInfo/sceneInfo/sceneCenterCoord/incidenceAngle

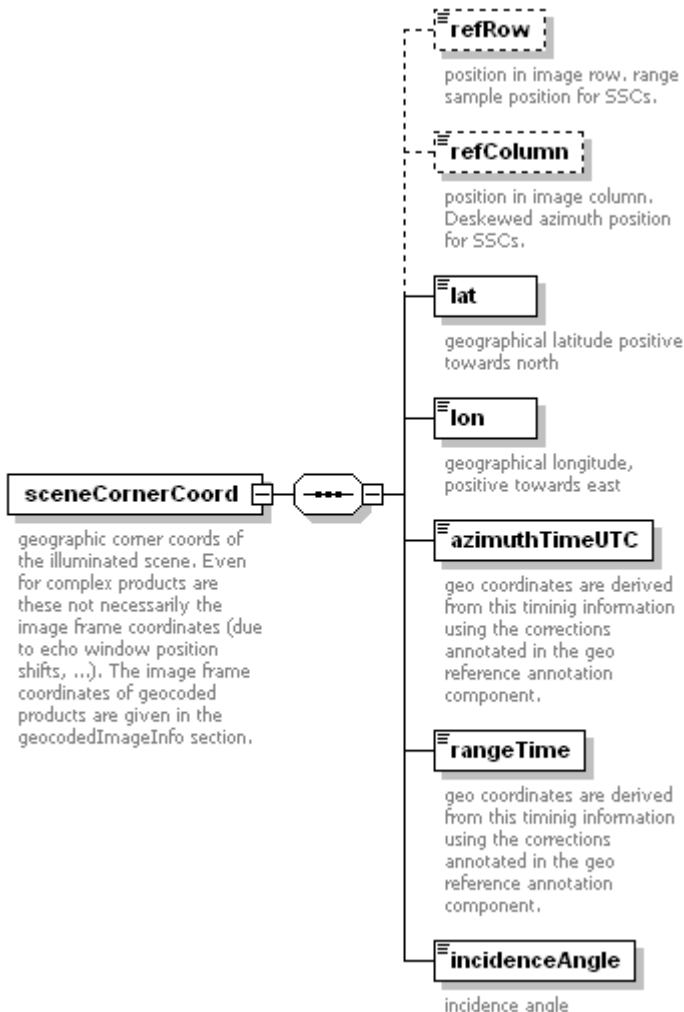
diagram	 incidence angle
type	xs:double
properties	isRef 0 con-sim- tent le
annotation	documentati-incidence on angle

element level1Product/productInfo/sceneInfo/sceneAverageHeight

diagram	 meter (w.r.t. to reference frame)
type	xs:double
properties	isRef 0

	con-simp- tent le
annotation	documentati-meter (w.r.t. to reference on frame)

element level1Product/productInfo/sceneInfo/sceneCornerCoord

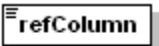
diagram	 sceneCornerCoord geographic corner coords of the illuminated scene. Even for complex products are these not necessarily the image frame coordinates (due to echo window position shifts, ...). The image frame coordinates of geocoded products are given in the geocodedImageInfo section. refRow position in image row, range sample position for SSCs. refColumn position in image column. Deskewed azimuth position for SSCs. lat geographical latitude positive towards north lon geographical longitude, positive towards east azimuthTimeUTC geo coordinates are derived from this timing information using the corrections annotated in the geo reference annotation component. rangeTime geo coordinates are derived from this timing information using the corrections annotated in the geo reference annotation component. incidenceAngle incidence angle
properties	isRef 0 con-com- tent plex
children	<u>refRow</u> <u>refColumn</u> <u>lat</u> <u>lon</u> <u>azimuthTimeUTC</u> <u>rangeTime</u> <u>incidenceAngle</u>
annotation	documentati-geographic corner coords of the illuminated scene. Even for complex products are these not necessarily the on image frame coordinates (due to echo window position shifts, ...). The image frame coordinates of geocoded products are given in the geocodedImageInfo section.

element level1Product/productInfo/sceneInfo/sceneCornerCoord/refRow

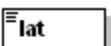
diagram	 refRow position in image row, range sample position for SSCs.
type	xs:int

properties	isRef 0 con-sim- tent le
annotation	documentati-position in image row. range sample position for on SSCs.

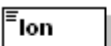
element **level1Product/productInfo/sceneInfo/sceneCornerCoord/refColumn**

diagram	 position in image column. Deskewed azimuth position for SSCs.
type	xs:int
properties	isRef 0 con-sim- tent le
annotation	documentati-position in image column. Deskewed azimuth position for on SSCs.

element **level1Product/productInfo/sceneInfo/sceneCornerCoord/lat**

diagram	 geographical latitude positive towards north
type	<u>latitudeDegType</u>
properties	isRef 0 con-sim- tent le
facets	minInclusive -90 maxInclusi-90 ve
annotation	documentati-geographical latitude positive towards on north

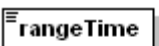
element **level1Product/productInfo/sceneInfo/sceneCornerCoord/lon**

diagram	 geographical longitude, positive towards east
type	<u>longitudeDegType</u>
properties	isRef 0 con-sim- tent le
facets	minInclusive -180 maxInclusi-180 ve
annotation	documentati-geographical longitude, positive towards on east

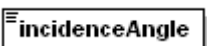
element **level1Product/productInfo/sceneInfo/sceneCornerCoord/azimuthTimeUTC**

diagram	 geo coordinates are derived from this timing information using the corrections annotated in the geo reference annotation component.
type	xs:dateTime
properties	isRef 0 con-sim- tent le
annotation	documentati-geo coordinates are derived from this timing information using the corrections annotated in the geo refer- on ence annotation component.

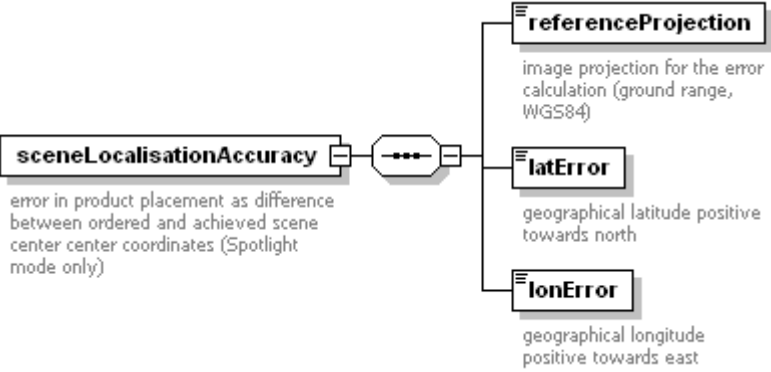
element **level1Product/productInfo/sceneInfo/sceneCornerCoord/rangeTime**

diagram	 geo coordinates are derived from this timing information using the corrections annotated in the geo reference annotation component.
type	xs:double
properties	isRef 0 con-sim- tent le
annotation	documentati-geo coordinates are derived from this timing information using the corrections annotated in the geo refer- on ence annotation component.

element **level1Product/productInfo/sceneInfo/sceneCornerCoord/incidenceAngle**

diagram	 incidence angle
type	xs:double
properties	isRef 0 con-sim- tent le
annotation	documentati-incidence on angle

element **level1Product/productInfo/sceneInfo/sceneLocalisationAccuracy**

diagram	 <pre> graph LR A[sceneLocalisationAccuracy] --- B(()) B --- C[referenceProjection] B --- D[latError] B --- E[lonError] </pre> sceneLocalisationAccuracy error in product placement as difference between ordered and achieved scene center center coordinates (Spotlight mode only) referenceProjection image projection for the error calculation (ground range, WGS84) latError geographical latitude positive towards north lonError geographical longitude positive towards east
properties	isRef 0 con-com- tent plex
children	<u>referenceProjection</u> <u>latError</u> <u>lonError</u>
annotation	documentati-error in product placement as difference between ordered and achieved scene center center coordinates on (Spotlight mode only)

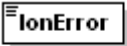
element level1Product/productInfo/sceneInfo/sceneLocalisationAccuracy/referenceProjection

diagram	 referenceProjection image projection for the error calculation (ground range, WGS84)
type	<u>string128</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 128
annotation	documentati-image projection for the error calculation (ground range, on WGS84)

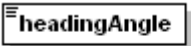
element level1Product/productInfo/sceneInfo/sceneLocalisationAccuracy/latError

diagram	 latError geographical latitude positive towards north
type	<u>latitudeDegType</u>
properties	isRef 0 con-simp- tent le
facets	minInclusive -90 maxInclusi-90 ve
annotation	documentati-geographical latitude positive towards on north

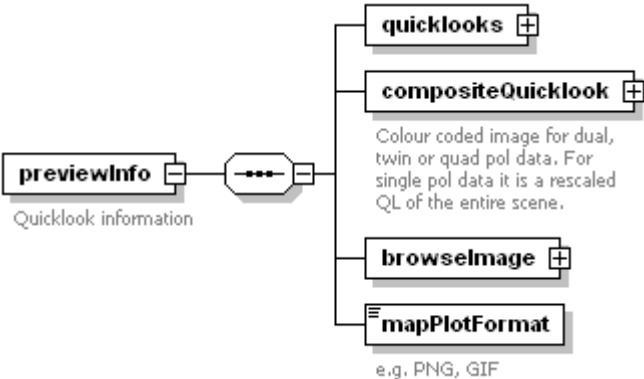
element level1Product/productInfo/sceneInfo/sceneLocalisationAccuracy/lonError

diagram	 geographical longitude positive towards east
type	<u>longitudeDegType</u>
properties	isRef 0 con-simp- tent le
facets	minInclusive -180 maxInclusi-180 ve
annotation	documentati-geographical longitude positive towards on east

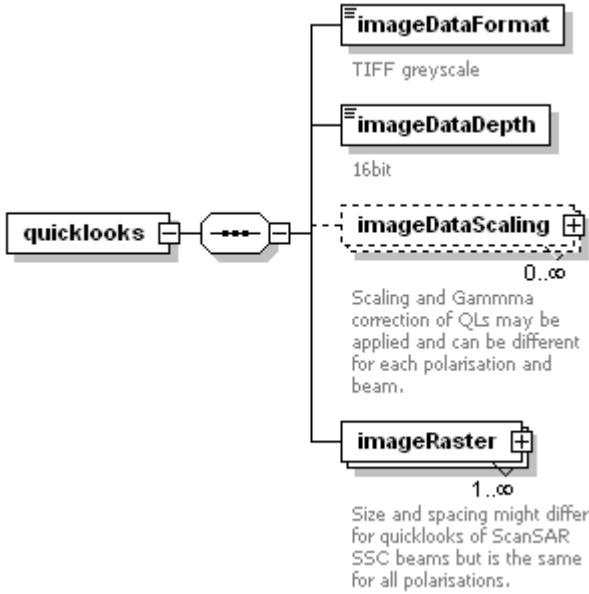
element **level1Product/productInfo/sceneInfo/headingAngle**

diagram	 rotation of azimuth heading clock wise w.r.t. North at mid-scene in degree
type	xs:float
properties	isRef 0 con-simp- tent le
annotation	documentati-rotation of azimuth heading clock wise w.r.t. North at mid-scene in de- on gree

element **level1Product/productInfo/previewInfo**

diagram	 Quicklook information Colour coded image for dual, twin or quad pol data. For single pol data it is a rescaled QL of the entire scene. e.g. PNG, GIF
properties	isRef 0 con-com- tent plex
children	<u>quicklooks</u> <u>compositeQuicklook</u> <u>browseImage</u> <u>mapPlotFormat</u>
annotation	documentati-Quicklook informati- on on

element **level1Product/productInfo/previewInfo/quicklooks**

diagram	
properties	isRef 0 con-com- tent plex
children	<u>imageDataFormat</u> <u>imageDataDepth</u> <u>imageDataScaling</u> <u>imageRaster</u>

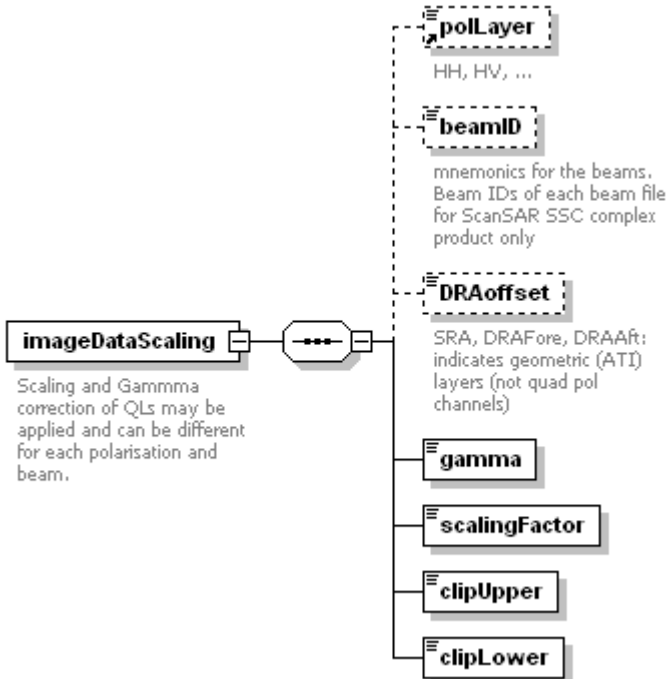
element level1Product/productInfo/previewInfo/quicklooks/imageDataFormat

diagram	 TIFF greyscale
type	<u>string255</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 255
annotation	documentati-TIFF greysca- on le

element level1Product/productInfo/previewInfo/quicklooks/imageDataDepth

diagram	 16bit
type	xs:int
properties	isRef 0 con-simp- tent le
annotation	documentati-16bit on

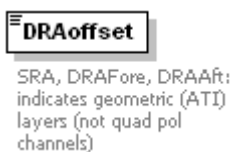
element level1Product/productInfo/previewInfo/quicklooks/imageDataScaling

diagram	 imageDataScaling Scaling and Gamma correction of QLs may be applied and can be different for each polarisation and beam. polLayer HH, HV, ... beamID mnemonics for the beams. Beam IDs of each beam file for ScanSAR SSC complex product only DRAoffset SRA, DRAFore, DRAAft: indicates geometric (ATI) layers (not quad pol channels) gamma scalingFactor clipUpper clipLower
properties	isRef 0 con-com- tent plex
children	<u>polLayer</u> <u>beamID</u> <u>DRAoffset</u> <u>gamma</u> <u>scalingFactor</u> <u>clipUpper</u> <u>clipLower</u>
annotation	documentati-Scaling and Gamma correction of QLs may be applied and can be different for each polarisation and on beam.

element **level1Product/productInfo/previewInfo/quicklooks/imageDataScaling/beamID**

diagram	 beamID mnemonics for the beams. Beam IDs of each beam file for ScanSAR SSC complex product only
type	<u>string20</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 20
annotation	documentati-mnemonics for the beams. Beam IDs of each beam file for ScanSAR SSC complex product on only

element **level1Product/productInfo/previewInfo/quicklooks/imageDataScaling/DRAoffset**

diagram	 DRAoffset SRA, DRAFore, DRAAft: indicates geometric (ATI) layers (not quad pol channels)
type	restriction of xs:NMTOKENS

properties	isRef 0 con-simp- tent le
facets	enumerati-SRA on enumerati-DRAFore on enumerati-DRAAft on
annotation	documentati-SRA, DRAFore, DRAAft: indicates geometric (ATI) layers (not quad pol chan- on nels)

element **level1Product/productInfo/previewInfo/quicklooks/imageDataScaling/gamma**

diagram	
type	xs:double
properties	isRef 0 con-simp- tent le

element **level1Product/productInfo/previewInfo/quicklooks/imageDataScaling/scalingFactor**

diagram	
type	xs:double
properties	isRef 0 con-simp- tent le

element **level1Product/productInfo/previewInfo/quicklooks/imageDataScaling/clipUpper**

diagram	
type	xs:double
properties	isRef 0 con-simp- tent le

element **level1Product/productInfo/previewInfo/quicklooks/imageDataScaling/clipLower**

diagram	
type	xs:double
properties	isRef 0 con-simp- tent le

element **level1Product/productInfo/previewInfo/quicklooks/imageRaster**

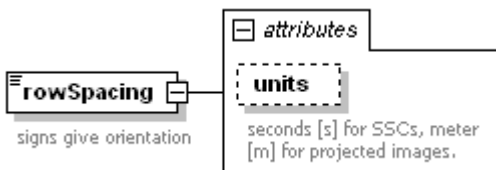
element level1Product/productInfo/previewInfo/quicklooks/imageRaster/columnBlockLength

diagram	 resampling factor (in pixel)
type	xs:float
properties	isRef 0 con-simp- tent le
annotation	documentati-resampling factor (in on pixel)

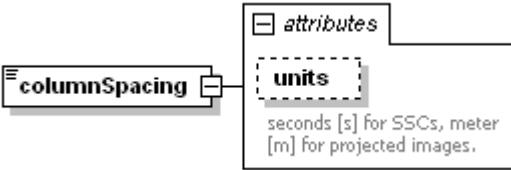
element level1Product/productInfo/previewInfo/quicklooks/imageRaster/rowBlockLength

diagram	
type	xs:float
properties	isRef 0 con-simp- tent le

element level1Product/productInfo/previewInfo/quicklooks/imageRaster/rowSpacing

diagram	 signs give orientation seconds [s] for SSCs, meter [m] for projected images.												
type	extension of xs:float												
properties	isRef 0 con-com- tent plex												
attributes	<table><tr><th>Name</th><th>Type</th><th>Use</th><th>Default</th><th>Fixed</th><th>Annotation</th></tr><tr><td>units</td><td></td><td></td><td></td><td></td><td>documentati-seconds on [s] for SSCs, meter [m] for projected images.</td></tr></table>	Name	Type	Use	Default	Fixed	Annotation	units					documentati-seconds on [s] for SSCs, meter [m] for projected images.
Name	Type	Use	Default	Fixed	Annotation								
units					documentati-seconds on [s] for SSCs, meter [m] for projected images.								
annotation	documentati-signs give orientati- on on												

element level1Product/productInfo/previewInfo/quicklooks/imageRaster/columnSpacing

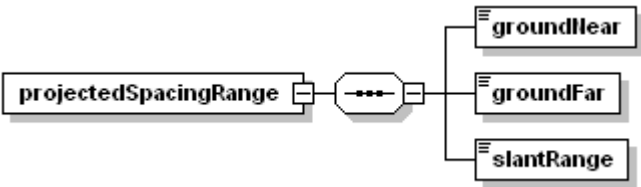
diagram	 seconds [s] for SSCs, meter [m] for projected images.
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type	extension of xs:float					
properties	isRef 0 con-com- tent plex					
attributes	Name units	Type	Use	Default	Fixed	Annotation documentati-seconds on [s] for SSCs, meter [m] for projected images.

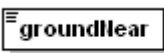
element **level1Product/productInfo/previewInfo/quicklooks/imageRaster/projectedSpacingAzimuth**

diagram						
type	xs:float					
properties	isRef 0 con-simp- tent le					
annotation	documentati-nominal projected pixel spacing on ground [m] for on SSCs					

element **level1Product/productInfo/previewInfo/quicklooks/imageRaster/projectedSpacingRange**

diagram						
properties	isRef 0 con-com- tent plex					
children	<u>groundNear</u> <u>groundFar</u> <u>slantRange</u>					

element **level1Product/productInfo/previewInfo/quicklooks/imageRaster/projectedSpacingRange/groundNear**

diagram						
type	xs:float					
properties	isRef 0 con-simp- tent le					

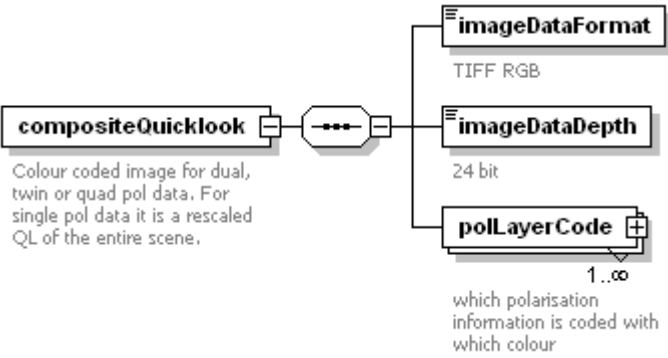
element **level1Product/productInfo/previewInfo/quicklooks/imageRaster/projectedSpacingRange/groundFar**

diagram	
type	xs:float
properties	isRef 0 con-simp- tent le

element **level1Product/productInfo/previewInfo/quicklooks/imageRaster/projectedSpacingRange/slantRange**

diagram	
type	xs:float
properties	isRef 0 con-simp- tent le

element **level1Product/productInfo/previewInfo/compositeQuicklook**

diagram	
properties	isRef 0 con-com- tent plex
children	<u>imageDataFormat</u> <u>imageDataDepth</u> <u>polLayerCode</u>
annotation	documentati-Colour coded image for dual, twin or quad pol data. For single pol data it is a rescaled QL of the entire on scene.

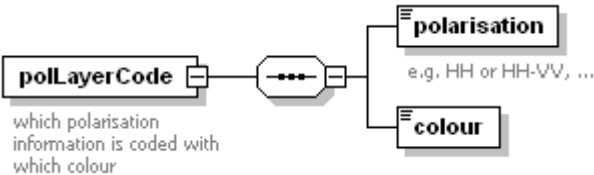
element **level1Product/productInfo/previewInfo/compositeQuicklook/imageDataFormat**

diagram	
type	<u>string255</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 255
annotation	documentati-TIFF on RGB

element **level1Product/productInfo/previewInfo/compositeQuicklook/imageDataDepth**

diagram	 24 bit
type	xs:int
properties	isRef 0 con-simp- tent le
annotation	documentati-24 on bit

element **level1Product/productInfo/previewInfo/compositeQuicklook/polLayerCode**

diagram	 which polarisation information is coded with which colour
properties	isRef 0 con-com- tent plex
children	polarisation colour
annotation	documentati-which polarisation information is coded with which on colour

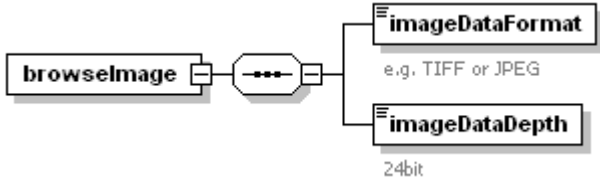
element **level1Product/productInfo/previewInfo/compositeQuicklook/polLayerCode/polarisation**

diagram	 e.g. HH or HH-VV, ...
type	<u>string80</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 80
annotation	documentati-e.g. HH or HH-VV, on ...

element **level1Product/productInfo/previewInfo/compositeQuicklook/polLayerCode/colour**

diagram	
type	<u>string20</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 20

element **level1Product/productInfo/previewInfo/browseImage**

diagram	
properties	isRef 0 con-com- tent plex
children	<u>imageDataFormat</u> <u>imageDataDepth</u>

element **level1Product/productInfo/previewInfo/browseImage/imageDataFormat**

diagram	
type	<u>string255</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 255
annotation	documentati-e.g. TIFF or on JPEG

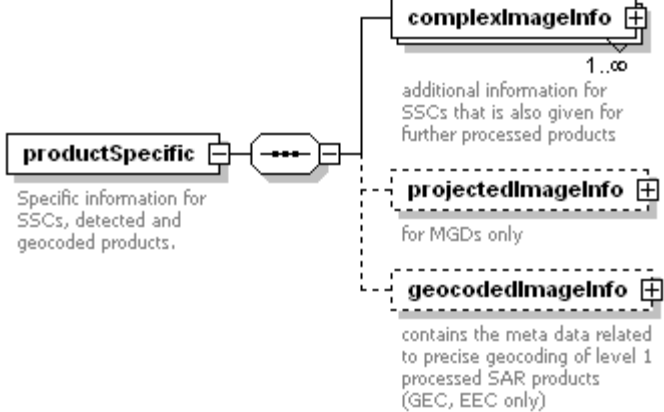
element **level1Product/productInfo/previewInfo/browseImage/imageDataDepth**

diagram	
type	xs:int
properties	isRef 0 con-simp- tent le
annotation	documentati-24bit on

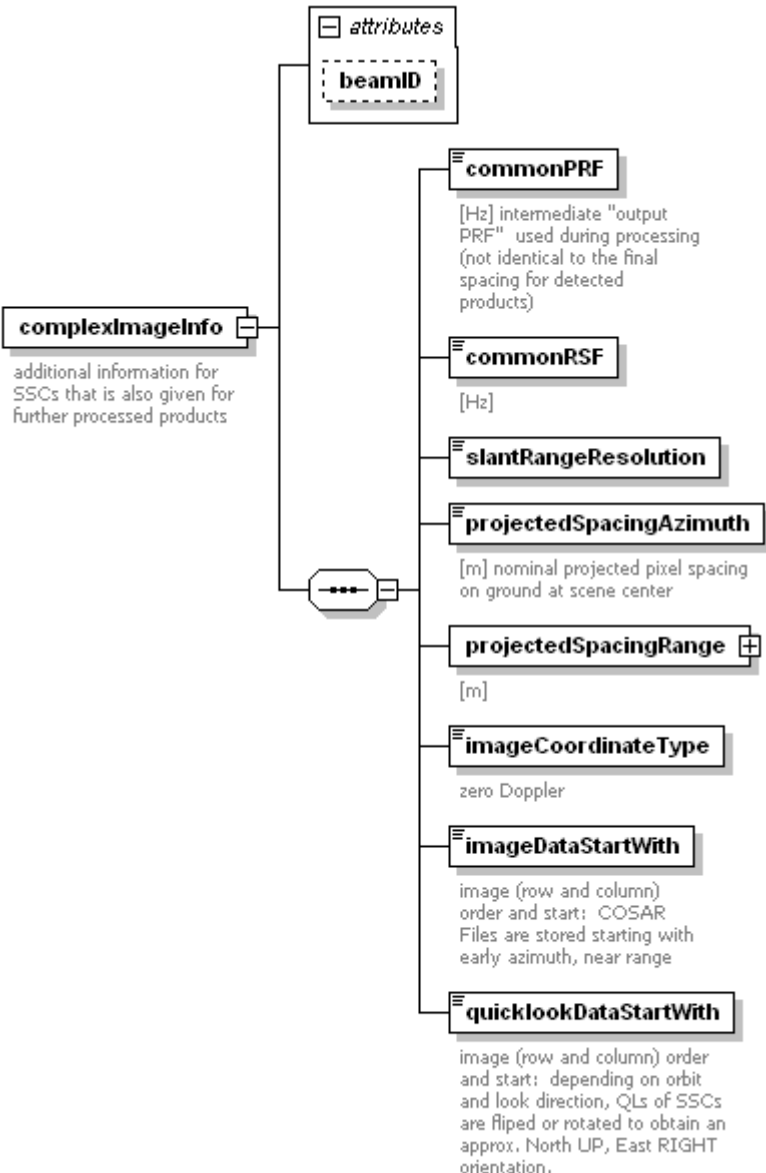
element **level1Product/productInfo/previewInfo/mapPlotFormat**

diagram	
type	<u>string255</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 255
annotation	documentati-e.g. PNG, on GIF

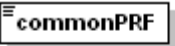
element **level1Product/productSpecific**

diagram	
properties	isRef 0 con- tent plex
children	<u>complexImageInfo</u> <u>projectedImageInfo</u> <u>geocodedImageInfo</u>
annotation	documentati-Specific information for SSCs, detected and geocoded prod- on ucts.

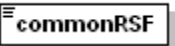
element **level1Product/productSpecific/complexImageInfo**

diagram	 complexImageInfo additional information for SSCs that is also given for further processed products attributes beamID commonPRF [Hz] intermediate "output PRF" used during processing (not identical to the final spacing for detected products) commonRSF [Hz] slantRangeResolution projectedSpacingAzimuth [m] nominal projected pixel spacing on ground at scene center projectedSpacingRange [m] imageCoordinateType zero Doppler imageDataStartWith image (row and column) order and start: COSAR Files are stored starting with early azimuth, near range quicklookDataStartWith image (row and column) order and start: depending on orbit and look direction, QLs of SSCs are flipped or rotated to obtain an approx. North UP, East RIGHT orientation.					
properties	isRef 0 con-com- tent plex					
children	<u>commonPRF</u> <u>commonRSF</u> <u>slantRangeResolution</u> <u>projectedSpacingAzimuth</u> <u>projectedSpacingRange</u> <u>imageCoordinateType</u> <u>imageDataStartWith</u> <u>quicklookDataStartWith</u>					
attributes	Name	Type	Use	Default	Fixed	Annotation
	beamID	<u>string20</u>				
annotation	documentati- on ucts					

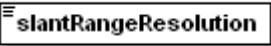
element **level1Product/productSpecific/complexImageInfo/commonPRF**

diagram	 [Hz] intermediate "output PRF" used during processing (not identical to the final spacing for detected products)
type	xs:double
properties	isRef 0 con-sim- tent le
annotation	documentati-[Hz] intermediate "output PRF" used during processing (not identical to the final spacing for detected prod- on ucts)

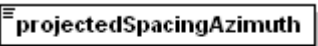
element level1Product/productSpecific/complexImageInfo/commonRSF

diagram	 [Hz]
type	xs:double
properties	isRef 0 con-sim- tent le
annotation	documentati-[Hz] on

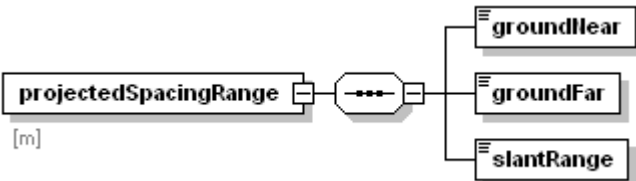
element level1Product/productSpecific/complexImageInfo/slantRangeResolution

diagram	
type	xs:double
properties	isRef 0 con-sim- tent le

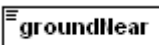
element level1Product/productSpecific/complexImageInfo/projectedSpacingAzimuth

diagram	 [m] nominal projected pixel spacing on ground at scene center
type	xs:float
properties	isRef 0 con-sim- tent le
annotation	documentati-[m] nominal projected pixel spacing on ground at scene on center

element level1Product/productSpecific/complexImageInfo/projectedSpacingRange

diagram	 The diagram shows a box labeled 'projectedSpacingRange' with '[m]' below it. This box is connected to a central oval containing three dots. From the right side of the oval, three lines branch out to three separate boxes: 'groundNear', 'groundFar', and 'slantRange'.
properties	isRef 0 con-com- tent plex
children	<u>groundNear</u> <u>groundFar</u> <u>slantRange</u>
annotation	documentati-[m on]

element **level1Product/productSpecific/complexImageInfo/projectedSpacingRange/groundNear**

diagram	 The diagram shows a box labeled 'groundNear' with a small icon to its left.
type	xs:float
properties	isRef 0 con-simp- tent le

element **level1Product/productSpecific/complexImageInfo/projectedSpacingRange/groundFar**

diagram	 The diagram shows a box labeled 'groundFar' with a small icon to its left.
type	xs:float
properties	isRef 0 con-simp- tent le

element **level1Product/productSpecific/complexImageInfo/projectedSpacingRange/slantRange**

diagram	 The diagram shows a box labeled 'slantRange' with a small icon to its left.
type	xs:float
properties	isRef 0 con-simp- tent le

element **level1Product/productSpecific/complexImageInfo/imageCoordinateType**

diagram	 The diagram shows a box labeled 'imageCoordinateType' with a small icon to its left. Below the box, the text 'zero Doppler' is written.
type	restriction of <u>string128</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 128

	enumerati-RAW on enumerati-ZERODOPPLE on R enumerati-UNDEFINED on
annotation	documentati-zero Doppler on

element **level1Product/productSpecific/complexImageInfo/imageDataStartWith**

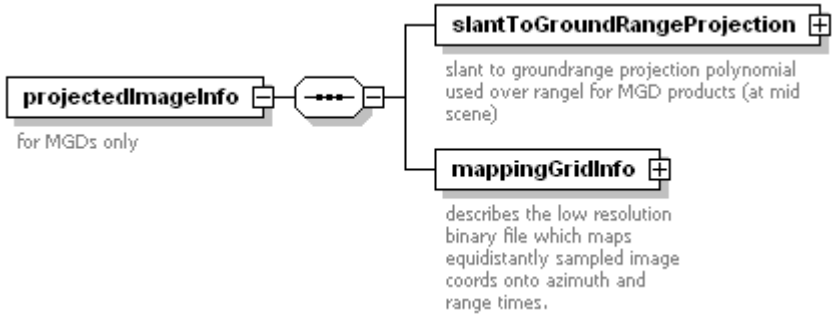
diagram	 image (row and column) order and start: COSAR Files are stored starting with early azimuth, near range
type	restriction of xs:NMTOKENS
properties	isRef 0 con-simp- tent le
facets	enumerati-EARLYAZNEARR on G enumerati-EARLYAZFARRG on enumerati-LATEAZNEARRG on enumerati-LATEAZFARRG on enumerati-UNDEFINED on
annotation	documentati-image (row and column) order and start: COSAR Files are stored starting with early azimuth, near on range

element **level1Product/productSpecific/complexImageInfo/quicklookDataStartWith**

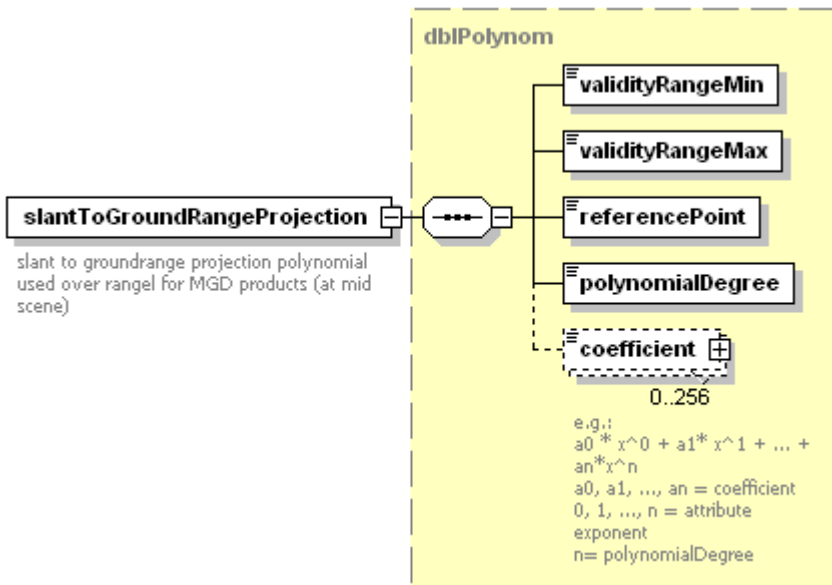
diagram	 image (row and column) order and start: depending on orbit and look direction, QLs of SSCs are flipped or rotated to obtain an approx. North UP, East RIGHT orientation.
type	restriction of xs:NMTOKENS
properties	isRef 0 con-simp- tent le
facets	enumerati-EARLYAZNEARR on G enumerati-EARLYAZFARRG on enumerati-LATEAZNEARRG on enumerati-LATEAZFARRG on enumerati-UNDEFINED on
annotation	documentati-image (row and column) order and start: depending on orbit and look direction, QLs of SSCs are flipped or

on rotated to obtain an approx. North UP, East RIGHT orientation.

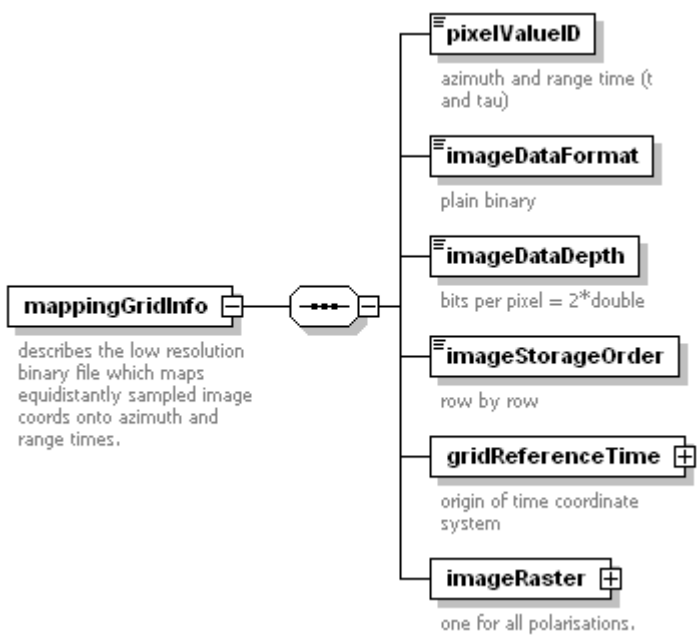
element **level1Product/productSpecific/projectedImageInfo**

diagram	 The diagram shows a box labeled projectedImageInfo with the text "for MGDs only" below it. This box is connected to a dashed oval, which in turn connects to two stacked boxes: slantToGroundRangeProjection (with a plus icon) and mappingGridInfo (with a plus icon). The slantToGroundRangeProjection box contains the text: "slant to groundrange projection polynomial used over rangal for MGD products (at mid scene)". The mappingGridInfo box contains the text: "describes the low resolution binary file which maps equidistantly sampled image coords onto azimuth and range times."
properties	isRef 0 con-com- tent plex
children	<u>slantToGroundRangeProjection</u> <u>mappingGridInfo</u>
annotation	documentati-for MGDs on only

element **level1Product/productSpecific/projectedImageInfo/slantToGroundRangeProjection**

diagram	 The diagram shows a box labeled slantToGroundRangeProjection with the text "slant to groundrange projection polynomial used over rangal for MGD products (at mid scene)" below it. This box is connected to a dashed oval, which connects to a dashed yellow box labeled dbIPolynomial. Inside this box are four stacked boxes: validityRangeMin, validityRangeMax, referencePoint, and polynomialDegree. Below these is a dashed box labeled coefficient with a plus icon, containing the value "0.256". Below the dashed box is the text: "e.g.: $a_0 * x^0 + a_1 * x^1 + \dots + a_n * x^n$ $a_0, a_1, \dots, a_n = \text{coefficient}$ $0, 1, \dots, n = \text{attribute exponent}$ $n = \text{polynomialDegree}$"
type	<u>dbIPolynomial</u>
properties	isRef 0 con-com- tent plex
children	<u>validityRangeMin</u> <u>validityRangeMax</u> <u>referencePoint</u> <u>polynomialDegree</u> <u>coefficient</u>
annotation	documentati-slant to groundrange projection polynomial used over rangal for MGD products (at mid sce- on ne)

element **level1Product/productSpecific/projectedImageInfo/mappingGridInfo**

diagram	 mappingGridInfo describes the low resolution binary file which maps equidistantly sampled image coords onto azimuth and range times. pixelValueID azimuth and range time (t and tau) imageDataFormat plain binary imageDataDepth bits per pixel = 2*double imageStorageOrder row by row gridReferenceTime + origin of time coordinate system imageRaster + one for all polarisations.
properties	isRef 0 con-com- tent plex
children	<u>pixelValueID</u> <u>imageDataFormat</u> <u>imageDataDepth</u> <u>imageStorageOrder</u> <u>gridReferenceTime</u> <u>imageRaster</u>
annotation	documentati-describes the low resolution binary file which maps equidistantly sampled image coords onto azimuth and on range times.

element **level1Product/productSpecific/projectedImageInfo/mappingGridInfo/pixelValueID**

diagram	 pixelValueID azimuth and range time (t and tau)
type	<u>string128</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 128
annotation	documentati-azimuth and range time (t and on tau)

element **level1Product/productSpecific/projectedImageInfo/mappingGridInfo/imageDataFormat**

diagram	 imageDataFormat plain binary
type	<u>string255</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 255

annotation	documentati-plain binary on
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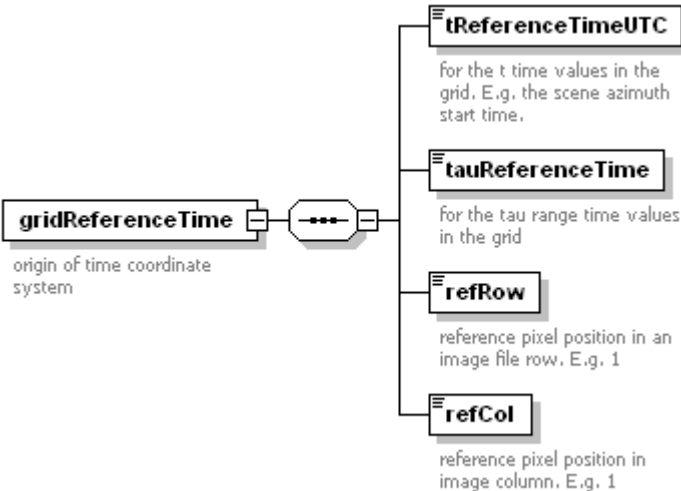
element **level1Product/productSpecific/projectedImageInfo/mappingGridInfo/imageDataDepth**

diagram	 bits per pixel = 2*double
type	xs:int
properties	isRef 0 con-simp- tent le
annotation	documentati-bits per pixel = on 2*double

element **level1Product/productSpecific/projectedImageInfo/mappingGridInfo/imageStorageOrder**

diagram	 row by row
type	restriction of xs:NMTOKENS
properties	isRef 0 con-simp- tent le
facets	enumerati-ROWBYRO on W enumerati-COLBYCOL on enumerati-UNDEFINED on
annotation	documentati-row by row on

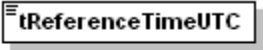
element **level1Product/productSpecific/projectedImageInfo/mappingGridInfo/gridReferenceTime**

diagram	 origin of time coordinate system tReferenceTimeUTC for the t time values in the grid, E.g. the scene azimuth start time, tauReferenceTime for the tau range time values in the grid refRow reference pixel position in an image file row, E.g. 1 refCol reference pixel position in image column, E.g. 1
properties	isRef 0 con-com- tent plex

children	<u>tReferenceTimeUTC</u> <u>tauReferenceTime</u> <u>refRow</u> <u>refCol</u>
annotation	documentati- on tem origin of time coordinate sys-

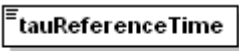
element lev-

**el1Product/productSpecific/projectedImageInfo/mappingGridInfo/gridReferenceTime/tReferenceTimeU
TC**

diagram	 for the t time values in the grid, E.g. the scene azimuth start time.
type	xs:dateTime
properties	isRef 0 con-simp- tent le
annotation	documentati- on time. for the t time values in the grid. E.g. the scene azimuth start

element lev-

**el1Product/productSpecific/projectedImageInfo/mappingGridInfo/gridReferenceTime/tauReferenceTim
e**

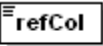
diagram	 for the tau range time values in the grid
type	xs:double
properties	isRef 0 con-simp- tent le
annotation	documentati- on grid for the tau range time values in the

element lev-

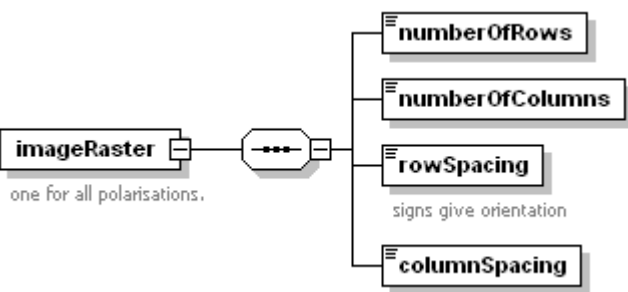
el1Product/productSpecific/projectedImageInfo/mappingGridInfo/gridReferenceTime/refRow

diagram	 reference pixel position in an image file row, E.g. 1
type	xs:long
properties	isRef 0 con-simp- tent le
annotation	documentati- on 1 reference pixel position in an image file row. E.g.

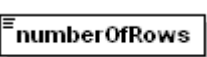
element level1**Product/productSpecific/projectedImageInfo/mappingGridInfo/gridReferenceTime/refCol**

diagram	 reference pixel position in image column. E.g. 1
type	xs:long
properties	isRef 0 con-sim- tent le
annotation	documentati-reference pixel position in image column. E.g. on 1

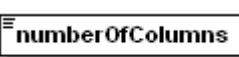
element **level1Product/productSpecific/projectedImageInfo/mappingGridInfo/imageRaster**

diagram	 one for all polarisations.
properties	isRef 0 con-com- tent plex
children	<u>numberOfRows</u> <u>numberOfColumns</u> <u>rowSpacing</u> <u>columnSpacing</u>
annotation	documentati-one for all polarisati- on ons.

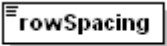
element **level1Product/productSpecific/projectedImageInfo/mappingGridInfo/imageRaster/numberOfRows**

diagram	
type	xs:int
properties	isRef 0 con-sim- tent le

element **level1Product/productSpecific/projectedImageInfo/mappingGridInfo/imageRaster/numberOfColumns**

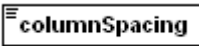
diagram	
type	xs:int
properties	isRef 0 con-sim- tent le

element **level1Product/productSpecific/projectedImageInfo/mappingGridInfo/imageRaster/rowSpacing**

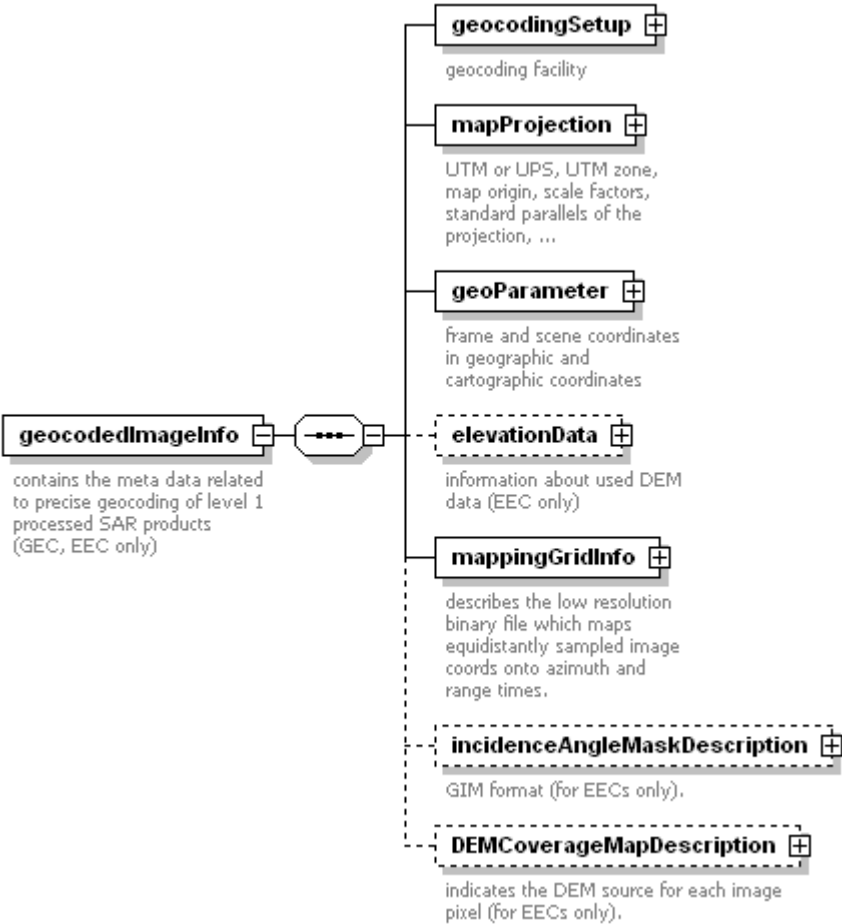
diagram	 signs give orientation
type	xs:float
properties	isRef 0 con-simp- tent le
annotation	documentati-signs give orientati- on on

element lev-

el1Product/productSpecific/projectedImageInfo/mappingGridInfo/imageRaster/columnSpacing

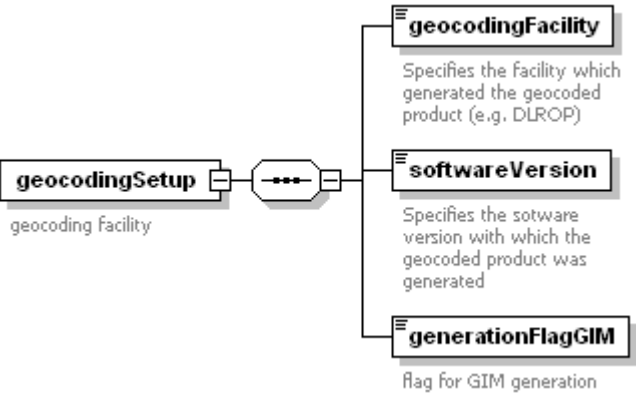
diagram	
type	xs:float
properties	isRef 0 con-simp- tent le

element level1Product/productSpecific/geocodedImageInfo

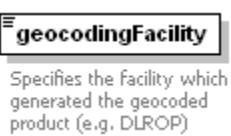
diagram	 The diagram shows the structure of the geocodedImageInfo element. It is a container element (rectangle with a small square in the top-left corner) that contains several child elements. The children are: geocodingSetup (rectangle with a plus sign), mapProjection (rectangle with a plus sign), geoParameter (rectangle with a plus sign), elevationData (dashed rectangle with a plus sign), mappingGridInfo (rectangle with a plus sign), incidenceAngleMaskDescription (dashed rectangle with a plus sign), and DEMCoverageMapDescription (dashed rectangle with a plus sign). A dashed line connects the geocodedImageInfo element to the elevationData element, indicating a relationship or constraint.
properties	isRef 0

	con-com- tent plex
children	<u>geocodingSetup</u> <u>mapProjection</u> <u>geoParameter</u> <u>elevationData</u> <u>mappingGridInfo</u> <u>incidenceAngleMaskDescription</u> <u>DEMCoverageMapDescription</u>
annotation	documentati-contains the meta data related to precise geocoding of level 1 processed SAR products (GEC, EEC on only)

element level1Product/productSpecific/geocodedImageInfo/geocodingSetup

diagram	
properties	isRef 0 con-com- tent plex
children	<u>geocodingFacility</u> <u>softwareVersion</u> <u>generationFlagGIM</u>
annotation	documentati-geocoding facili- on ty

element level1Product/productSpecific/geocodedImageInfo/geocodingSetup/geocodingFacility

diagram	
type	<u>string80</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 80
annotation	documentati-Specifies the facility which generated the geocoded product (e.g. on DLROP)

element level1Product/productSpecific/geocodedImageInfo/geocodingSetup/softwareVersion

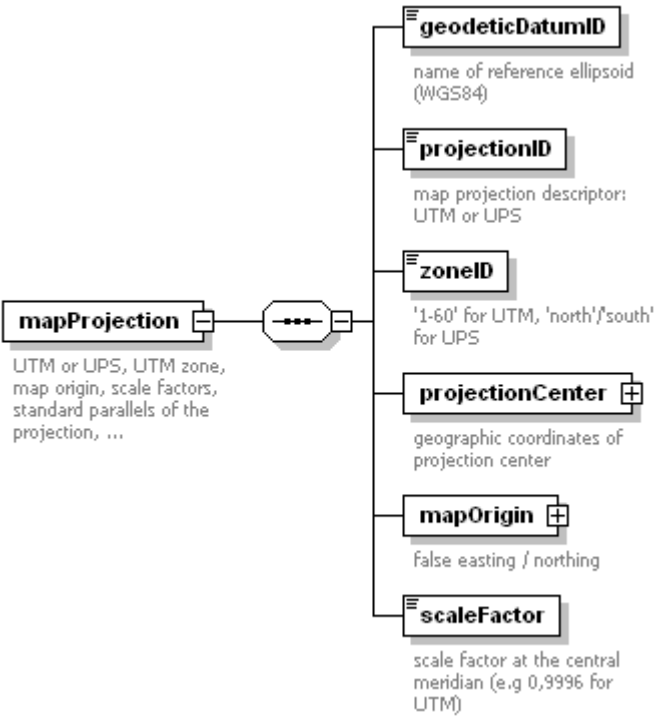
diagram	
type	<u>string20</u>

properties	isRef 0 con-sim- tent le
facets	maxLength 20
annotation	documentati-Specifies the sotware version with which the geocoded product was generat- on ed

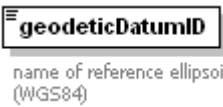
element level1Product/productSpecific/geocodedImageInfo/geocodingSetup/generationFlagGIM

diagram	
type	xs:boolean
properties	isRef 0 con-sim- tent le
annotation	documentati-flag for GIM generati- on on

element level1Product/productSpecific/geocodedImageInfo/mapProjection

diagram	
properties	isRef 0 con-com- tent plex
children	<u>geodeticDatumID</u> <u>projectionID</u> <u>zoneID</u> <u>projectionCenter</u> <u>mapOrigin</u> <u>scaleFactor</u>
annotation	documentati-UTM or UPS, UTM zone, map origin, scale factors, standard parallels of the projection, on ...

element level1Product/productSpecific/geocodedImageInfo/mapProjection/geodeticDatumID

diagram	
type	string20
properties	isRef 0 con-sim- tent le
facets	maxLength 20
annotation	documentati-name of reference ellipsoid on (WGS84)

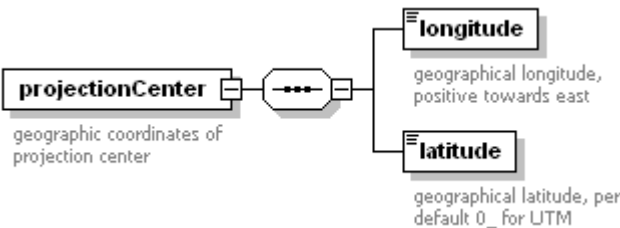
element level1Product/productSpecific/geocodedImageInfo/mapProjection/projectionID

diagram	
type	string20
properties	isRef 0 con-sim- tent le
facets	maxLength 20
annotation	documentati-map projection descriptor: UTM or on UPS

element level1Product/productSpecific/geocodedImageInfo/mapProjection/zoneID

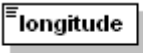
diagram	
type	string20
properties	isRef 0 con-sim- tent le
facets	maxLength 20
annotation	documentati-'1-60' for UTM, 'north'/'south' for on UPS

element level1Product/productSpecific/geocodedImageInfo/mapProjection/projectionCenter

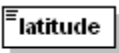
diagram	
properties	isRef 0

	con-com- tent plex
children	<u>longitude</u> <u>latitude</u>
annotation	documentati-geographic coordinates of projection cen- on ter

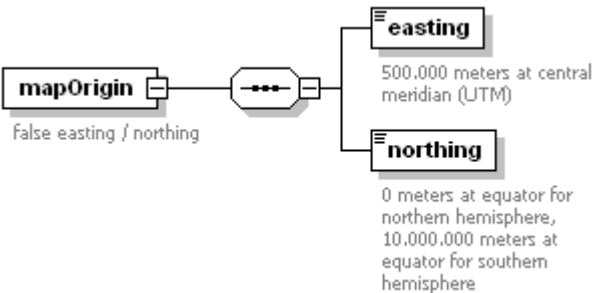
element **level1Product/productSpecific/geocodedImageInfo/mapProjection/projectionCenter/longitude**

diagram	 geographical longitude, positive towards east
type	<u>longitudeDegType</u>
properties	isRef 0 con-simp- tent le
facets	minInclusive -180 maxInclusi-180 ve
annotation	documentati-geographical longitude, positive towards on east

element **level1Product/productSpecific/geocodedImageInfo/mapProjection/projectionCenter/latitude**

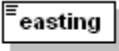
diagram	 geographical latitude, per default 0_ for UTM
type	<u>latitudeDegType</u>
properties	isRef 0 con-simp- tent le
facets	minInclusive -90 maxInclusi-90 ve
annotation	documentati-geographical latitude, per default 0_ for on UTM

element **level1Product/productSpecific/geocodedImageInfo/mapProjection/mapOrigin**

diagram	 mapOrigin false easting / northing easting 500,000 meters at central meridian (UTM) northing 0 meters at equator for northern hemisphere, 10,000,000 meters at equator for southern hemisphere
properties	isRef 0 con-com- tent plex

children	<u>easting northing</u>
annotation	documentati-false easting / north- on hing

element level1Product/productSpecific/geocodedImageInfo/mapProjection/mapOrigin/easting

diagram	 500.000 meters at central meridian (UTM)
type	xs:float
properties	isRef 0 con-simp- tent le
annotation	documentati-500.000 meters at central meridian on (UTM)

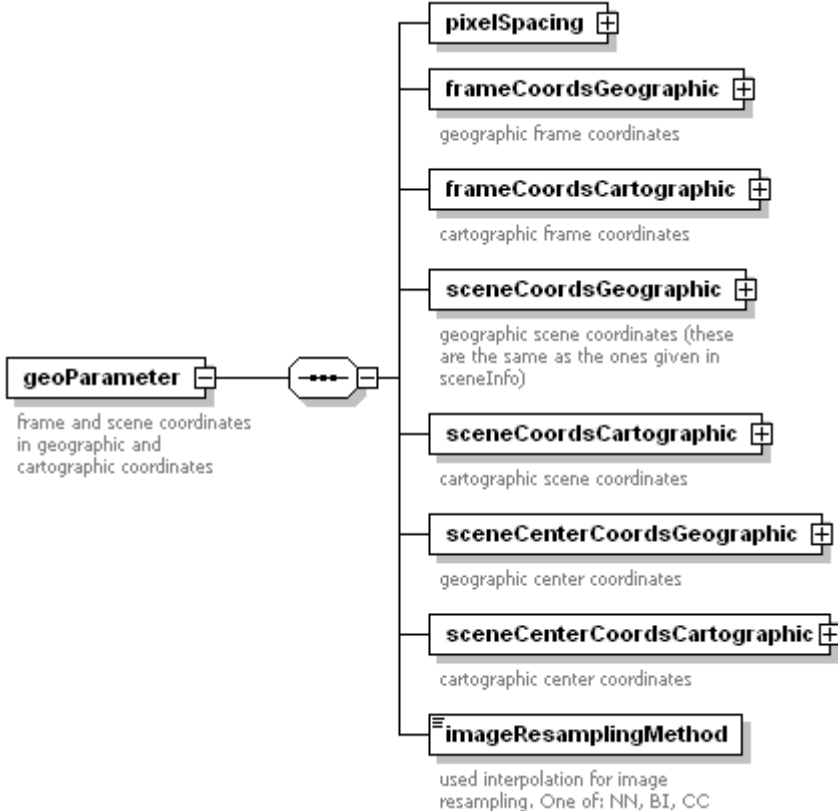
element level1Product/productSpecific/geocodedImageInfo/mapProjection/mapOrigin/northing

diagram	 0 meters at equator for northern hemisphere, 10.000.000 meters at equator for southern hemisphere
type	xs:float
properties	isRef 0 con-simp- tent le
annotation	documentati-0 meters at equator for northern hemisphere, 10.000.000 meters at equator for southern hemisphere

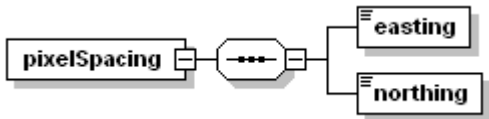
element level1Product/productSpecific/geocodedImageInfo/mapProjection/scaleFactor

diagram	 scale factor at the central meridian (e.g 0,9996 for UTM)
type	xs:float
properties	isRef 0 con-simp- tent le
annotation	documentati-scale factor at the central meridian (e.g 0,9996 for on UTM)

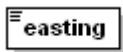
element level1Product/productSpecific/geocodedImageInfo/geoParameter

diagram	 geoParameter frame and scene coordinates in geographic and cartographic coordinates pixelSpacing geographic frame coordinates frameCoordsGeographic geographic frame coordinates frameCoordsCartographic cartographic frame coordinates sceneCoordsGeographic geographic scene coordinates (these are the same as the ones given in sceneInfo) sceneCoordsCartographic cartographic scene coordinates sceneCenterCoordsGeographic geographic center coordinates sceneCenterCoordsCartographic cartographic center coordinates imageResamplingMethod used interpolation for image resampling. One of: NN, BI, CC
properties	isRef 0 con-com- tent plex
children	<u>pixelSpacing</u> <u>frameCoordsGeographic</u> <u>frameCoordsCartographic</u> <u>sceneCoordsGeographic</u> <u>sceneCoordsCartographic</u> <u>sceneCenterCoordsGeographic</u> <u>sceneCenterCoordsCartographic</u> <u>imageResamplingMethod</u>
annotation	documentati-frame and scene coordinates in geographic and cartographic coordi- on nates

element level1Product/productSpecific/geocodedImageInfo/geoParameter/pixelSpacing

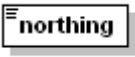
diagram	 pixelSpacing easting northing
properties	isRef 0 con-com- tent plex
children	<u>easting</u> <u>northing</u>

element level1Product/productSpecific/geocodedImageInfo/geoParameter/pixelSpacing/easting

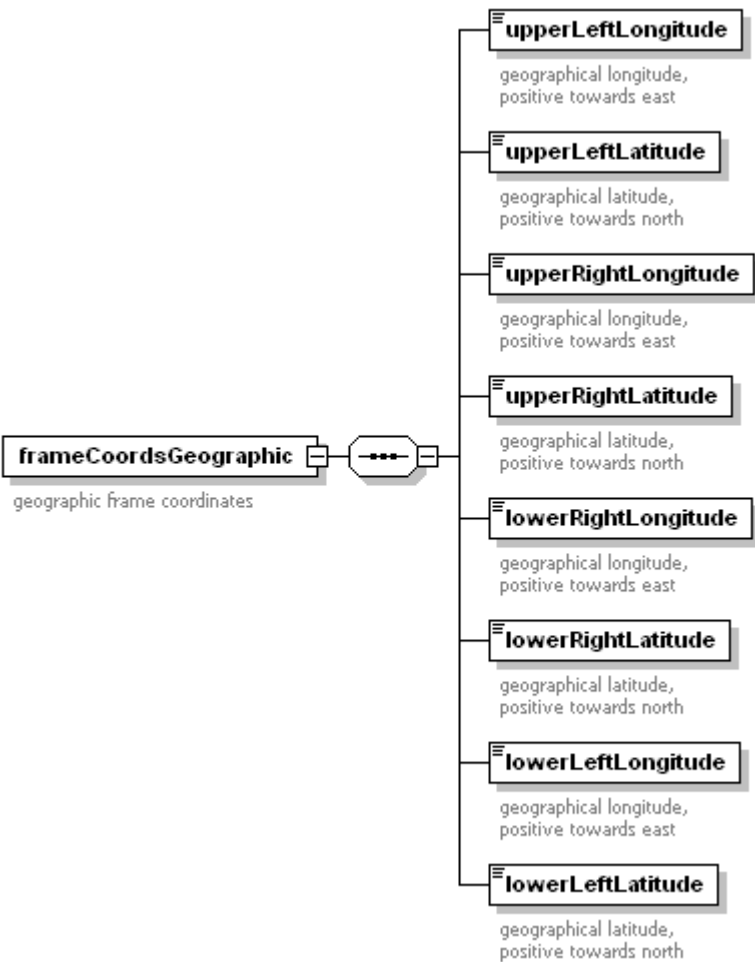
diagram	 easting
type	xs:float
properties	isRef 0 con-simp-

	tent le
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element **level1Product/productSpecific/geocodedImageInfo/geoParameter/pixelSpacing/northing**

diagram	
type	xs:float
properties	isRef 0 con-simp- tent le

element **level1Product/productSpecific/geocodedImageInfo/geoParameter/frameCoordsGeographic**

diagram	
properties	isRef 0 con-com- tent plex
children	<u>upperLeftLongitude</u> <u>upperLeftLatitude</u> <u>upperRightLongitude</u> <u>upperRightLatitude</u> <u>lowerRightLongitude</u> <u>lowerRightLatitude</u> <u>lowerLeftLongitude</u> <u>lowerLeftLatitude</u>
annotation	documentati-geographic frame coordina- on tes

element **lev-**

el1Product/productSpecific/geocodedImageInfo/geoParameter/frameCoordsGeographic/upperLeftLongitude

diagram	 geographical longitude, positive towards east
type	<u>longitudeDegType</u>
properties	isRef 0 con-sim- tent le
facets	minInclusive -180 maxInclusi-180 ve
annotation	documentati-geographical longitude, positive towards on east

element lev-

el1Product/productSpecific/geocodedImageInfo/geoParameter/frameCoordsGeographic/upperLeftLatitude

diagram	 geographical latitude, positive towards north
type	<u>latitudeDegType</u>
properties	isRef 0 con-sim- tent le
facets	minInclusive -90 maxInclusi-90 ve
annotation	documentati-geographical latitude, positive towards on north

element lev-

el1Product/productSpecific/geocodedImageInfo/geoParameter/frameCoordsGeographic/upperRightLongitude

diagram	 geographical longitude, positive towards east
type	<u>longitudeDegType</u>
properties	isRef 0 con-sim- tent le
facets	minInclusive -180 maxInclusi-180 ve
annotation	documentati-geographical longitude, positive towards on east

element **lev-**

el1Product/productSpecific/geocodedImageInfo/geoParameter/frameCoordsGeographic/upperRightLatitude

diagram	 geographical latitude, positive towards north
type	<u>latitudeDegType</u>
properties	isRef 0 con-sim- tent le
facets	minInclusive -90 maxInclusi-90 ve
annotation	documentati-geographical latitude, positive towards on north

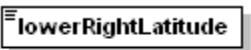
element **lev-**

el1Product/productSpecific/geocodedImageInfo/geoParameter/frameCoordsGeographic/lowerRightLongitude

diagram	 geographical longitude, positive towards east
type	<u>longitudeDegType</u>
properties	isRef 0 con-sim- tent le
facets	minInclusive -180 maxInclusi-180 ve
annotation	documentati-geographical longitude, positive towards on east

element **lev-**

el1Product/productSpecific/geocodedImageInfo/geoParameter/frameCoordsGeographic/lowerRightLatitude

diagram	 geographical latitude, positive towards north
type	<u>latitudeDegType</u>
properties	isRef 0 con-sim- tent le
facets	minInclusive -90 maxInclusi-90 ve
annotation	documentati-geographical latitude, positive towards

	on north
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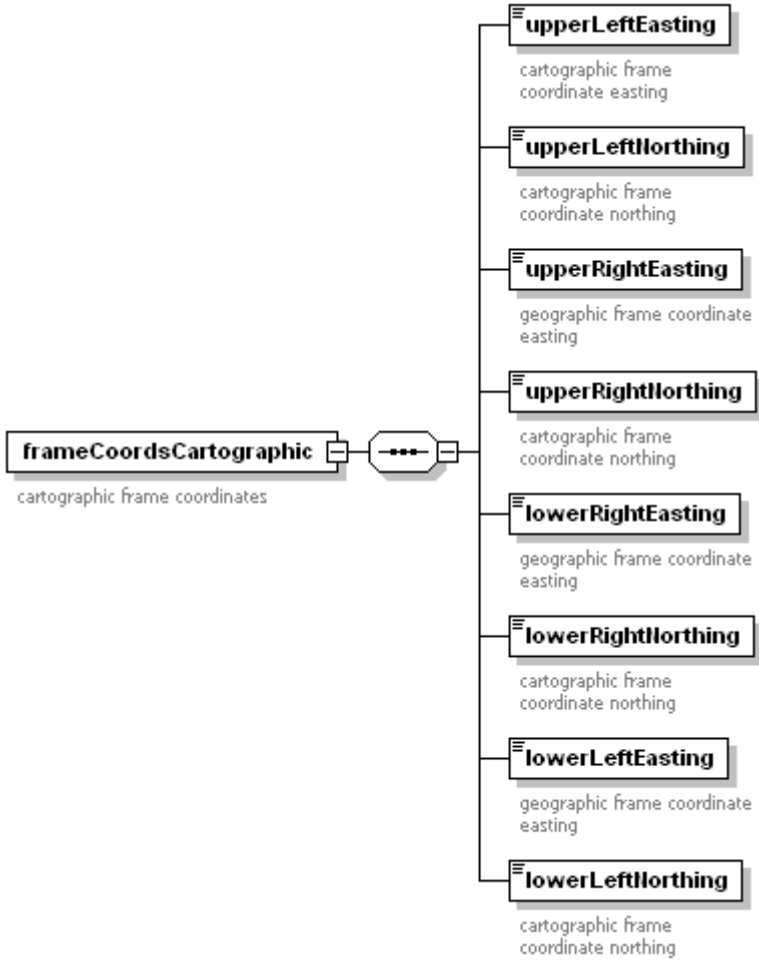
element **level1Product/productSpecific/geocodedImageInfo/geoParameter/frameCoordsGeographic/lowerLeftLongitude**

diagram	 geographical longitude, positive towards east
type	<u>longitudeDegType</u>
properties	isRef 0 con-sim- tent le
facets	minInclusive -180 maxInclusi-180 ve
annotation	documentati-geographical longitude, positive towards on east

element **level1Product/productSpecific/geocodedImageInfo/geoParameter/frameCoordsGeographic/lowerLeftLatitude**

diagram	 geographical latitude, positive towards north
type	<u>latitudeDegType</u>
properties	isRef 0 con-sim- tent le
facets	minInclusive -90 maxInclusi-90 ve
annotation	documentati-geographical latitude, positive towards on north

element **level1Product/productSpecific/geocodedImageInfo/geoParameter/frameCoordsCartographic**

diagram	
properties	isRef 0 con- tent plex
children	<u>upperLeftEasting</u> <u>upperLeftNorthing</u> <u>upperRightEasting</u> <u>upperRightNorthing</u> <u>lowerRightEasting</u> <u>lowerRightNorthing</u> <u>lowerLeftEasting</u> <u>lowerLeftNorthing</u>
annotation	documentati- on tes

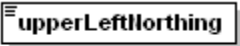
element lev-

el1Product/productSpecific/geocodedImageInfo/geoParameter/frameCoordsCartographic/upperLeftEasting

diagram	
type	xs:double
properties	isRef 0 con-simp- tent le
annotation	documentati- on ting

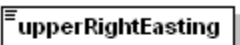
element **lev-**

el1Product/productSpecific/geocodedImageInfo/geoParameter/frameCoordsCartographic/upperLeftNorthing

diagram	 cartographic frame coordinate northing
type	xs:double
properties	isRef 0 con-sim- tent le
annotation	documentati-cartographic frame coordinate north- on hing

element **lev-**

el1Product/productSpecific/geocodedImageInfo/geoParameter/frameCoordsCartographic/upperRightEasting

diagram	 geographic frame coordinate easting
type	xs:double
properties	isRef 0 con-sim- tent le
annotation	documentati-geographic frame coordinate east- on ting

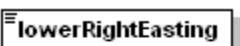
element **lev-**

el1Product/productSpecific/geocodedImageInfo/geoParameter/frameCoordsCartographic/upperRightNorthing

diagram	 cartographic frame coordinate northing
type	xs:double
properties	isRef 0 con-sim- tent le
annotation	documentati-cartographic frame coordinate north- on hing

element **lev-**

el1Product/productSpecific/geocodedImageInfo/geoParameter/frameCoordsCartographic/lowerRightEasting

diagram	 geographic frame coordinate easting
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type	xs:double
properties	isRef 0 con-simp- tent le
annotation	documentati-geographic frame coordinate eas- on ting

element **lev-**
el1Product/productSpecific/geocodedImageInfo/geoParameter/frameCoordsCartographic/lowerRightNorthing

diagram	 cartographic frame coordinate northing
type	xs:double
properties	isRef 0 con-simp- tent le
annotation	documentati-cartographic frame coordinate north- on hing

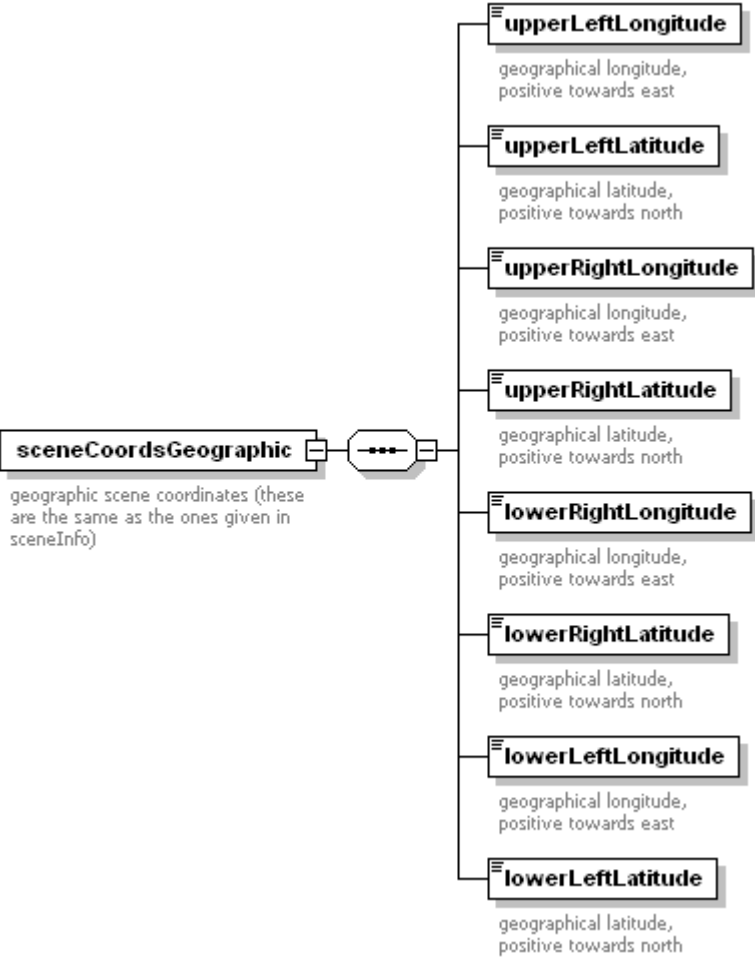
element **lev-**
el1Product/productSpecific/geocodedImageInfo/geoParameter/frameCoordsCartographic/lowerLeftEasting

diagram	 geographic frame coordinate easting
type	xs:double
properties	isRef 0 con-simp- tent le
annotation	documentati-geographic frame coordinate eas- on ting

element **lev-**
el1Product/productSpecific/geocodedImageInfo/geoParameter/frameCoordsCartographic/lowerLeftNorthing

diagram	 cartographic frame coordinate northing
type	xs:double
properties	isRef 0 con-simp- tent le
annotation	documentati-cartographic frame coordinate north- on hing

element **level1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCoordsGeographic**

diagram	
properties	isRef 0 con-com- tent plex
children	<u>upperLeftLongitude</u> <u>upperLeftLatitude</u> <u>upperRightLongitude</u> <u>upperRightLatitude</u> <u>lowerRightLongitude</u> <u>lowerRightLatitude</u> <u>lowerLeftLongitude</u> <u>lowerLeftLatitude</u>
annotation	documentati-geographic scene coordinates (these are the same as the ones given in scenelIn- on fo)

element **level1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCoordsGeographic/upperLeftLongitude**

diagram	
type	<u>longitudeDegType</u>
properties	isRef 0 con-simp- tent le

facets	minInclusive -180 maxInclusive -180 ve
annotation	documentati-geographical longitude, positive towards on east

element **lev-**
el1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCoordsGeographic/upperLeftLatitude

diagram	 geographical latitude, positive towards north
type	<u>latitudeDegType</u>
properties	isRef 0 con-sim- tent le
facets	minInclusive -90 maxInclusive -90 ve
annotation	documentati-geographical latitude, positive towards on north

element **lev-**
el1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCoordsGeographic/upperRightLongitude

diagram	 geographical longitude, positive towards east
type	<u>longitudeDegType</u>
properties	isRef 0 con-sim- tent le
facets	minInclusive -180 maxInclusive -180 ve
annotation	documentati-geographical longitude, positive towards on east

element **lev-**
el1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCoordsGeographic/upperRightLatitude

diagram	 geographical latitude, positive towards north
type	<u>latitudeDegType</u>
properties	isRef 0 con-sim-

	tent le
facets	minInclusive -90 maxInclusi-90 ve
annotation	documentati-geographical latitude, positive towards on north

element lev-
el1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCoordsGeographic/lowerRightLongitude

diagram	 geographical longitude, positive towards east
type	<u>longitudeDegType</u>
properties	isRef 0 con-simp- tent le
facets	minInclusive -180 maxInclusi-180 ve
annotation	documentati-geographical longitude, positive towards on east

element lev-
el1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCoordsGeographic/lowerRightLatitude

diagram	 geographical latitude, positive towards north
type	<u>latitudeDegType</u>
properties	isRef 0 con-simp- tent le
facets	minInclusive -90 maxInclusi-90 ve
annotation	documentati-geographical latitude, positive towards on north

element lev-
el1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCoordsGeographic/lowerLeftLongitude

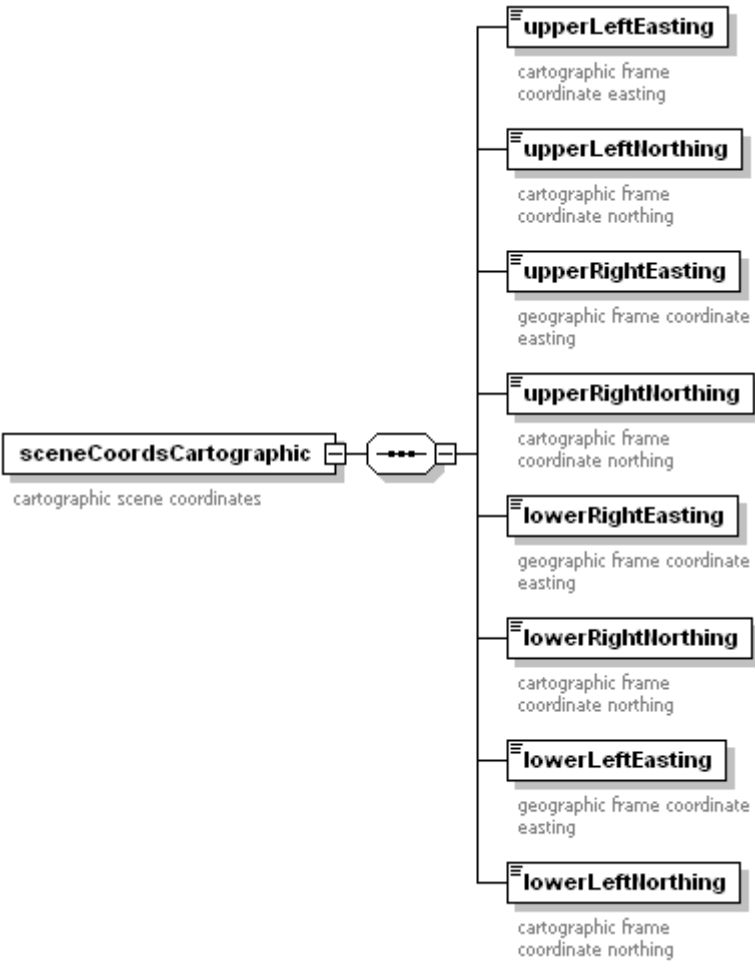
diagram	 geographical longitude, positive towards east
type	<u>longitudeDegType</u>

properties	isRef 0 con-simp- tent le
facets	minInclusive -180 maxInclusi-180 ve
annotation	documentati-geographical longitude, positive towards on east

element **level1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCoordsGeographic/lowerLeftLatitude**

diagram	 geographical latitude, positive towards north
type	<u>latitudeDegType</u>
properties	isRef 0 con-simp- tent le
facets	minInclusive -90 maxInclusi-90 ve
annotation	documentati-geographical latitude, positive towards on north

element **level1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCoordsCartographic**

diagram	 The diagram shows a central element sceneCoordsCartographic (cartographic scene coordinates) connected to a container element (dashed line with three dots). This container is linked to eight child elements arranged vertically: upperLeftEasting (cartographic frame coordinate easting), upperLeftNorthing (cartographic frame coordinate northing), upperRightEasting (geographic frame coordinate easting), upperRightNorthing (cartographic frame coordinate northing), lowerRightEasting (geographic frame coordinate easting), lowerRightNorthing (cartographic frame coordinate northing), lowerLeftEasting (geographic frame coordinate easting), and lowerLeftNorthing (cartographic frame coordinate northing).
properties	isRef 0 con-com- tent plex
children	<u>upperLeftEasting</u> <u>upperLeftNorthing</u> <u>upperRightEasting</u> <u>upperRightNorthing</u> <u>lowerRightEasting</u> <u>lowerRightNorthing</u> <u>lowerLeftEasting</u> <u>lowerLeftNorthing</u>
annotation	documentati-cartographic scene coordina- on tes

element lev-

el1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCoordsCartographic/upperLeftEasting

diagram	 The diagram shows the upperLeftEasting element (cartographic frame coordinate easting).
type	xs:double
properties	isRef 0 con-simp- tent le
annotation	documentati-cartographic frame coordinate eas- on ting

element lev-

el1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCoordsCartographic/upperLeftNorthing

diagram	
type	xs:double
properties	isRef 0 con-sim- tent le
annotation	documentati-cartographic frame coordinate north- on hing

element lev-

el1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCoordsCartographic/upperRightEasting

diagram	
type	xs:double
properties	isRef 0 con-sim- tent le
annotation	documentati-geographic frame coordinate east- on ting

element lev-

el1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCoordsCartographic/upperRightNorthing

diagram	
type	xs:double
properties	isRef 0 con-sim- tent le
annotation	documentati-cartographic frame coordinate north- on hing

element lev-

el1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCoordsCartographic/lowerRightEasting

diagram	
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type	xs:double
properties	isRef 0 con-simp- tent le
annotation	documentati-geographic frame coordinate eas- on ting

element **lev-**
el1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCoordsCartographic/lowerRightNo
orthing

diagram	 cartographic frame coordinate northing
type	xs:double
properties	isRef 0 con-simp- tent le
annotation	documentati-cartographic frame coordinate north- on hing

element **lev-**
el1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCoordsCartographic/lowerLeftEas
sting

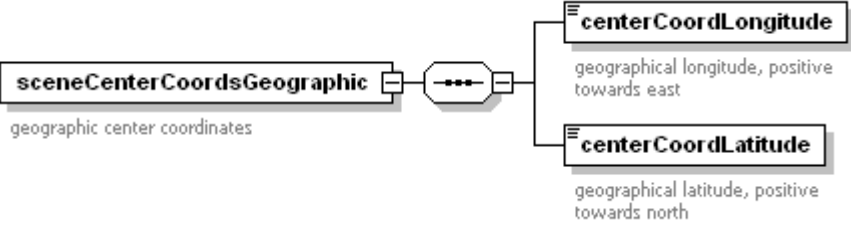
diagram	 geographic frame coordinate easting
type	xs:double
properties	isRef 0 con-simp- tent le
annotation	documentati-geographic frame coordinate eas- on ting

element **lev-**
el1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCoordsCartographic/lowerLeftNo
rthing

diagram	 cartographic frame coordinate northing
type	xs:double
properties	isRef 0 con-simp- tent le
annotation	documentati-cartographic frame coordinate north- on hing

element lev-

el1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCenterCoordsGeographic

diagram	 The diagram shows a box labeled sceneCenterCoordsGeographic with the text "geographic center coordinates" below it. This box is connected to a central point, which then branches into two separate boxes: centerCoordLongitude (with text "geographical longitude, positive towards east") and centerCoordLatitude (with text "geographical latitude, positive towards north").
properties	isRef 0 con-com- tent plex
children	<u>centerCoordLongitude</u> <u>centerCoordLatitude</u>
annotation	documentati-geographic center coordina- on tes

element lev-

el1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCenterCoordsGeographic/centerCoordLongitude

diagram	 The diagram shows a box labeled centerCoordLongitude with the text "geographical longitude, positive towards east" below it.
type	<u>longitudeDegType</u>
properties	isRef 0 con-simp- tent le
facets	minInclusive -180 maxInclusi-180 ve
annotation	documentati-geographical longitude, positive towards on east

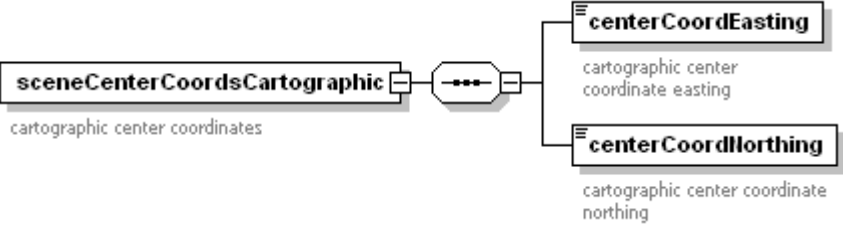
element lev-

el1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCenterCoordsGeographic/centerCoordLatitude

diagram	 The diagram shows a box labeled centerCoordLatitude with the text "geographical latitude, positive towards north" below it.
type	<u>latitudeDegType</u>
properties	isRef 0 con-simp- tent le
facets	minInclusive -90 maxInclusi-90 ve
annotation	documentati-geographical latitude, positive towards on north

element **lev-**

el1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCenterCoordsCartographic

diagram	
properties	isRef 0 con-com- tent plex
children	<u>centerCoordEasting</u> <u>centerCoordNorthing</u>
annotation	documentati-cartographic center coordina- on tes

element **lev-**

el1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCenterCoordsCartographic/centerCoordEasting

diagram	
type	xs:double
properties	isRef 0 con-simp- tent le
annotation	documentati-cartographic center coordinate eas- on ting

element **lev-**

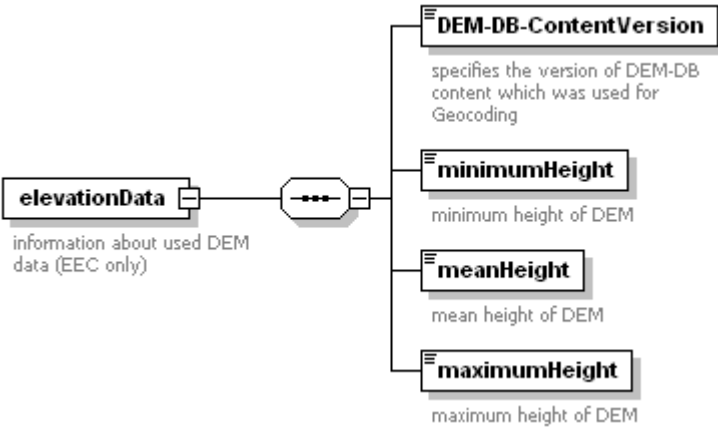
el1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCenterCoordsCartographic/centerCoordNorthing

diagram	
type	xs:double
properties	isRef 0 con-simp- tent le
annotation	documentati-cartographic center coordinate nort- on hing

element **level1Product/productSpecific/geocodedImageInfo/geoParameter/imageResamplingMethod**

diagram	
type	string20
properties	isRef 0 con-simp- tent le
facets	maxLength 20
annotation	documentati-used interpolation for image resampling. One of: NN, BI, on CC

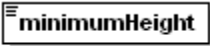
element level1Product/productSpecific/geocodedImageInfo/elevationData

diagram	
properties	isRef 0 con-com- tent plex
children	DEM-DB-ContentVersion minimumHeight meanHeight maximumHeight
annotation	documentati-information about used DEM data (EEC on only)

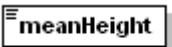
element level1Product/productSpecific/geocodedImageInfo/elevationData/DEM-DB-ContentVersion

diagram	
type	extension of string80
properties	isRef 0 con-com- tent plex
facets	maxLength 80
annotation	documentati-specifies the version of DEM-DB content which was used for Ge- on ocoding

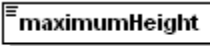
element level1Product/productSpecific/geocodedImageInfo/elevationData/minimumHeight

diagram	 minimum height of DEM
type	xs:float
properties	isRef 0 con-simp- tent le
annotation	documentati-minimum height of on DEM

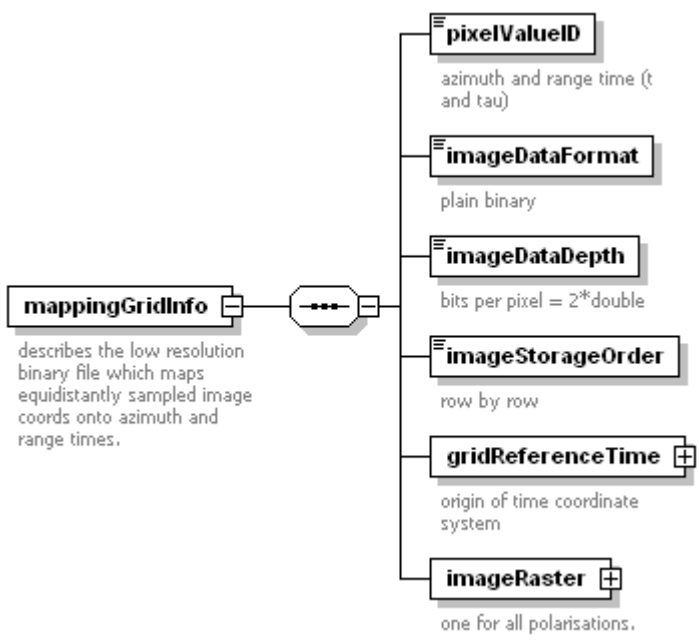
element **level1Product/productSpecific/geocodedImageInfo/elevationData/meanHeight**

diagram	 mean height of DEM
type	xs:float
properties	isRef 0 con-simp- tent le
annotation	documentati-mean height of on DEM

element **level1Product/productSpecific/geocodedImageInfo/elevationData/maximumHeight**

diagram	 maximum height of DEM
type	xs:float
properties	isRef 0 con-simp- tent le
annotation	documentati-maximum height of on DEM

element **level1Product/productSpecific/geocodedImageInfo/mappingGridInfo**

diagram	 mappingGridInfo describes the low resolution binary file which maps equidistantly sampled image coords onto azimuth and range times. pixelValueID azimuth and range time (t and tau) imageDataFormat plain binary imageDataDepth bits per pixel = 2*double imageStorageOrder row by row gridReferenceTime + origin of time coordinate system imageRaster + one for all polarisations.
properties	isRef 0 con-com- tent plex
children	<u>pixelValueID</u> <u>imageDataFormat</u> <u>imageDataDepth</u> <u>imageStorageOrder</u> <u>gridReferenceTime</u> <u>imageRaster</u>
annotation	documentati-describes the low resolution binary file which maps equidistantly sampled image coords onto azimuth and on range times.

element **level1Product/productSpecific/geocodedImageInfo/mappingGridInfo/pixelValueID**

diagram	 pixelValueID azimuth and range time (t and tau)
type	<u>string128</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 128
annotation	documentati-azimuth and range time (t and on tau)

element **level1Product/productSpecific/geocodedImageInfo/mappingGridInfo/imageDataFormat**

diagram	 imageDataFormat plain binary
type	<u>string255</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 255

annotation	documentati-plain binary on
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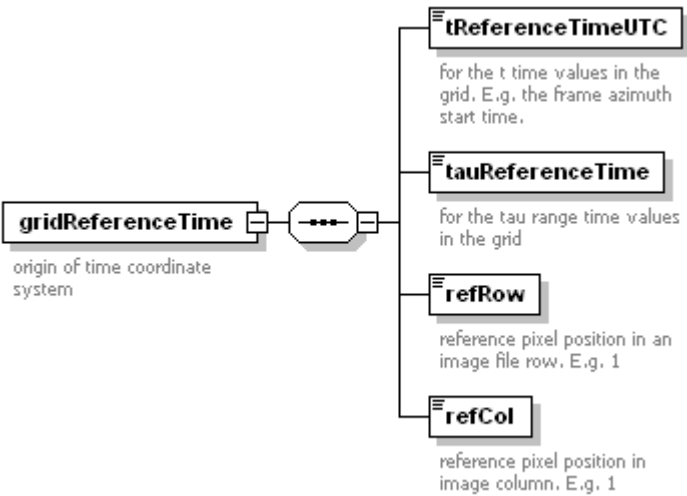
element **level1Product/productSpecific/geocodedImageInfo/mappingGridInfo/imageDataDepth**

diagram	
type	xs:int
properties	isRef 0 con-simp- tent le
annotation	documentati-bits per pixel = on 2*double

element **level1Product/productSpecific/geocodedImageInfo/mappingGridInfo/imageStorageOrder**

diagram	
type	restriction of xs:NMTOKENS
properties	isRef 0 con-simp- tent le
facets	enumerati-ROWBYRO on W enumerati-COLBYCOL on enumerati-UNDEFINED on
annotation	documentati-row by row on

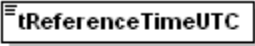
element **level1Product/productSpecific/geocodedImageInfo/mappingGridInfo/gridReferenceTime**

diagram	
properties	isRef 0 con-com- tent plex

children	<u>tReferenceTimeUTC</u> <u>tauReferenceTime</u> <u>refRow</u> <u>refCol</u>
annotation	documentati- on tem origin of time coordinate sys-

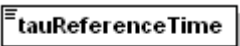
element lev-

el1Product/productSpecific/geocodedImageInfo/mappingGridInfo/gridReferenceTime/tReferenceTime UTC

diagram	 for the t time values in the grid. E.g. the frame azimuth start time.
type	xs:dateTime
properties	isRef 0 con-simp- tent le
annotation	documentati- on time. for the t time values in the grid. E.g. the frame azimuth start

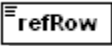
element lev-

el1Product/productSpecific/geocodedImageInfo/mappingGridInfo/gridReferenceTime/tauReferenceTime

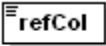
diagram	 for the tau range time values in the grid
type	xs:double
properties	isRef 0 con-simp- tent le
annotation	documentati- on grid for the tau range time values in the

element lev-

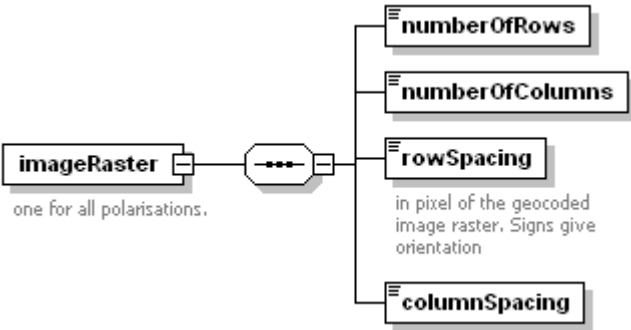
el1Product/productSpecific/geocodedImageInfo/mappingGridInfo/gridReferenceTime/refRow

diagram	 reference pixel position in an image file row. E.g. 1
type	xs:long
properties	isRef 0 con-simp- tent le
annotation	documentati- on 1 reference pixel position in an image file row. E.g.

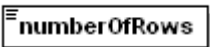
element level1**Product/productSpecific/geocodedImageInfo/mappingGridInfo/gridReferenceTime/refCol**

diagram	 reference pixel position in image column. E.g. 1
type	xs:long
properties	isRef 0 con-sim- tent le
annotation	documentati-reference pixel position in image column. E.g. on 1

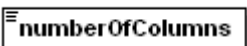
element level1Product/productSpecific/geocodedImageInfo/mappingGridInfo/imageRaster

diagram	 one for all polarisations.
properties	isRef 0 con-com- tent plex
children	<u>numberOfRows</u> <u>numberOfColumns</u> <u>rowSpacing</u> <u>columnSpacing</u>
annotation	documentati-one for all polarisati- on ons.

element lev- el1Product/productSpecific/geocodedImageInfo/mappingGridInfo/imageRaster/numberOfRows

diagram	
type	xs:int
properties	isRef 0 con-sim- tent le

element lev- el1Product/productSpecific/geocodedImageInfo/mappingGridInfo/imageRaster/numberOfColumns

diagram	
type	xs:int
properties	isRef 0 con-sim- tent le

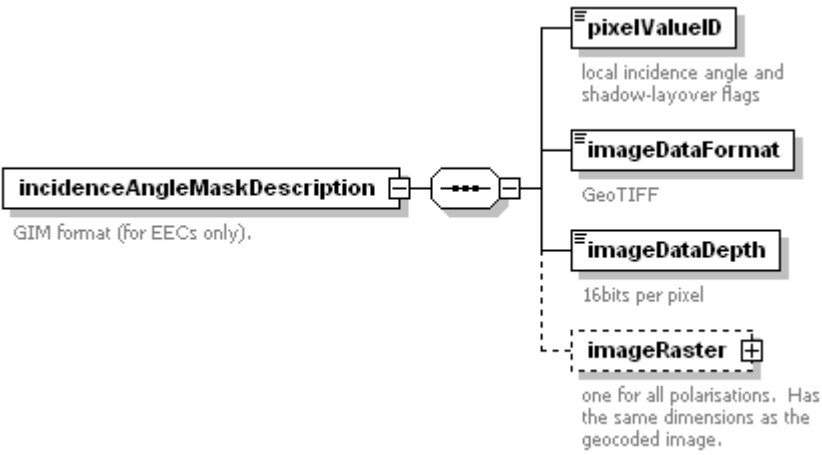
element **level1Product/productSpecific/geocodedImageInfo/mappingGridInfo/imageRaster/rowSpacing**

diagram	 in pixel of the geocoded image raster. Signs give orientation
type	xs:float
properties	isRef 0 con-sim- tent le
annotation	documentati-in pixel of the geocoded image raster. Signs give orientati- on on

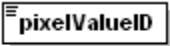
element **lev-
el1Product/productSpecific/geocodedImageInfo/mappingGridInfo/imageRaster/columnSpacing**

diagram	
type	xs:float
properties	isRef 0 con-sim- tent le

element **level1Product/productSpecific/geocodedImageInfo/incidenceAngleMaskDescription**

diagram	 incidenceAngleMaskDescription GIM format (for EECs only). pixelValueID local incidence angle and shadow-layover flags imageDataFormat GeoTIFF imageDataDepth 16bits per pixel imageRaster one for all polarisations. Has the same dimensions as the geocoded image.
properties	isRef 0 con-com- tent plex
children	<u>pixelValueID</u> <u>imageDataFormat</u> <u>imageDataDepth</u> <u>imageRaster</u>
annotation	documentati-GIM format (for EECs on only).

element **lev-
el1Product/productSpecific/geocodedImageInfo/incidenceAngleMaskDescription/pixelValueID**

diagram	 local incidence angle and shadow-layover flags
type	string128
properties	isRef 0 con-sim- tent le
facets	maxLength 128
annotation	documentati-local incidence angle and shadow-layover on flags

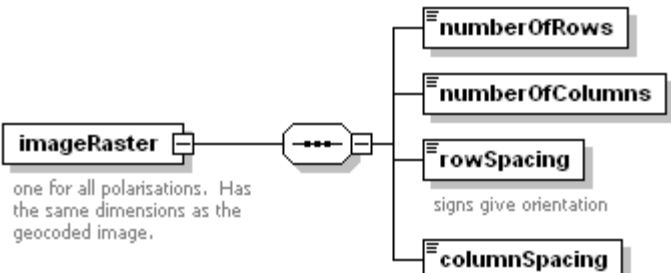
element lev-
el1Product/productSpecific/geocodedImageInfo/incidenceAngleMaskDescription/imageDataFormat

diagram	 GeoTIFF
type	string255
properties	isRef 0 con-sim- tent le
facets	maxLength 255
annotation	documentati-Geo- on TIFF

element lev-
el1Product/productSpecific/geocodedImageInfo/incidenceAngleMaskDescription/imageDataDepth

diagram	 16bits per pixel
type	xs:int
properties	isRef 0 con-sim- tent le
annotation	documentati-16bits per pixel on

element lev-
el1Product/productSpecific/geocodedImageInfo/incidenceAngleMaskDescription/imageRaster

diagram	 one for all polarisations. Has the same dimensions as the geocoded image. numberOfRows numberOfColumns rowSpacing signs give orientation columnSpacing
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properties	isRef 0 con-com- tent plex
children	<u>numberOfRows</u> <u>numberOfColumns</u> <u>rowSpacing</u> <u>columnSpacing</u>
annotation	documentati-one for all polarisations. Has the same dimensions as the geocoded im- on age.

element **lev-**
el1Product/productSpecific/geocodedImageInfo/incidenceAngleMaskDescription/imageRaster/number
OfRows

diagram	
type	xs:int
properties	isRef 0 con-simp- tent le

element **lev-**
el1Product/productSpecific/geocodedImageInfo/incidenceAngleMaskDescription/imageRaster/number
OfColumns

diagram	
type	xs:int
properties	isRef 0 con-simp- tent le

element **lev-**
el1Product/productSpecific/geocodedImageInfo/incidenceAngleMaskDescription/imageRaster/rowSpa
cing

diagram	 signs give orientation
type	xs:float
properties	isRef 0 con-simp- tent le
annotation	documentati-signs give orientati- on on

element **lev-**
el1Product/productSpecific/geocodedImageInfo/incidenceAngleMaskDescription/imageRaster/column
Spacing

diagram	
type	xs:float

properties	isRef 0 con-simp- tent le
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element **level1Product/productSpecific/geocodedImageInfo/DEMCoverageMapDescription**

diagram	
properties	isRef 0 con-com- tent plex
children	<u>pixelValueID</u> <u>imageDataFormat</u> <u>imageDataDepth</u> <u>imageRaster</u>
annotation	documentati-indicates the DEM source for each image pixel (for EECs on only).

element **level1Product/productSpecific/geocodedImageInfo/DEMCoverageMapDescription/pixelValueID**

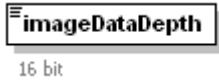
diagram	
type	<u>string128</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 128
annotation	documentati-DEM sources on codes

element **lev-
el1Product/productSpecific/geocodedImageInfo/DEMCoverageMapDescription/imageDataFormat**

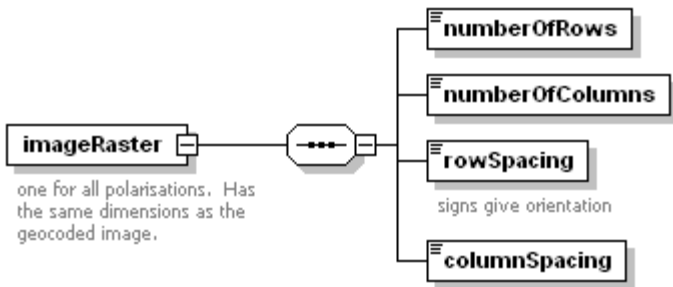
diagram	
type	<u>string255</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 255

annotation	documentati-Geo- on TIFF
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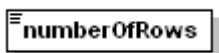
element **lev-
el1Product/productSpecific/geocodedImageInfo/DEMCoverageMapDescription/imageDataDepth**

diagram	 16 bit
type	xs:int
properties	isRef 0 con-simp- tent le
annotation	documentati-16 on bit

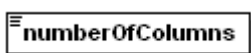
element **level1Product/productSpecific/geocodedImageInfo/DEMCoverageMapDescription/imageRaster**

diagram	 one for all polarisations. Has the same dimensions as the geocoded image.
properties	isRef 0 con-com- tent plex
children	<u>numberOfRows</u> <u>numberOfColumns</u> <u>rowSpacing</u> <u>columnSpacing</u>
annotation	documentati-one for all polarisations. Has the same dimensions as the geocoded im- on age.

element **lev-
el1Product/productSpecific/geocodedImageInfo/DEMCoverageMapDescription/imageRaster/numberOf
Rows**

diagram	
type	xs:int
properties	isRef 0 con-simp- tent le

element **lev-
el1Product/productSpecific/geocodedImageInfo/DEMCoverageMapDescription/imageRaster/numberOf
Columns**

diagram	
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type	xs:int
properties	isRef 0 con-simp- tent le

element **lev-**

el1Product/productSpecific/geocodedImageInfo/DEMCoverageMapDescription/imageRaster/rowSpacing

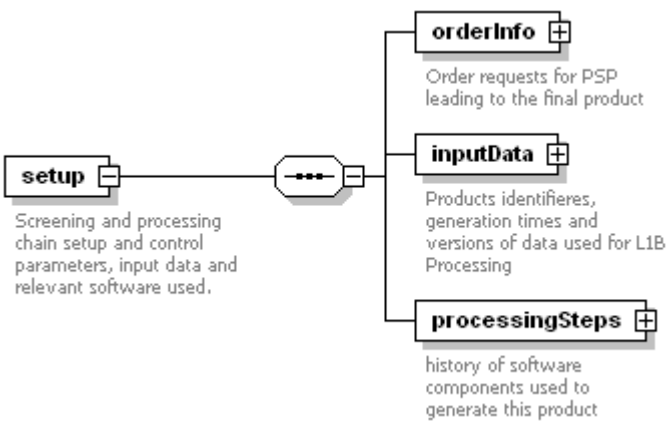
diagram	 signs give orientation
type	xs:float
properties	isRef 0 con-simp- tent le
annotation	documentati-signs give orientati- on on

element **lev-**

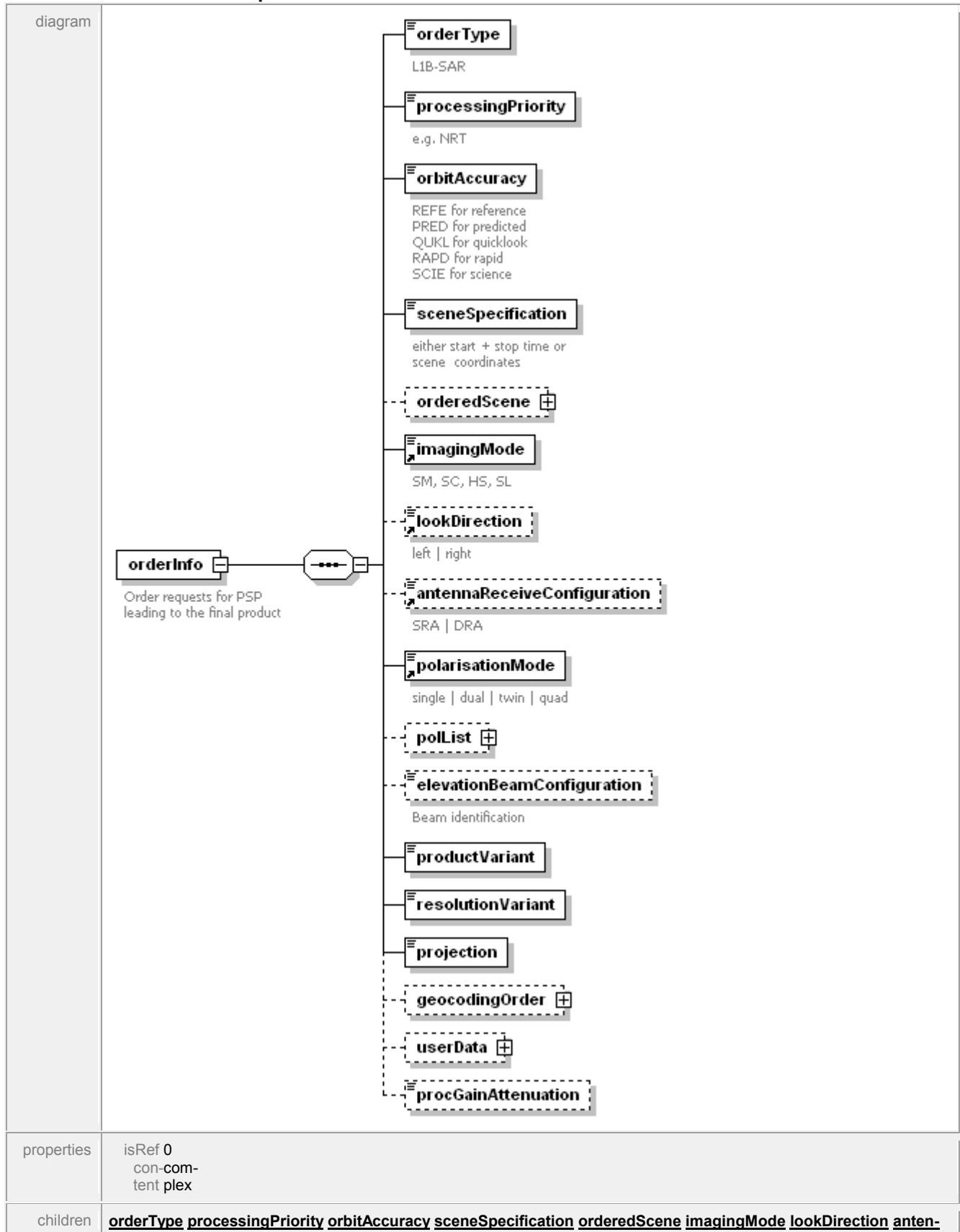
el1Product/productSpecific/geocodedImageInfo/DEMCoverageMapDescription/imageRaster/columnSpacing

diagram	
type	xs:float
properties	isRef 0 con-simp- tent le

element **level1Product/setup**

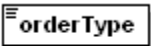
diagram	 The diagram shows a hierarchical structure. A central box labeled 'setup' (with a small square icon) is connected to a larger box labeled 'orderInfo' (with a small square icon). Below 'orderInfo' are two more boxes: 'inputData' and 'processingSteps', both with small square icons. The 'setup' box contains the text: 'Screening and processing chain setup and control parameters, input data and relevant software used.' The 'orderInfo' box contains: 'Order requests for PSP leading to the final product'. The 'inputData' box contains: 'Products identifiers, generation times and versions of data used for L1B Processing'. The 'processingSteps' box contains: 'history of software components used to generate this product'.
properties	isRef 0 con-com- tent plex
children	<u>orderInfo</u> <u>inputData</u> <u>processingSteps</u>
annotation	documentati-Screening and processing chain setup and control parameters, input data and relevant software on used.

element level1Product/setup/orderInfo

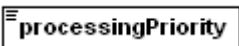


	<u>naReceiveConfiguration</u> <u>polarisationMode</u> <u>polList</u> <u>elevationBeamConfiguration</u> <u>productVariant</u> <u>resolutionVariant</u> <u>projection</u> <u>geocodingOrder</u> <u>userData</u> <u>procGainAttenuation</u>
annotation	documentati-Order requests for PSP leading to the final prod- on uct

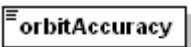
element **level1Product/setup/orderInfo/orderType**

diagram	 LIB-SAR
type	<u>string128</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 128
annotation	documentati-L1B- on SAR

element **level1Product/setup/orderInfo/processingPriority**

diagram	 e.g. NRT
type	<u>string20</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 20
annotation	documentati-e.g. on NRT

element **level1Product/setup/orderInfo/orbitAccuracy**

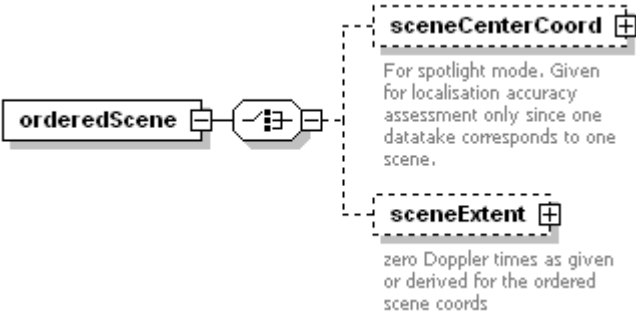
diagram	 REFE for reference PRED for predicted QUKL for quicklook RAPD for rapid SCIE for science
type	restriction of xs:NMTOKEN
properties	isRef 0 con-simp- tent le
facets	enumerati-REFE on enumerati-PRED on enumerati-QUKL on enumerati-RAPD on enumerati-SCIE on

	enumerati-UNDEFINE on D
annotation	documentati-REFE for refer- on ence PRED for predict- ed QUKL for quick- look RAPD for rapid SCIE for science

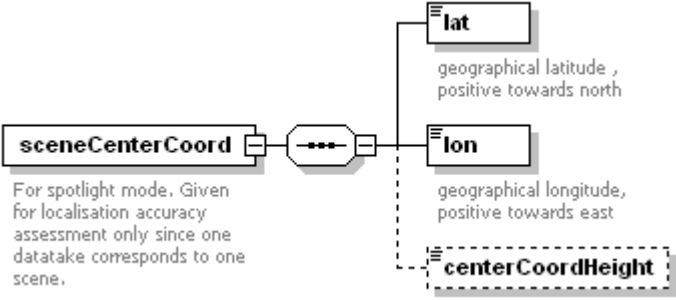
element **level1Product/setup/orderInfo/sceneSpecification**

diagram	 either start + stop time or scene coordinates
type	restriction of xs:NMTOKENS
properties	isRef 0 con-simp- tent le
facets	enumerati-COORDS on enumerati-TIME on enumerati-CENTERCOORD on S enumerati-UNDEFINED on
annotation	documentati-either start + stop time or scene coordi- on nates

element **level1Product/setup/orderInfo/orderedScene**

diagram	 orderedScene is connected to sceneCenterCoord and sceneExtent. sceneCenterCoord (+): For spotlight mode, Given for localisation accuracy assessment only since one datatake corresponds to one scene. sceneExtent (+): zero Doppler times as given or derived for the ordered scene coords
properties	isRef 0 con-com- tent plex
children	<u>sceneCenterCoord</u> <u>sceneExtent</u>

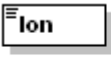
element **level1Product/setup/orderInfo/orderedScene/sceneCenterCoord**

diagram	 For spotlight mode. Given for localisation accuracy assessment only since one data take corresponds to one scene. lat geographical latitude , positive towards north lon geographical longitude, positive towards east centerCoordHeight
properties	isRef 0 con-com- tent plex
children	<u>lat lon centerCoordHeight</u>
annotation	documentati-For spotlight mode. Given for localisation accuracy assessment only since one data take corresponds to on one scene.

element **level1Product/setup/orderInfo/orderedScene/sceneCenterCoord/lat**

diagram	 geographical latitude , positive towards north
type	<u>latitudeDegType</u>
properties	isRef 0 con-simp- tent le
facets	minInclusive -90 maxInclusi-90 ve
annotation	documentati-geographical latitude , positive towards on north

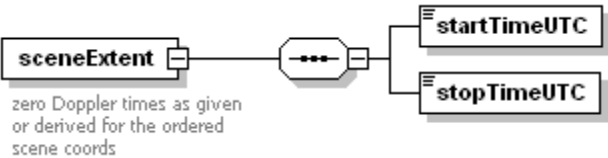
element **level1Product/setup/orderInfo/orderedScene/sceneCenterCoord/lon**

diagram	 geographical longitude, positive towards east
type	<u>longitudeDegType</u>
properties	isRef 0 con-simp- tent le
facets	minInclusive -180 maxInclusi-180 ve
annotation	documentati-geographical longitude, positive towards on east

element **level1Product/setup/orderInfo/orderedScene/sceneCenterCoord/centerCoordHeight**

diagram	
type	xs:double
properties	isRef 0 con-sim- tent le

element **level1Product/setup/orderInfo/orderedScene/sceneExtent**

diagram	 zero Doppler times as given or derived for the ordered scene coords
properties	isRef 0 con-com- tent plex
children	<u>startTimeUTC</u> <u>stopTimeUTC</u>
annotation	documentati-zero Doppler times as given or derived for the ordered scene on coords

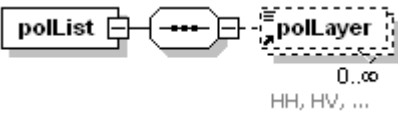
element **level1Product/setup/orderInfo/orderedScene/sceneExtent/startTimeUTC**

diagram	
type	xs:dateTime
properties	isRef 0 con-sim- tent le

element **level1Product/setup/orderInfo/orderedScene/sceneExtent/stopTimeUTC**

diagram	
type	xs:dateTime
properties	isRef 0 con-sim- tent le

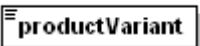
element **level1Product/setup/orderInfo/pollList**

diagram	 0..∞ HH, HV, ...
properties	isRef 0 con-com- tent plex
children	<u>pollLayer</u>

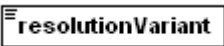
element level1Product/setup/orderInfo/elevationBeamConfiguration

diagram	 Beam identification
type	string20
properties	isRef 0 con-simp- tent le
facets	maxLength 20
annotation	documentati-Beam identificati- on on

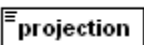
element level1Product/setup/orderInfo/productVariant

diagram	
type	restriction of xs:NMTOKENS
properties	isRef 0 con-simp- tent le
facets	enumerati-SSC on enumerati-MGD on enumerati-GEC on enumerati-EEC on enumerati-UNDEFINE on D

element level1Product/setup/orderInfo/resolutionVariant

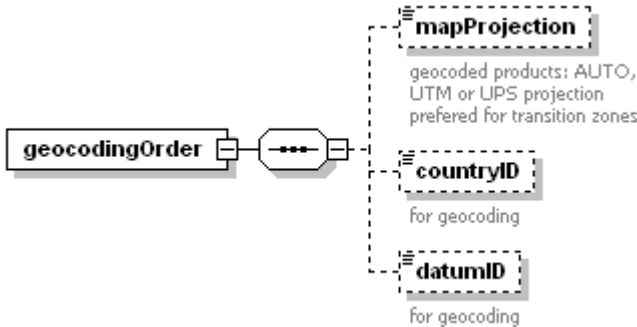
diagram	
type	restriction of xs:NMTOKENS
properties	isRef 0 con-simp- tent le
facets	enumerati-SE on enumerati-RE on enumerati-UNDEFINE on D

element level1Product/setup/orderInfo/projection

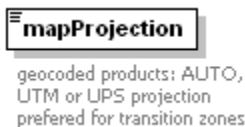
diagram	
type	restriction of xs:NMTOKENS

properties	isRef 0 con-simp- tent le
facets	enumerati- on GROUND RANGE enumerati- on SLAN RANGE enumerati- on UNDE FINED enumerati- on MAP on

element **level1Product/setup/orderInfo/geocodingOrder**

diagram	
properties	isRef 0 con-com- tent plex
children	<u>mapProjection</u> <u>countryID</u> <u>datumID</u>

element **level1Product/setup/orderInfo/geocodingOrder/mapProjection**

diagram	
type	restriction of xs:NMTOKENS
properties	isRef 0 con-simp- tent le
facets	enumerati- on UTM enumerati- on UPS enumerati- on UNDE FINE enumerati- on D enumerati- on AUTO on
annotation	documentati-geocoded products: AUTO, UTM or UPS projection preferred for transition on zones

element **level1Product/setup/orderInfo/geocodingOrder/countryID**

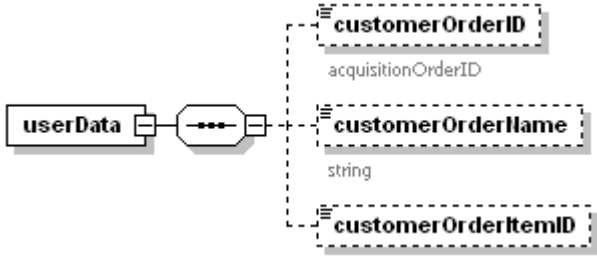
diagram	
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type	<u>string128</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 128
annotation	documentati-for ge- on ocoding

element **level1Product/setup/orderInfo/geocodingOrder/datumID**

diagram	
type	<u>string128</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 128
annotation	documentati-for ge- on ocoding

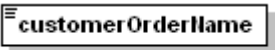
element **level1Product/setup/orderInfo/userData**

diagram	
properties	isRef 0 con-com- tent plex
children	<u>customerOrderID</u> <u>customerOrderName</u> <u>customerOrderItemID</u>

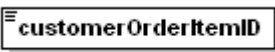
element **level1Product/setup/orderInfo/userData/customerOrderID**

diagram	
type	xs:string
properties	isRef 0 con-simp- tent le
annotation	documentati-acquisitionOrde- on rID

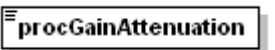
element **level1Product/setup/orderInfo/userData/customerOrderName**

diagram	 string
type	xs:string
properties	isRef 0 con-simp- tent le
annotation	documentati-strin on g

element **level1Product/setup/orderInfo/userData/customerOrderItemID**

diagram	 string
type	xs:string
properties	isRef 0 con-simp- tent le

element **level1Product/setup/orderInfo/procGainAttenuation**

diagram	 double
type	xs:double
properties	isRef 0 con-simp- tent le

element **level1Product/setup/inputData**

diagram	 <pre> classDiagram class inputData { Products identifiers, generation times and versions of data used for L1B Processing } class logicalDataTakeID { logical dataake ID built by receiving station, dataake file number, commanded acquisition start time } class uniqueDataTakeID { unique number of dataake if available } class level0ProductID class L0BaseGenerationTimeUTC class L0SARGenerationTimeUTC class IOCSAuxProductID class IOCSAuxProductFileName class IOCSAuxProductVersion class IOCSAuxProductGenerationTimeUTC class orbitProductID class orbitProductFileName class orbitAccuracy class orbitProductGenerationTimeUTC class attitudeProductID class attitudeProductFileName class attitudeProductGenerationTimeUTC class configurationID { processor and product configuration file } class configurationFileName { processor and product configuration file } class configurationGenerationTimeUTC inputData --> logicalDataTakeID inputData --> uniqueDataTakeID inputData --> level0ProductID inputData --> L0BaseGenerationTimeUTC inputData --> L0SARGenerationTimeUTC inputData --> IOCSAuxProductID inputData --> IOCSAuxProductFileName inputData --> IOCSAuxProductVersion inputData --> IOCSAuxProductGenerationTimeUTC inputData --> orbitProductID inputData --> orbitProductFileName inputData --> orbitAccuracy inputData --> orbitProductGenerationTimeUTC inputData --> attitudeProductID inputData --> attitudeProductFileName inputData --> attitudeProductGenerationTimeUTC inputData --> configurationID inputData --> configurationFileName inputData --> configurationGenerationTimeUTC </pre>
properties	isRef 0 con-com- tent plex
children	logicalDataTakeID uniqueDataTakeID level0ProductID L0BaseGenerationTimeUTC L0SARGenerationTimeUTC IOCSAuxProductID IOCSAuxProductFileName IOCSAuxProductVersion IOCSAuxProductGenerationTimeUTC orbitProductID orbitProductFileName orbitAccuracy orbitProductGenerationTimeUTC attitudeProductID attitudeProductFileName attitudeProductGenerationTimeUTC configurationID configurationFileName configurationGenerationTimeUTC

	<u>tionGenerationTimeUTC</u>
annotation	documentati-Products identifieres, generation times and versions of data used for L1B Pro- on censing

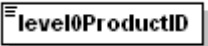
element level1Product/setup/inputData/logicalDataTakeID

diagram	 logical datatake ID built by receiving station, datatake file number, commanded acquisition start time
type	<u>string1024</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 1024
annotation	documentati-logical datatake ID built by receiving station, datatake file number, commanded acquisition start on time

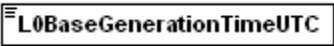
element level1Product/setup/inputData/uniqueDataTakeID

diagram	 unique number of datatake if available
type	<u>string1024</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 1024
annotation	documentati-unique number of datatake if availa- on ble

element level1Product/setup/inputData/level0ProductID

diagram	
type	<u>string1024</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 1024

element level1Product/setup/inputData/L0BaseGenerationTimeUTC

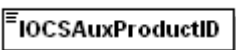
diagram	
type	xs:dateTime
properties	isRef 0

	con-simp- tent le
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element **level1Product/setup/inputData/L0SARGenerationTimeUTC**

diagram	
type	xs:dateTime
properties	isRef 0 con-simp- tent le

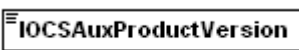
element **level1Product/setup/inputData/IOCSAuxProductID**

diagram	
type	<u>string1024</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 1024

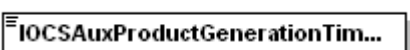
element **level1Product/setup/inputData/IOCSAuxProductFileName**

diagram	
type	<u>string1024</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 1024

element **level1Product/setup/inputData/IOCSAuxProductVersion**

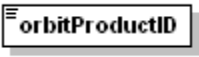
diagram	
type	<u>string80</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 80

element **level1Product/setup/inputData/IOCSAuxProductGenerationTimeUTC**

diagram	
type	xs:dateTime
properties	isRef 0 con-simp-

	tent le
--	---------

element **level1Product/setup/inputData/orbitProductID**

diagram	
type	<u>string1024</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 1024

element **level1Product/setup/inputData/orbitProductFileName**

diagram	
type	<u>string1024</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 1024

element **level1Product/setup/inputData/orbitAccuracy**

diagram	
type	restriction of xs:string
properties	isRef 0 con-simp- tent le
facets	maxLength 20 enumerati-REFE on enumerati-PRE on D enumerati-QUKL on enumerati-RAP on D enumerati-SCIE on

element **level1Product/setup/inputData/orbitProductGenerationTimeUTC**

diagram	
type	xs:dateTime
properties	isRef 0 con-simp- tent le

element **level1Product/setup/inputData/attitudeProductID**

diagram	
type	<u>string1024</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 1024

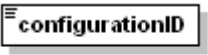
element **level1Product/setup/inputData/attitudeProductFileName**

diagram	
type	<u>string1024</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 1024

element **level1Product/setup/inputData/attitudeProductGenerationTimeUTC**

diagram	
type	xs:dateTime
properties	isRef 0 con-simp- tent le

element **level1Product/setup/inputData/configurationID**

diagram	 processor and product configuration file
type	<u>string1024</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 1024
annotation	documentati-processor and product configuration on file

element **level1Product/setup/inputData/configurationFileName**

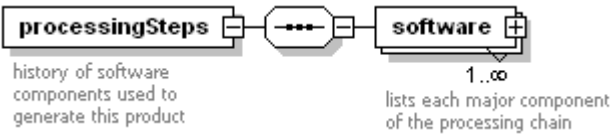
diagram	 processor and product configuration file
type	<u>string1024</u>
properties	isRef 0

	con-simp- tent le
facets	maxLength 1024
annotation	documentati-processor and product configuration on file

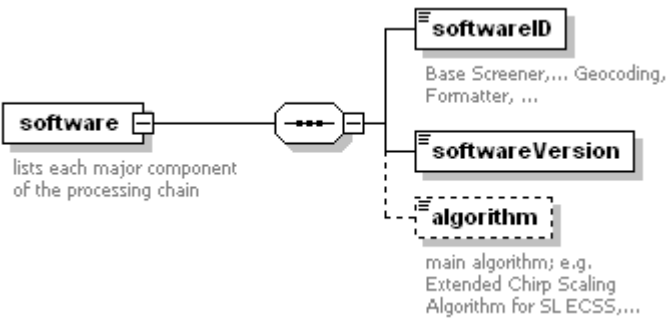
element **level1Product/setup/inputData/configurationGenerationTimeUTC**

diagram	
type	xs:dateTime
properties	isRef 0 con-simp- tent le

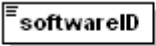
element **level1Product/setup/processingSteps**

diagram	 history of software components used to generate this product 1..∞ lists each major component of the processing chain
properties	isRef 0 con-com- tent plex
children	<u>software</u>
annotation	documentati-history of software components used to generate this prod- on uct

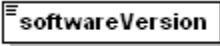
element **level1Product/setup/processingSteps/software**

diagram	 lists each major component of the processing chain
properties	isRef 0 con-com- tent plex
children	<u>softwareID</u> <u>softwareVersion</u> <u>algorithm</u>
annotation	documentati-lists each major component of the processing on chain

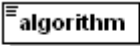
element **level1Product/setup/processingSteps/software/softwareID**

diagram	 Base Screener,... Geocoding, Formatter, ...
type	<u>string128</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 128
annotation	documentati-Base Screener,... Geocoding, Formatter, on ...

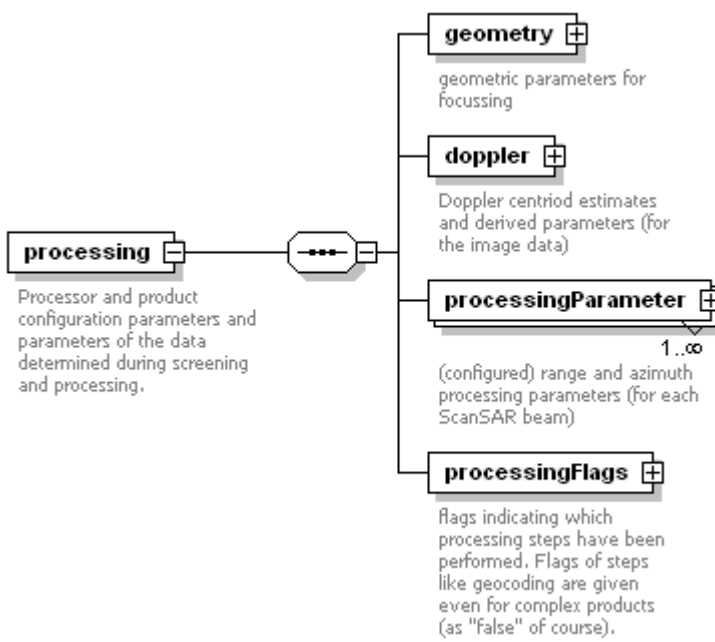
element level1Product/setup/processingSteps/software/softwareVersion

diagram	
type	<u>string128</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 128

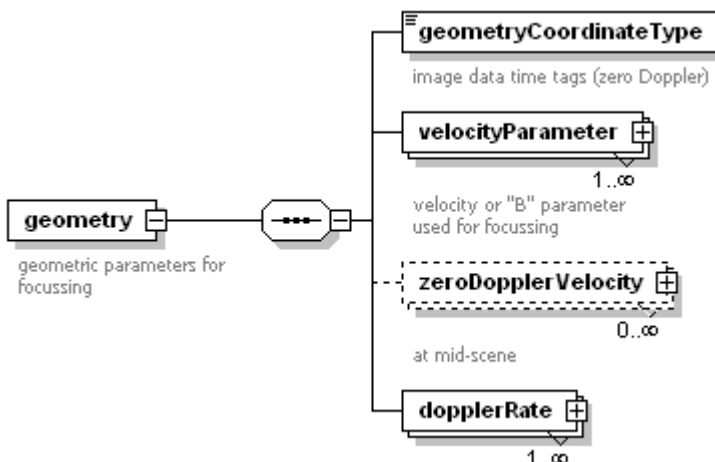
element level1Product/setup/processingSteps/software/algorithm

diagram	 main algorithm; e.g. Extended Chirp Scaling Algorithm for SL ECSS,...
type	<u>string255</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 255
annotation	documentati-main algorithm; e.g. Extended Chirp Scaling Algorithm for SL on ECSS,...

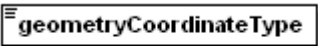
element level1Product/processing

diagram	
properties	isRef 0 con-com- tent plex
children	<u>geometry</u> <u>doppler</u> <u>processingParameter</u> <u>processingFlags</u>
annotation	documentati-Processor and product configuration parameters and parameters of the data determined during screening on and processing.

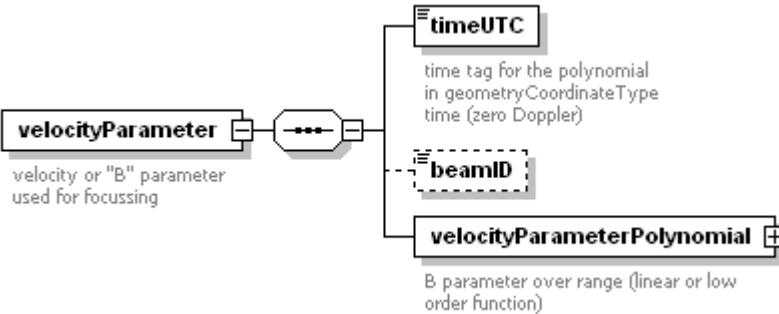
element level1Product/processing/geometry

diagram	
properties	isRef 0 con-com- tent plex
children	<u>geometryCoordinateType</u> <u>velocityParameter</u> <u>zeroDopplerVelocity</u> <u>dopplerRate</u>
annotation	documentati-geometric parameters for focus- on sing

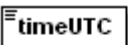
element level1Product/processing/geometry/geometryCoordinateType

diagram	 image data time tags (zero Doppler)
type	<u>string20</u>
properties	isRef 0 con-sim- tent le
facets	maxLength 20
annotation	documentati-image data time tags (zero Dopp- on ler)

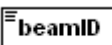
element level1Product/processing/geometry/velocityParameter

diagram	 velocityParameter velocity or "B" parameter used for focussing timeUTC time tag for the polynomial in geometryCoordinateType time (zero Doppler) beamID B parameter over range (linear or low order function) velocityParameterPolynomial B parameter over range (linear or low order function)
properties	isRef 0 con-com- tent plex
children	<u>timeUTC</u> <u>beamID</u> <u>velocityParameterPolynomial</u>
annotation	documentati-velocity or "B" parameter used for focus- on sing

element level1Product/processing/geometry/velocityParameter/timeUTC

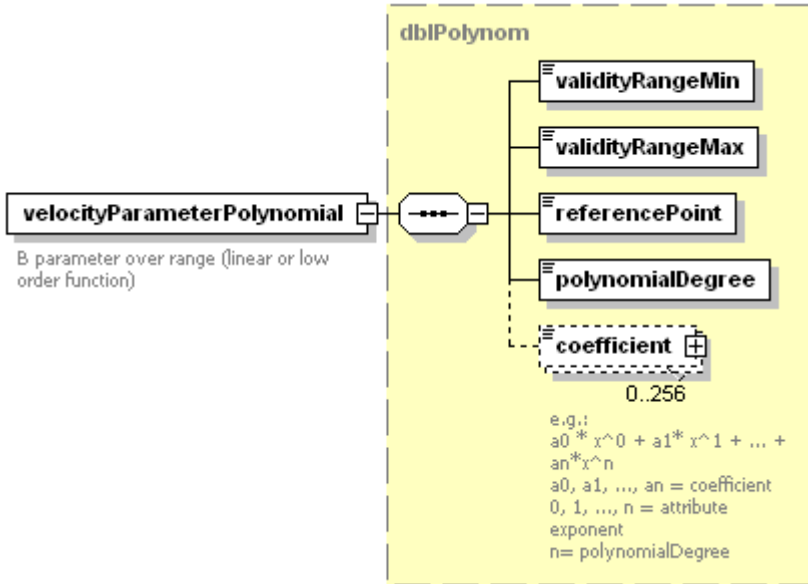
diagram	 time tag for the polynomial in geometryCoordinateType time (zero Doppler)
type	xs:dateTime
properties	isRef 0 con-sim- tent le
annotation	documentati-time tag for the polynomial in geometryCoordinateType time (zero Dop- on pler)

element level1Product/processing/geometry/velocityParameter/beamID

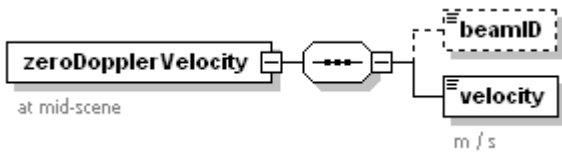
diagram	
type	<u>string20</u>
properties	isRef 0

	con-simp- tent le
facets	maxLength 20

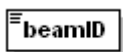
element **level1Product/processing/geometry/velocityParameter/velocityParameterPolynomial**

diagram	
type	<u>dbIPolynomial</u>
properties	isRef 0 con-com- tent plex
children	<u>validityRangeMin</u> <u>validityRangeMax</u> <u>referencePoint</u> <u>polynomialDegree</u> <u>coefficient</u>
annotation	documentati-B parameter over range (linear or low order func- on tion)

element **level1Product/processing/geometry/zeroDopplerVelocity**

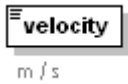
diagram	
properties	isRef 0 con-com- tent plex
children	<u>beamID</u> <u>velocity</u>
annotation	documentati-at mid- on scene

element **level1Product/processing/geometry/zeroDopplerVelocity/beamID**

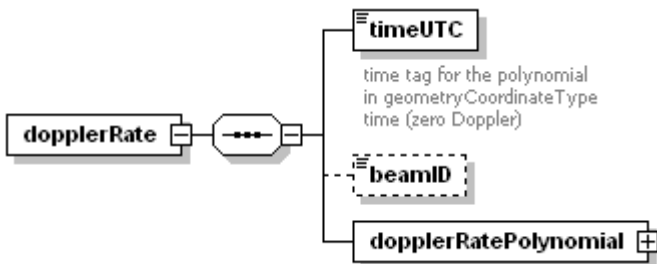
diagram	
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type	string20
properties	isRef 0 con-sim- tent le
facets	maxLength 20

element **level1Product/processing/geometry/zeroDopplerVelocity/velocity**

diagram	
type	xs:double
properties	isRef 0 con-sim- tent le
annotation	documentati-m / on s

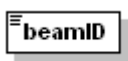
element **level1Product/processing/geometry/dopplerRate**

diagram	
properties	isRef 0 con-com- tent plex
children	timeUTC beamID dopplerRatePolynomial

element **level1Product/processing/geometry/dopplerRate/timeUTC**

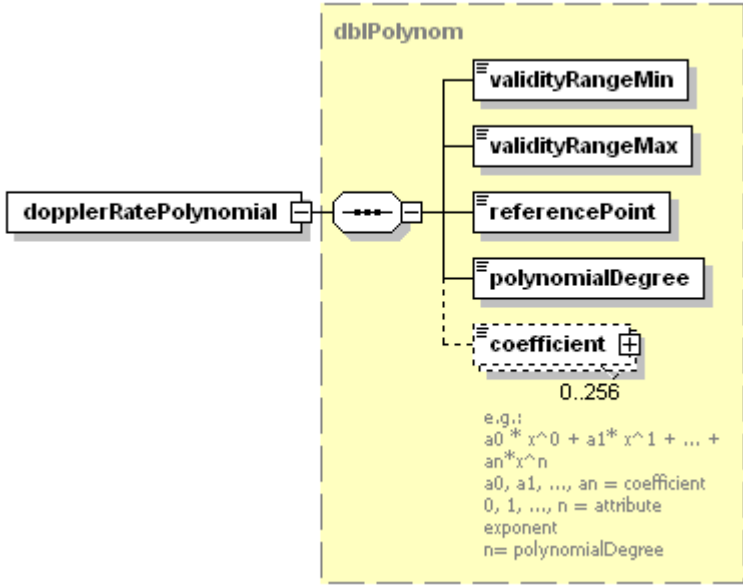
diagram	
type	xs:dateTime
properties	isRef 0 con-sim- tent le
annotation	documentati-time tag for the polynomial in geometryCoordinateType time (zero Dop- on pler)

element **level1Product/processing/geometry/dopplerRate/beamID**

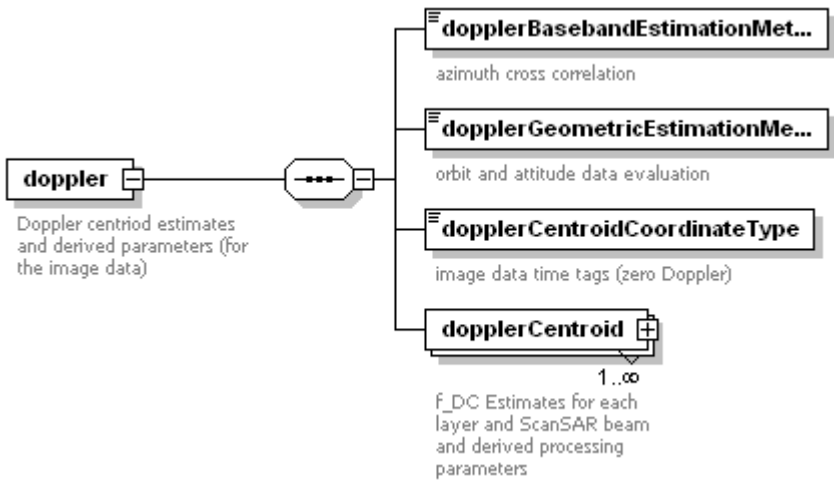
diagram	
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type	<u>string20</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 20

element **level1Product/processing/geometry/dopplerRate/dopplerRatePolynomial**

diagram	 The diagram shows a box labeled dopplerRatePolynomial connected to a dashed box labeled dbiPolynom. Inside dbiPolynom, there are four attributes: validityRangeMin, validityRangeMax, referencePoint, and polynomialDegree. A dashed box labeled coefficient is also shown, containing the value 0..256. Below the coefficient box, there is a mathematical formula: $a_0 * x^0 + a_1 * x^1 + \dots + a_n * x^n$. Below the formula, there is a list of variables: a0, a1, ..., an = coefficient, 0, 1, ..., n = attribute exponent, and n = polynomialDegree.
type	<u>dbiPolynom</u>
properties	isRef 0 con-com- tent plex
children	<u>validityRangeMin</u> <u>validityRangeMax</u> <u>referencePoint</u> <u>polynomialDegree</u> <u>coefficient</u>

element **level1Product/processing/doppler**

diagram	 The diagram shows a box labeled doppler connected to a dashed box. Inside the dashed box, there are four attributes: dopplerBasebandEstimationMet..., dopplerGeometricEstimationMe..., dopplerCentroidCoordinateType, and dopplerCentroid. Below the dopplerCentroid box, there is a value 1..∞. Below the value, there is a list of variables: f_DC Estimates for each layer and ScanSAR beam and derived processing parameters.
properties	isRef 0 con-com- tent plex

children	<u>dopplerBasebandEstimationMethod</u> <u>dopplerGeometricEstimationMethod</u> <u>dopplerCentroidCoordinateType</u> <u>dopplerCentroid</u>
annotation	documentati-Doppler centriod estimates and derived parameters (for the image on data)

element **level1Product/processing/doppler/dopplerBasebandEstimationMethod**

diagram	 azimuth cross correlation
type	<u>string255</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 255
annotation	documentati-azimuth cross correlati- on on

element **level1Product/processing/doppler/dopplerGeometricEstimationMethod**

diagram	 orbit and attitude data evaluation
type	<u>string255</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 255
annotation	documentati-orbit and attitude data evalua- on tion

element **level1Product/processing/doppler/dopplerCentroidCoordinateType**

diagram	 image data time tags (zero Doppler)
type	restriction of <u>string20</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 20 enumerati-RAW on enumerati-ZERODOPPLE on R enumerati-UNDEFINED on
annotation	documentati-image data time tags (zero Dopp- on ler)

element **level1Product/processing/doppler/dopplerCentroid**

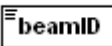
diagram	<pre> classDiagram class dopplerCentroid { layerIndex polLayer DRAoffset beamID scanSARDopplerOffset spotlightDopplerProgression polLayerDopplerOffset numberOfBlocks numberOfRejectedBlocks numberOfDopplerRecords dopplerRecordAzimuthSpacing dopplerEstimate } dopplerCentroid "1" -- "1..∞" dopplerEstimate </pre>					
properties	isRef 0 con-com- tent plex					
children	<u>polLayer</u> <u>DRAoffset</u> <u>beamID</u> <u>scanSARDopplerOffset</u> <u>spotlightDopplerProgression</u> <u>polLayerDopplerOffset</u> <u>number-OfBlocks</u> <u>numberOfRejectedBlocks</u> <u>numberOfDopplerRecords</u> <u>dopplerRecordAzimuthSpacing</u> <u>dopplerEstimate</u>					
attributes	Name layerIndex	Type xs:int	Use required	Default	Fixed	Annotation documentati-for on each

		image layer
annotation	documentati-f_DC Estimates for each layer and ScanSAR beam and derived processing parameters	

element level1Product/processing/doppler/dopplerCentroid/DRAoffset

diagram	 SRA, DRAFore, DRAAft
type	restriction of xs:NMTOKENS
properties	isRef 0 con-sim- tent le
facets	enumerati-SRA on enumerati-DRAFore on enumerati-DRAAft on
annotation	documentati-SRA, DRAFore, on DRAAft

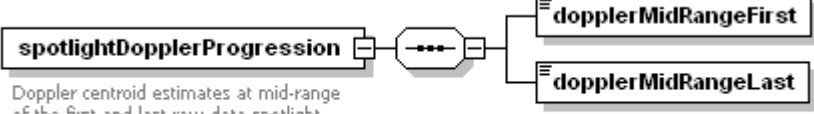
element level1Product/processing/doppler/dopplerCentroid/beamID

diagram	
type	string20
properties	isRef 0 con-sim- tent le
facets	maxLength 20

element level1Product/processing/doppler/dopplerCentroid/scanSARDopplerOffset

diagram	 f_dc offset of this ScanSAR beam to next far range beam due to beam misalignment
type	xs:double
properties	isRef 0 con-sim- tent le
annotation	documentati-f_dc offset of this ScanSAR beam to next far range beam due to beam misalign- on ment

element level1Product/processing/doppler/dopplerCentroid/spotlightDopplerProgression

diagram	 Doppler centroid estimates at mid-range of the first and last raw data spotlight azimuth data segments (not in the image data).
properties	isRef 0 con-com- tent plex
children	<u>dopplerMidRangeFirst</u> <u>dopplerMidRangeLast</u>
annotation	documentati-Doppler centroid estimates at mid-range of the first and last raw data spotlight azimuth data segments (not on in the image data).

element lev-

el1Product/processing/doppler/dopplerCentroid/spotlightDopplerProgression/dopplerMidRangeFirst

diagram	
type	xs:double
properties	isRef 0 con-simp- tent le

element lev-

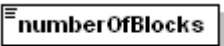
el1Product/processing/doppler/dopplerCentroid/spotlightDopplerProgression/dopplerMidRangeLast

diagram	
type	xs:double
properties	isRef 0 con-simp- tent le

element level1Product/processing/doppler/dopplerCentroid/polLayerDopplerOffset

diagram	 f_{dc} offset of this polarisation layer to the mean of all polarisations (mid-scene).
type	xs:double
properties	isRef 0 con-simp- tent le
annotation	documentati-f _{dc} offset of this polarisation layer to the mean of all polarisations (mid-on scene).

element level1Product/processing/doppler/dopplerCentroid/numberOfBlocks

diagram	 for baseband fdc estimation
type	xs:int
properties	isRef 0 con-simp- tent le
annotation	documentati-for baseband fdc estimati- on on

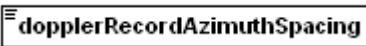
element level1Product/processing/doppler/dopplerCentroid/numberOfRejectedBlocks

diagram	 Doppler centroid estimate rejected (e.g. due to land-sea transition)
type	xs:int
properties	isRef 0 con-simp- tent le
annotation	documentati-Doppler centroid estimate rejected (e.g. due to land-sea transi- on tion)

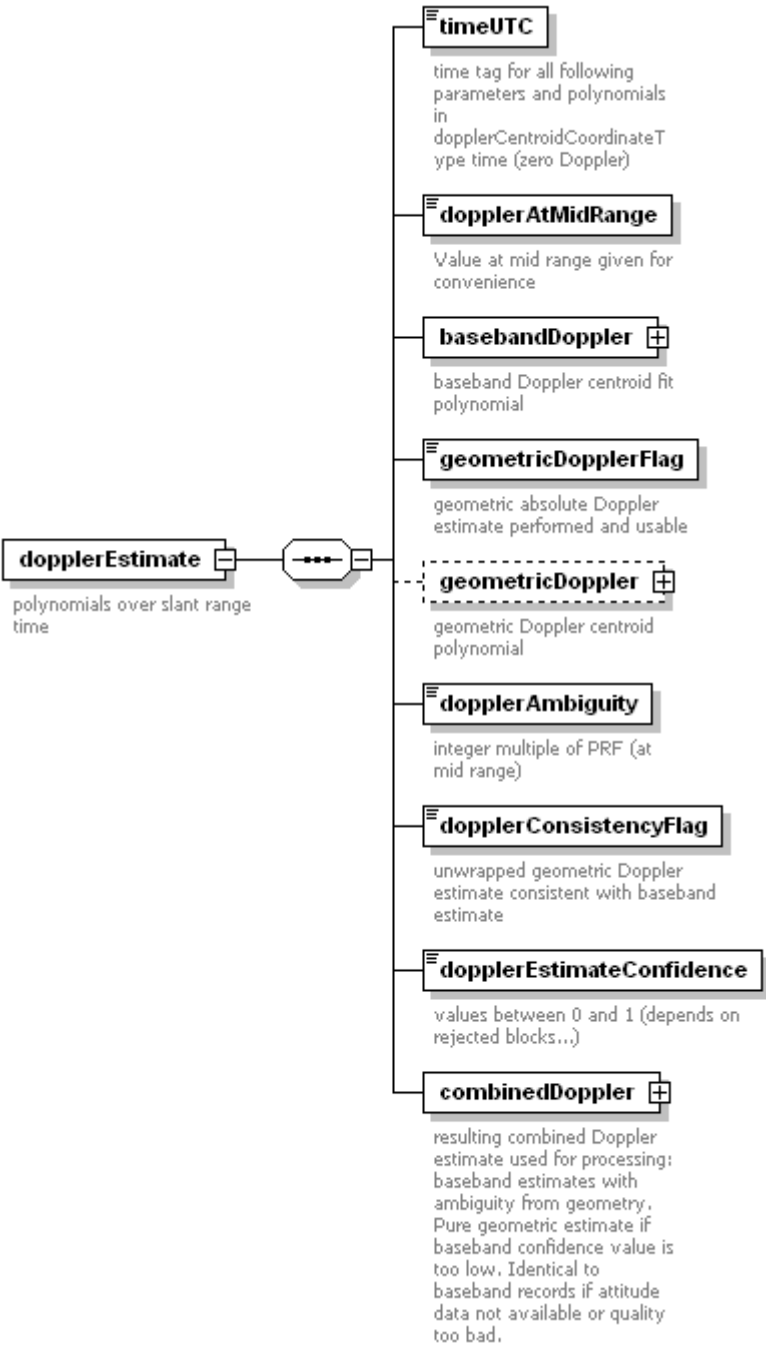
element level1Product/processing/doppler/dopplerCentroid/numberOfDopplerRecords

diagram	 Number of the following azimuth time tagged Doppler data sets
type	xs:int
properties	isRef 0 con-simp- tent le
annotation	documentati-Number of the following azimuth time tagged Doppler data on sets

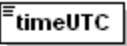
element level1Product/processing/doppler/dopplerCentroid/dopplerRecordAzimuthSpacing

diagram	 [s] nominal value
type	xs:float
properties	isRef 0 con-simp- tent le
annotation	documentati-[s] nominal on value

element level1Product/processing/doppler/dopplerCentroid/dopplerEstimate

diagram	 The diagram shows a block labeled dopplerEstimate with the description "polynomials over slant range time". This block is connected to a multi-ported block (represented by a circle with three dots) which then branches out to eight separate blocks: timeUTC: time tag for all following parameters and polynomials in dopplerCentroidCoordinateT type time (zero Doppler) dopplerAtMidRange: Value at mid range given for convenience basebandDoppler (+): baseband Doppler centroid fit polynomial geometricDopplerFlag: geometric absolute Doppler estimate performed and usable geometricDoppler (+): geometric Doppler centroid polynomial dopplerAmbiguity: integer multiple of PRF (at mid range) dopplerConsistencyFlag: unwrapped geometric Doppler estimate consistent with baseband estimate dopplerEstimateConfidence: values between 0 and 1 (depends on rejected blocks...) combinedDoppler (+): resulting combined Doppler estimate used for processing: baseband estimates with ambiguity from geometry. Pure geometric estimate if baseband confidence value is too low. Identical to baseband records if attitude data not available or quality too bad.
properties	isRef 0 con-com- tent plex
children	<u>timeUTC</u> <u>dopplerAtMidRange</u> <u>basebandDoppler</u> <u>geometricDopplerFlag</u> <u>geometricDoppler</u> <u>dopplerAmbiguity</u> <u>dopplerConsistencyFlag</u> <u>dopplerEstimateConfidence</u> <u>combinedDoppler</u>
annotation	documentati-polynomials over slant range on time

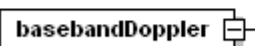
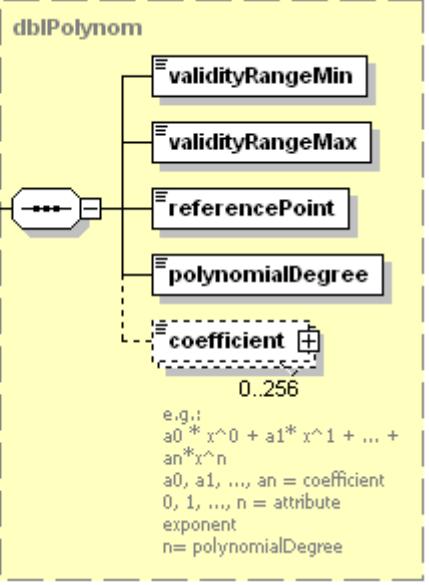
element level1Product/processing/doppler/dopplerCentroid/dopplerEstimate/timeUTC

diagram	 time tag for all following parameters and polynomials in dopplerCentroidCoordinateType time (zero Doppler)
type	xs:dateTime
properties	isRef 0 con-sim- tent le
annotation	documentati-time tag for all following parameters and polynomials in dopplerCentroidCoordinateType time (zero Dop- on pler)

element level1Product/processing/doppler/dopplerCentroid/dopplerEstimate/dopplerAtMidRange

diagram	 Value at mid range given for convenience
type	xs:double
properties	isRef 0 con-sim- tent le
annotation	documentati-Value at mid range given for conven- on ience

element level1Product/processing/doppler/dopplerCentroid/dopplerEstimate/basebandDoppler

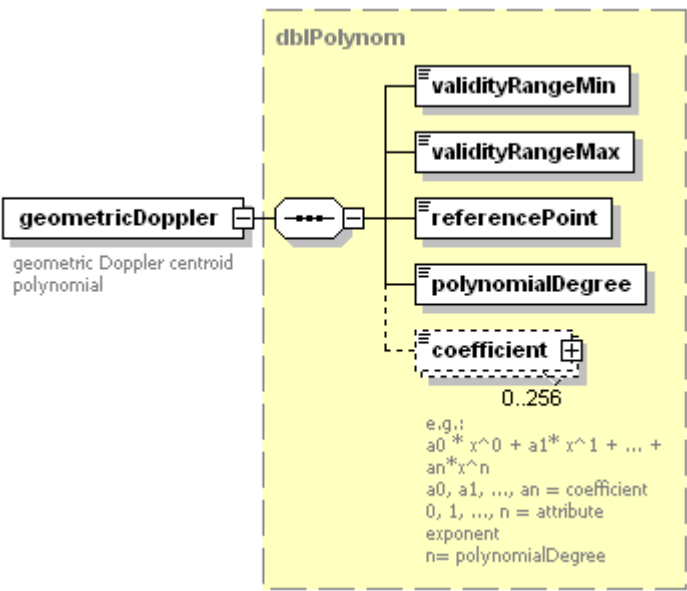
diagram	 baseband Doppler centroid fit polynomial dbfPolynom  e.g.: $a_0 * x^0 + a_1 * x^1 + \dots + a_n * x^n$ $a_0, a_1, \dots, a_n$ = coefficient $0, 1, \dots, n$ = attribute exponent n = polynomialDegree
type	<u>dbfPolynom</u>
properties	isRef 0 con-com- tent plex
children	<u>validityRangeMin</u> <u>validityRangeMax</u> <u>referencePoint</u> <u>polynomialDegree</u> <u>coefficient</u>

annotation	documentati-baseband Doppler centroid fit polynomi- on al
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element **level1Product/processing/doppler/dopplerCentroid/dopplerEstimate/geometricDopplerFlag**

diagram	
type	xs:boolean
properties	isRef 0 con-simp- tent le
annotation	documentati-geometric absolute Doppler estimate performed and usa- on ble

element **level1Product/processing/doppler/dopplerCentroid/dopplerEstimate/geometricDoppler**

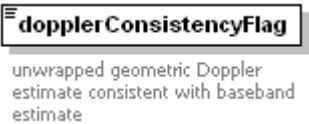
diagram	
type	<u>dbiPolynom</u>
properties	isRef 0 con-com- tent plex
children	<u>validityRangeMin</u> <u>validityRangeMax</u> <u>referencePoint</u> <u>polynomialDegree</u> <u>coefficient</u>
annotation	documentati-geometric Doppler centroid polynomi- on al

element **level1Product/processing/doppler/dopplerCentroid/dopplerEstimate/dopplerAmbiguity**

diagram	
type	xs:int

properties	isRef 0 con-simp- tent le
annotation	documentati-integer multiple of PRF (at mid on range)

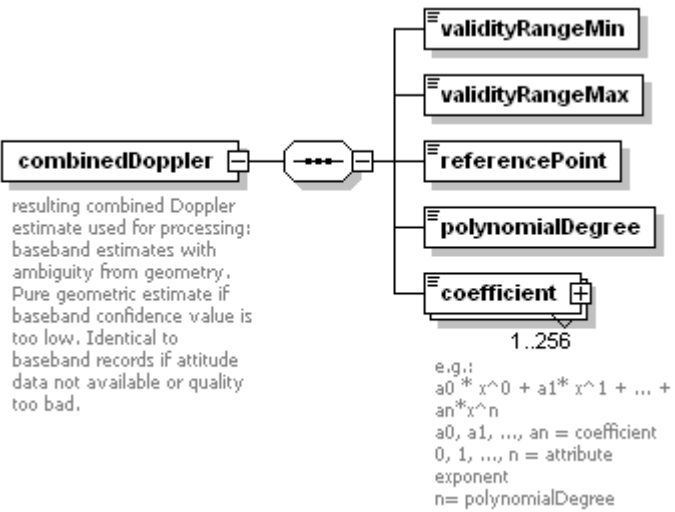
element level1Product/processing/doppler/dopplerCentroid/dopplerEstimate/dopplerConsistencyFlag

diagram	
type	xs:boolean
properties	isRef 0 con-simp- tent le
annotation	documentati-unwrapped geometric Doppler estimate consistent with baseband esti- on mate

element lev- el1Product/processing/doppler/dopplerCentroid/dopplerEstimate/dopplerEstimateConfidence

diagram	
type	xs:float
properties	isRef 0 con-simp- tent le
annotation	documentati-values between 0 and 1 (depends on rejected on blocks...)

element level1Product/processing/doppler/dopplerCentroid/dopplerEstimate/combinedDoppler

diagram	
properties	isRef 0

	con-com- tent plex
children	<u>validityRangeMin</u> <u>validityRangeMax</u> <u>referencePoint</u> <u>polynomialDegree</u> <u>coefficient</u>
annotation	documentati- on try. Pure geometric estimate if baseband confidence value is too low. Identical to baseband records if atti- tude data not available or quality too bad.

element lev-

el1Product/processing/doppler/dopplerCentroid/dopplerEstimate/combinedDoppler/validityRangeMin

diagram	
type	xs:double
properties	isRef 0 con-simp- tent le

element lev-

el1Product/processing/doppler/dopplerCentroid/dopplerEstimate/combinedDoppler/validityRangeMax

diagram	
type	xs:double
properties	isRef 0 con-simp- tent le

element lev-

el1Product/processing/doppler/dopplerCentroid/dopplerEstimate/combinedDoppler/referencePoint

diagram	
type	xs:double
properties	isRef 0 con-simp- tent le

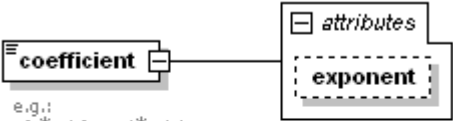
element lev-

el1Product/processing/doppler/dopplerCentroid/dopplerEstimate/combinedDoppler/polynomialDegree

diagram	
type	xs:unsignedInt
properties	isRef 0 con-simp- tent le

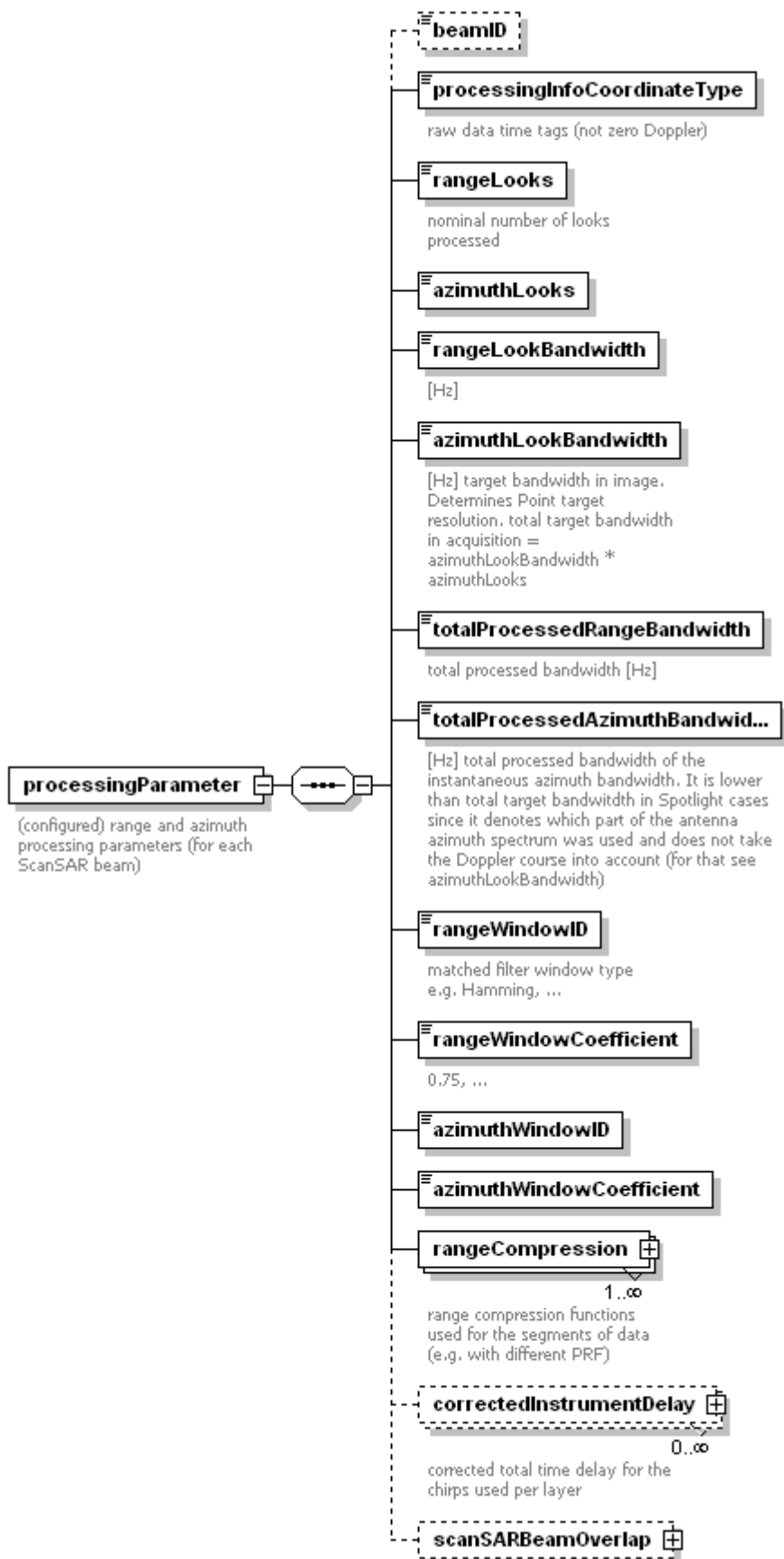
element lev-

el1Product/processing/doppler/dopplerCentroid/dopplerEstimate/combinedDoppler/coefficient

diagram	 e.g.: $a_0 * x^0 + a_1 * x^1 + \dots + a_n * x^n$ $a_0, a_1, \dots, a_n$ = coefficient $0, 1, \dots, n$ = attribute exponent n = polynomialDegree					
type	extension of xs:double					
properties	isRef 0 con-com- tent plex					
attributes	Name exponent	Type xs:unsignedInt	Use	Default	Fixed	Annotation
annotation	documentati-e.g.: $a_0 * x^0 + a_1 * x^1 + \dots + a_n * x^n$ $a_0, a_1, \dots, a_n$ = coefficient $0, 1, \dots, n$ = attribute exponent n = polynomialDegree					

element **level1Product/processing/processingParameter**

diagram



properties	isRef 0 con-com- tent plex
children	<u>beamID</u> <u>processingInfoCoordinateType</u> <u>rangeLooks</u> <u>azimuthLooks</u> <u>rangeLookBandwidth</u> <u>azimuthLookBandwidth</u> <u>totalProcessedRangeBandwidth</u> <u>totalProcessedAzimuthBandwidth</u> <u>rangeWindowID</u> <u>rangeWindowCoefficient</u> <u>azimuthWindowID</u> <u>azimuthWindowCoefficient</u> <u>rangeCompression</u> <u>correctedInstrumentDelay</u> <u>scanSARBeamOverlap</u>
annotation	documentati-(configured) range and azimuth processing parameters (for each ScanSAR on beam)

element level1Product/processing/processingParameter/beamID

diagram	
type	<u>string20</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 20

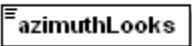
element level1Product/processing/processingParameter/processingInfoCoordinateType

diagram	 raw data time tags (not zero Doppler)
type	restriction of <u>string20</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 20 enumerati-RAW on enumerati-ZERODOPPLE on R enumerati-UNDEFINED on
annotation	documentati-raw data time tags (not zero Dop- on pler)

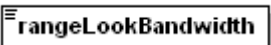
element level1Product/processing/processingParameter/rangeLooks

diagram	 nominal number of looks processed
type	xs:float
properties	isRef 0 con-simp- tent le
annotation	documentati-nominal number of looks pro- on cessed

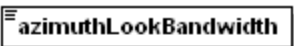
element level1Product/processing/processingParameter/azimuthLooks

diagram	
type	xs:float
properties	isRef 0 con-simp- tent le

element **level1Product/processing/processingParameter/rangeLookBandwidth**

diagram	 [Hz]
type	xs:double
properties	isRef 0 con-simp- tent le
annotation	documentati-[Hz] on

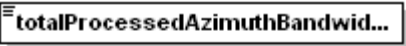
element **level1Product/processing/processingParameter/azimuthLookBandwidth**

diagram	 [Hz] target bandwidth in image. Determines Point target resolution. total target bandwidth in acquisition = azimuthLookBandwidth * azimuthLooks
type	xs:double
properties	isRef 0 con-simp- tent le
annotation	documentati-[Hz] target bandwidth in image. Determines Point target resolution. total target bandwidth in acquisition = on azimuthLookBandwidth * azimuthLooks

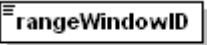
element **level1Product/processing/processingParameter/totalProcessedRangeBandwidth**

diagram	 total processed bandwidth [Hz]
type	xs:double
properties	isRef 0 con-simp- tent le
annotation	documentati-total processed bandwidth on [Hz]

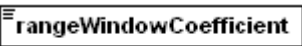
element **level1Product/processing/processingParameter/totalProcessedAzimuthBandwidth**

diagram	 [Hz] total processed bandwidth of the instantaneous azimuth bandwidth. It is lower than total target bandwidth in Spotlight cases since it denotes which part of the antenna azimuth spectrum was used and does not take the Doppler course into account (for that see azimuthLookBandwidth)
type	xs:double
properties	isRef 0 con-sim- tent le
annotation	documentati-[Hz] total processed bandwidth of the instantaneous azimuth bandwidth. It is lower than total target band- on width in Spotlight cases since it denotes which part of the antenna azimuth spectrum was used and does not take the Doppler course into account (for that see azimuthLookBandwidth)

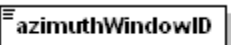
element level1Product/processing/processingParameter/rangeWindowID

diagram	 matched filter window type e.g. Hamming, ...
type	string20
properties	isRef 0 con-sim- tent le
facets	maxLength 20
annotation	documentati-matched filter window type e.g. Hamming, on ...

element level1Product/processing/processingParameter/rangeWindowCoefficient

diagram	 0.75, ...
type	xs:float
properties	isRef 0 con-sim- tent le
annotation	documentati-0.75, on ...

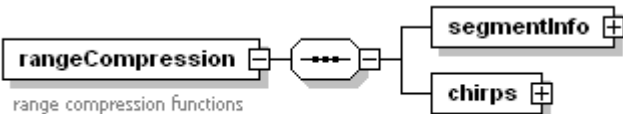
element level1Product/processing/processingParameter/azimuthWindowID

diagram	
type	string20
properties	isRef 0 con-sim- tent le
facets	maxLength 20

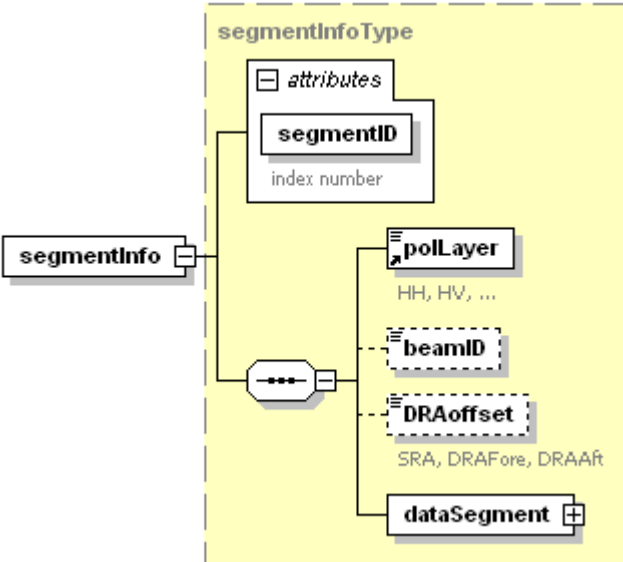
element level1Product/processing/processingParameter/azimuthWindowCoefficient

diagram	
type	xs:float
properties	isRef 0 con-simp- tent le

element level1Product/processing/processingParameter/rangeCompression

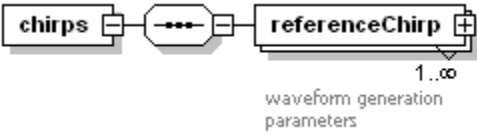
diagram	 range compression functions used for the segments of data (e.g. with different PRF)
properties	isRef 0 con-com- tent plex
children	<u>segmentInfo</u> <u>chirps</u>
annotation	documentati-range compression functions used for the segments of data (e.g. with different on PRF)

element level1Product/processing/processingParameter/rangeCompression/segmentInfo

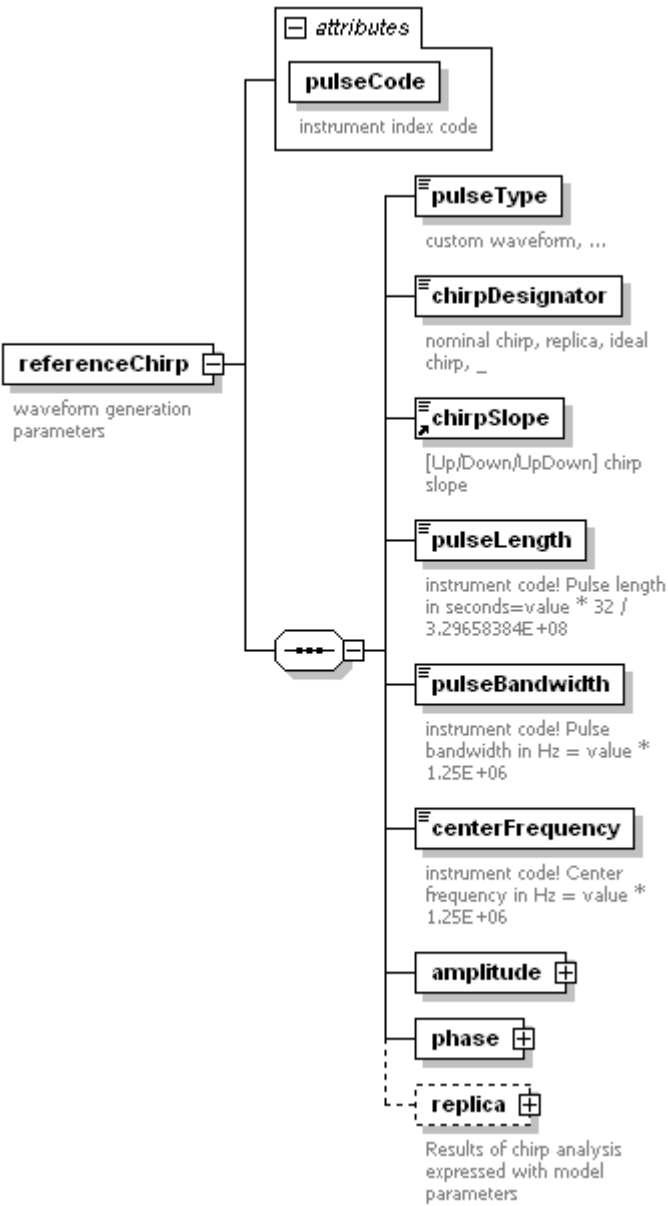
diagram						
type	<u>segmentInfoType</u>					
properties	isRef 0 con-com- tent plex					
children	<u>polLayer</u> <u>beamID</u> <u>DRAoffset</u> <u>dataSegment</u>					
attributes	Name segmentID	Type xs:int	Use required	Default	Fixed	Annotation documentati-index on num-

	ber
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element **level1Product/processing/processingParameter/rangeCompression/chirps**

diagram	
properties	isRef 0 con-com- tent plex
children	<u>referenceChirp</u>

element **level1Product/processing/processingParameter/rangeCompression/chirps/referenceChirp**

diagram	
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properties	isRef 0 con-com- tent plex					
children	<u>pulseType</u> <u>chirpDesignator</u> <u>chirpSlope</u> <u>pulseLength</u> <u>pulseBandwidth</u> <u>centerFrequency</u> <u>amplitude</u> <u>phase</u> <u>replica</u>					
attributes	Name pulseCode	Type xs:int	Use required	Default	Fixed	Annotation documentati-instru- on ment index code
annotation	documentati-waveform generation parame- on ters					

element lev-
 el1Product/processing/processingParameter/rangeCompression/chirps/referenceChirp/pulseType

diagram	
type	<u>string80</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 80
annotation	documentati-custom waveform, on ...

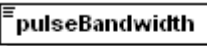
element lev-
 el1Product/processing/processingParameter/rangeCompression/chirps/referenceChirp/chirpDesignator

diagram	
type	restriction of xs:NMTOKENS
properties	isRef 0 con-simp- tent le
facets	enumerati-IDEAL on enumerati-NOMINAL on enumerati-REPLICA on enumerati-MODEL on enumerati-CUSTOM on enumerati-UNDEFINE on D
annotation	documentati-nominal chirp, replica, ideal chirp, on _

element lev-
 el1Product/processing/processingParameter/rangeCompression/chirps/referenceChirp/pulseLength

diagram	 instrument code! Pulse length in seconds=value * 32 / 3.29658384E+08
type	xs:double
properties	isRef 0 con-simp- tent le
annotation	documentati-instrument code! Pulse length in seconds=value * 32 / on 3.29658384E+08

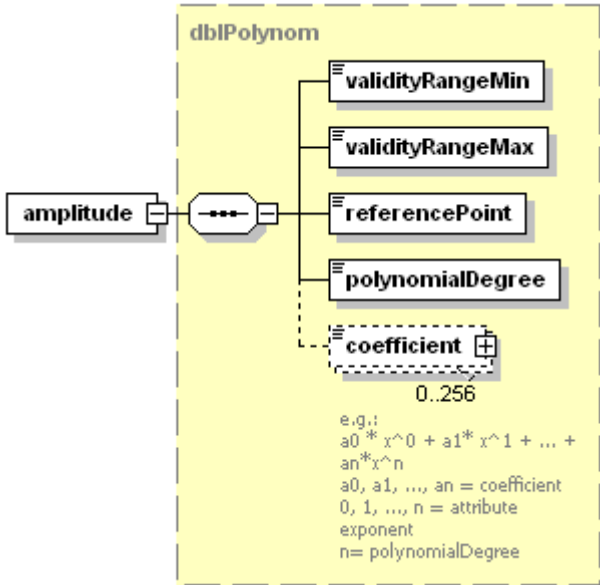
element lev-
el1Product/processing/processingParameter/rangeCompression/chirps/referenceChirp/pulseBandwidth

diagram	 instrument code! Pulse bandwidth in Hz = value * 1.25E+06
type	xs:double
properties	isRef 0 con-simp- tent le
annotation	documentati-instrument code! Pulse bandwidth in Hz = value * on 1.25E+06

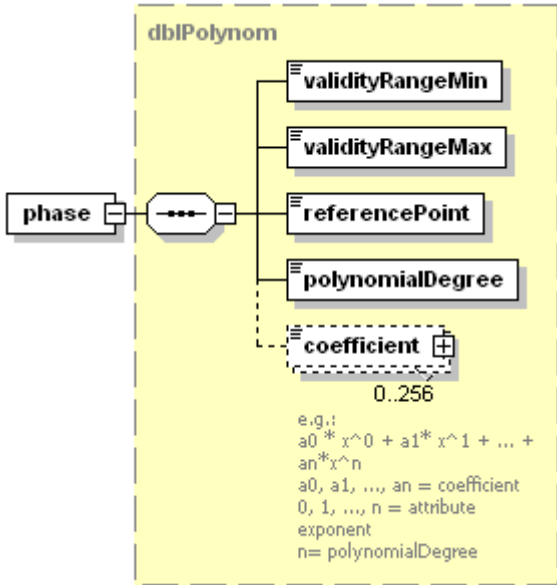
element lev-
el1Product/processing/processingParameter/rangeCompression/chirps/referenceChirp/centerFrequency

diagram	 instrument code! Center frequency in Hz = value * 1.25E+06
type	xs:double
properties	isRef 0 con-simp- tent le
annotation	documentati-instrument code! Center frequency in Hz = value * on 1.25E+06

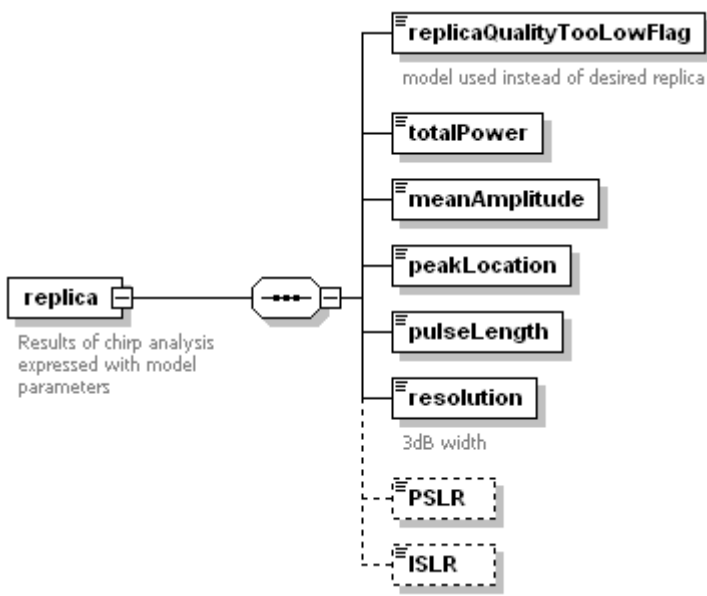
element lev-
el1Product/processing/processingParameter/rangeCompression/chirps/referenceChirp/amplitude

diagram	 The diagram shows a block labeled dbfPolynom with a yellow background. An input port labeled amplitude is connected to a multi-ported block. This block has four output ports: validityRangeMin, validityRangeMax, referencePoint, and polynomialDegree. A dashed line connects the multi-ported block to a coefficient port, which is also connected to a value of 0.256. Below the diagram, an example polynomial is given: $a_0 * x^0 + a_1 * x^1 + \dots + a_n * x^n$, with definitions for coefficients, exponents, and polynomial degree.
type	dbfPolynom
properties	isRef 0 con-com- tent plex
children	validityRangeMin validityRangeMax referencePoint polynomialDegree coefficient

element lev-
 el1Product/processing/processingParameter/rangeCompression/chirps/referenceChirp/phase

diagram	 The diagram shows a block labeled dbfPolynom with a yellow background. An input port labeled phase is connected to a multi-ported block. This block has four output ports: validityRangeMin, validityRangeMax, referencePoint, and polynomialDegree. A dashed line connects the multi-ported block to a coefficient port, which is also connected to a value of 0.256. Below the diagram, an example polynomial is given: $a_0 * x^0 + a_1 * x^1 + \dots + a_n * x^n$, with definitions for coefficients, exponents, and polynomial degree.
type	dbfPolynom
properties	isRef 0 con-com- tent plex
children	validityRangeMin validityRangeMax referencePoint polynomialDegree coefficient

element lev-
 el1Product/processing/processingParameter/rangeCompression/chirps/referenceChirp/replica

diagram	
properties	isRef 0 con-com- tent plex
children	<u>replicaQualityTooLowFlag</u> <u>totalPower</u> <u>meanAmplitude</u> <u>peakLocation</u> <u>pulseLength</u> <u>resolution</u> <u>PSLR</u> <u>ISLR</u>
annotation	documentati-Results of chirp analysis expressed with model parame- on ters

element lev-
 el1Product/processing/processingParameter/rangeCompression/chirps/referenceChirp/replica/replica
 QualityTooLowFlag

diagram	
type	xs:boolean
properties	isRef 0 con-simp- tent le
annotation	documentati-model used instead of desired repli- on ca

element lev-
 el1Product/processing/processingParameter/rangeCompression/chirps/referenceChirp/replica/totalPo
 wer

diagram	
type	xs:float
properties	isRef 0 con-simp-

	tent le
--	---------

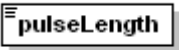
element lev-
el1Product/processing/processingParameter/rangeCompression/chirps/referenceChirp/replica/meanAmplitude

diagram	
type	xs:float
properties	isRef 0 con-simp- tent le

element lev-
el1Product/processing/processingParameter/rangeCompression/chirps/referenceChirp/replica/peakLocation

diagram	
type	xs:double
properties	isRef 0 con-simp- tent le

element lev-
el1Product/processing/processingParameter/rangeCompression/chirps/referenceChirp/replica/pulseLength

diagram	
type	xs:float
properties	isRef 0 con-simp- tent le

element lev-
el1Product/processing/processingParameter/rangeCompression/chirps/referenceChirp/replica/resolution

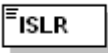
diagram	
type	xs:float
properties	isRef 0 con-simp- tent le
annotation	documentati-3dB width on

element lev-
el1Product/processing/processingParameter/rangeCompression/chirps/referenceChirp/replica/PSLR

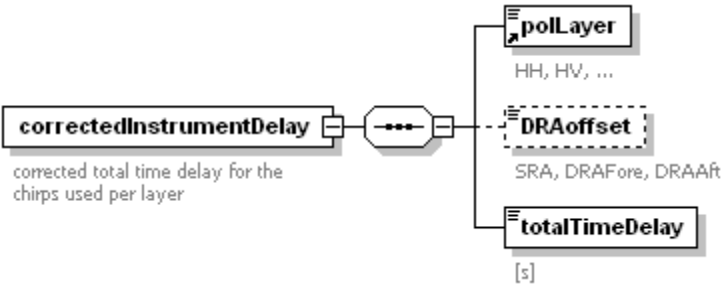
diagram	
type	xs:float
properties	isRef 0 con-simp- tent le

element **lev-**

el1Product/processing/processingParameter/rangeCompression/chirps/referenceChirp/replica/ISLR

diagram	
type	xs:float
properties	isRef 0 con-simp- tent le

element **level1Product/processing/processingParameter/correctedInstrumentDelay**

diagram	 The diagram shows the correctedInstrumentDelay element (a rectangle with a dashed border) containing the text "corrected total time delay for the chirps used per layer". It is connected via a line with three dots to a vertical stack of three elements: polLayer (rectangle with a dashed border, containing "HH, HV, ..."), DRAoffset (rectangle with a dashed border, containing "SRA, DRAFore, DRAAft"), and totalTimeDelay (rectangle with a solid border, containing "[s]").
properties	isRef 0 con-com- tent plex
children	<u>polLayer</u> <u>DRAoffset</u> <u>totalTimeDelay</u>
annotation	documentati-corrected total time delay for the chirps used per on layer

element **level1Product/processing/processingParameter/correctedInstrumentDelay/DRAoffset**

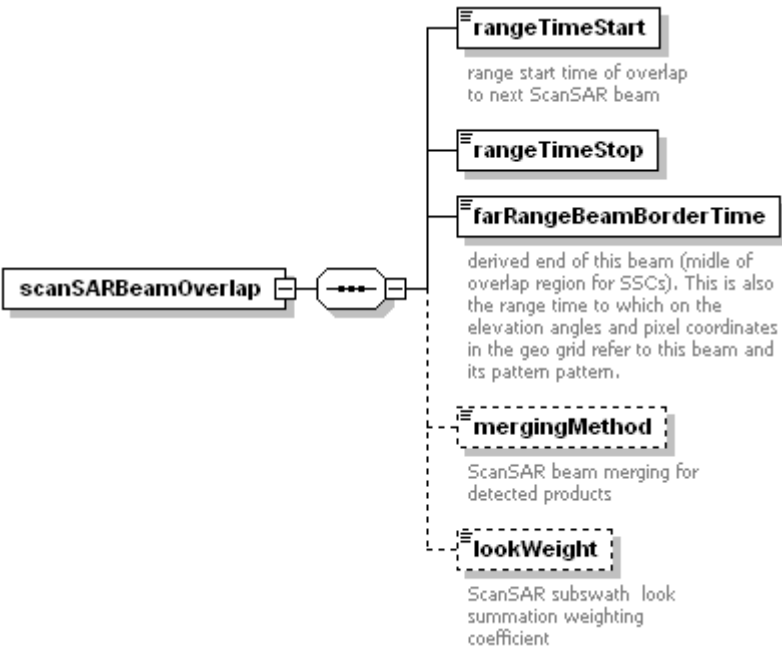
diagram	 SRA, DRAFore, DRAAft
type	restriction of xs:NMTOKENS
properties	isRef 0 con-simp- tent le
facets	enumerati-SRA on enumerati-DRAFore on enumerati-DRAAft on
annotation	documentati-SRA, DRAFore,

on DRAAft

element **level1Product/processing/processingParameter/correctedInstrumentDelay/totalTimeDelay**

diagram	 totalTimeDelay [s]
type	xs:double
properties	isRef 0 con-simp- tent le
annotation	documentati-[s on]

element **level1Product/processing/processingParameter/scanSARBeamOverlap**

diagram	 scanSARBeamOverlap rangeTimeStart range start time of overlap to next ScanSAR beam rangeTimeStop farRangeBeamBorderTime derived end of this beam (middle of overlap region for SSCs). This is also the range time to which on the elevation angles and pixel coordinates in the geo grid refer to this beam and its pattern pattern. mergingMethod ScanSAR beam merging for detected products lookWeight ScanSAR subswath look summation weighting coefficient
properties	isRef 0 con-com- tent plex
children	<u>rangeTimeStart</u> <u>rangeTimeStop</u> <u>farRangeBeamBorderTime</u> <u>mergingMethod</u> <u>lookWeight</u>

element **level1Product/processing/processingParameter/scanSARBeamOverlap/rangeTimeStart**

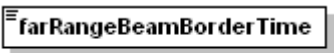
diagram	 rangeTimeStart range start time of overlap to next ScanSAR beam
type	xs:double
properties	isRef 0 con-simp- tent le
annotation	documentati-range start time of overlap to next ScanSAR

	on beam
--	---------

element **level1Product/processing/processingParameter/scanSARBeamOverlap/rangeTimeStop**

diagram	
type	xs:double
properties	isRef 0 con-simp- tent le

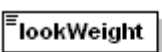
element **lev-
el1Product/processing/processingParameter/scanSARBeamOverlap/farRangeBeamBorderTime**

diagram	 derived end of this beam (middle of overlap region for SSCs). This is also the range time to which on the elevation angles and pixel coordinates in the geo grid refer to this beam and its pattern pattern.
type	xs:double
properties	isRef 0 con-simp- tent le
annotation	documentati-derived end of this beam (middle of overlap region for SSCs). This is also the range time to which on the elevation angles and pixel coordinates in the geo grid refer to this beam and its pattern pattern.

element **level1Product/processing/processingParameter/scanSARBeamOverlap/mergingMethod**

diagram	 ScanSAR beam merging for detected products
type	string128
properties	isRef 0 con-simp- tent le
facets	maxLength 128
annotation	documentati-ScanSAR beam merging for detected prod- on ucts

element **level1Product/processing/processingParameter/scanSARBeamOverlap/lookWeight**

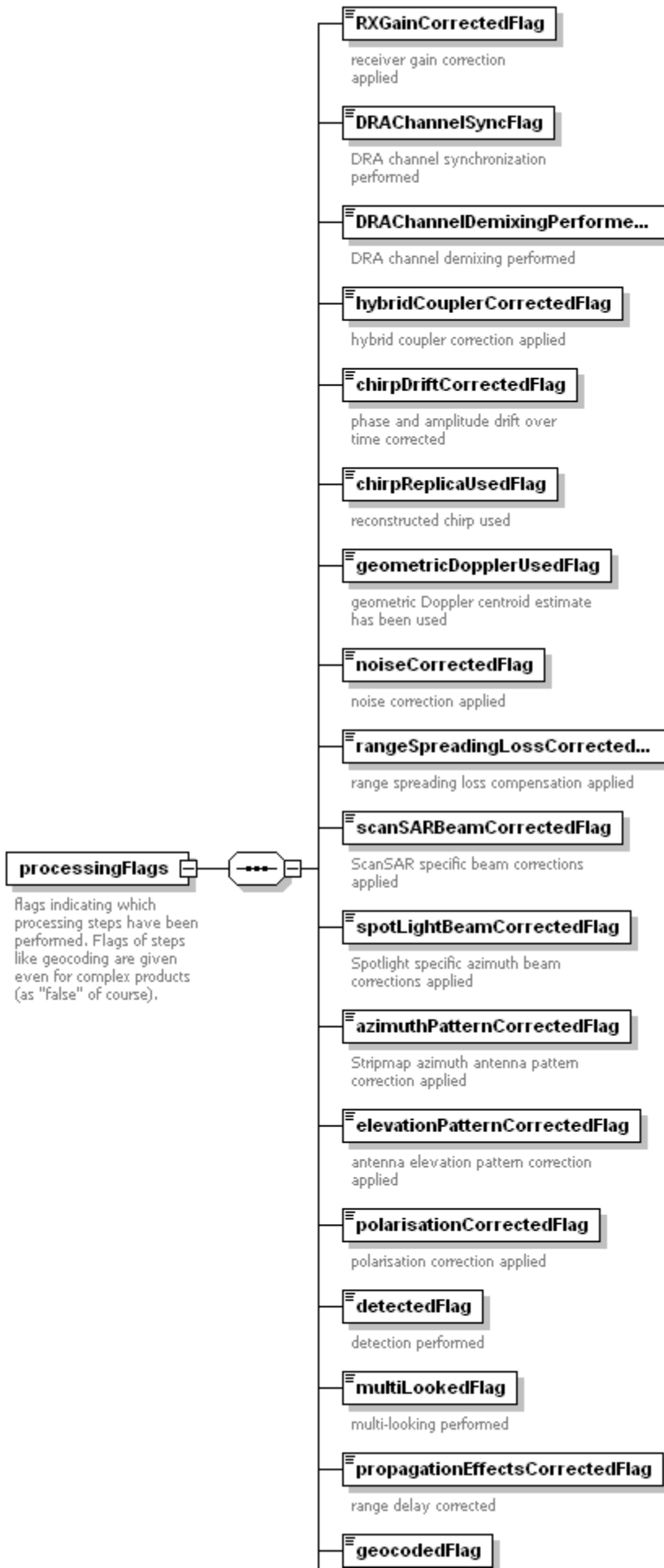
diagram	 ScanSAR subswath look summation weighting coefficient
type	extension of xs:float
properties	isRef 0 con-com-



	tent plex
annotation	documentati-ScanSAR subswath look summation weighting coeffi- on cient

element **level1Product/processing/processingFlags**

diagram

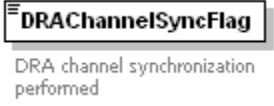


properties	isRef 0 con-com- tent plex
children	<u>RXGainCorrectedFlag</u> <u>DRACChannelSyncFlag</u> <u>DRACChannelDemixingPerformedFlag</u> <u>hybridCouplerCorrectedFlag</u> <u>chirpDriftCorrectedFlag</u> <u>chirpReplicaUsedFlag</u> <u>geometricDopplerUsedFlag</u> <u>noiseCorrectedFlag</u> <u>rangeSpreadingLossCorrectedFlag</u> <u>scanSARBeamCorrectedFlag</u> <u>spotLightBeamCorrectedFlag</u> <u>azimuthPatternCorrectedFlag</u> <u>elevationPatternCorrectedFlag</u> <u>polarisationCorrectedFlag</u> <u>detectedFlag</u> <u>multiLookedFlag</u> <u>propagationEffectsCorrectedFlag</u> <u>geocodedFlag</u> <u>incidenceAngleMaskGeneratedFlag</u> <u>nominalProcessingPerformedFlag</u>
annotation	documenta-flags indicating which processing steps have been performed. Flags of steps like geocoding are given even tion for complex products (as "false" of course).

element **level1Product/processing/processingFlags/RXGainCorrectedFlag**

diagram	
type	xs:boolean
properties	isRef 0 con-sim- tent ple
annotation	documenta-receiver gain correction ap- tion plied

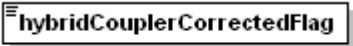
element **level1Product/processing/processingFlags/DRACChannelSyncFlag**

diagram	
type	xs:boolean
properties	isRef 0 con-sim- tent ple
annotation	documenta-DRA channel synchronization per- tion formed

element **level1Product/processing/processingFlags/DRACChannelDemixingPerformedFlag**

diagram	
type	xs:boolean
properties	isRef 0 con-sim- tent ple
annotation	documenta-DRA channel demixing per- tion formed

element **level1Product/processing/processingFlags/hybridCouplerCorrectedFlag**

diagram	 hybrid coupler correction applied
type	xs:boolean
properties	isRef 0 con-sim- tent le
annotation	documentati-hybrid coupler correction ap- on plied

element level1Product/processing/processingFlags/chirpDriftCorrectedFlag

diagram	 phase and amplitude drift over time corrected
type	xs:boolean
properties	isRef 0 con-sim- tent le
annotation	documentati-phase and amplitude drift over time correct- on ed

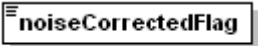
element level1Product/processing/processingFlags/chirpReplicaUsedFlag

diagram	 reconstructed chirp used
type	xs:boolean
properties	isRef 0 con-sim- tent le
annotation	documentati-reconstructed chirp on used

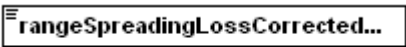
element level1Product/processing/processingFlags/geometricDopplerUsedFlag

diagram	 geometric Doppler centroid estimate has been used
type	xs:boolean
properties	isRef 0 con-sim- tent le
annotation	documentati-geometric Doppler centroid estimate has been on used

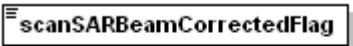
element level1Product/processing/processingFlags/noiseCorrectedFlag

diagram	 noise correction applied
type	xs:boolean
properties	isRef 0 con-simp- tent le
annotation	documentati-noise correction ap- on plied

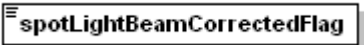
element **level1Product/processing/processingFlags/rangeSpreadingLossCorrectedFlag**

diagram	 range spreading loss compensation applied
type	xs:boolean
properties	isRef 0 con-simp- tent le
annotation	documentati-range spreading loss compensation ap- on plied

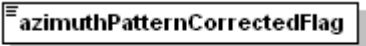
element **level1Product/processing/processingFlags/scanSARBeamCorrectedFlag**

diagram	 ScanSAR specific beam corrections applied
type	xs:boolean
properties	isRef 0 con-simp- tent le
annotation	documentati-ScanSAR specific beam corrections ap- on plied

element **level1Product/processing/processingFlags/spotLightBeamCorrectedFlag**

diagram	 Spotlight specific azimuth beam corrections applied
type	xs:boolean
properties	isRef 0 con-simp- tent le
annotation	documentati-Spotlight specific azimuth beam corrections ap- on plied

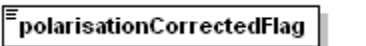
element **level1Product/processing/processingFlags/azimuthPatternCorrectedFlag**

diagram	 Stripmap azimuth antenna pattern correction applied
type	xs:boolean
properties	isRef 0 con-sim- tent le
annotation	documentati-Stripmap azimuth antenna pattern correction ap- on plied

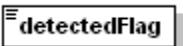
element level1Product/processing/processingFlags/elevationPatternCorrectedFlag

diagram	 antenna elevation pattern correction applied
type	xs:boolean
properties	isRef 0 con-sim- tent le
annotation	documentati-antenna elevation pattern correction ap- on plied

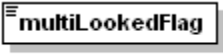
element level1Product/processing/processingFlags/polarisationCorrectedFlag

diagram	 polarisation correction applied
type	xs:boolean
properties	isRef 0 con-sim- tent le
annotation	documentati-polarisation correction ap- on plied

element level1Product/processing/processingFlags/detectedFlag

diagram	 detection performed
type	xs:boolean
properties	isRef 0 con-sim- tent le
annotation	documentati-detection perfor- on med

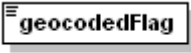
element level1Product/processing/processingFlags/multiLookedFlag

diagram	 multi-looking performed
type	xs:boolean
properties	isRef 0 con-simp- tent le
annotation	documentati-multi-looking perfor- on med

element **level1Product/processing/processingFlags/propagationEffectsCorrectedFlag**

diagram	 range delay corrected
type	xs:boolean
properties	isRef 0 con-simp- tent le
annotation	documentati-range delay correc- on ted

element **level1Product/processing/processingFlags/geocodedFlag**

diagram	 geocoding performed
type	xs:boolean
properties	isRef 0 con-simp- tent le
annotation	documentati-geocoding perfor- on med

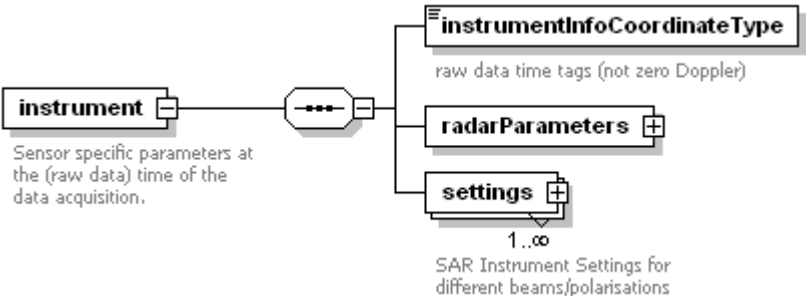
element **level1Product/processing/processingFlags/incidenceAngleMaskGeneratedFlag**

diagram	 for EEC products
type	xs:boolean
properties	isRef 0 con-simp- tent le
annotation	documentati-for EEC pro- on ducts

element **level1Product/processing/processingFlags/nominalProcessingPerformedFlag**

diagram	
type	xs:boolean
properties	isRef 0 con-simp- tent le
annotation	documentati-nominal L1B Processing chain or (manually) configured on steps

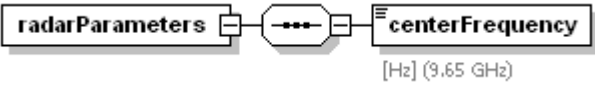
element level1Product/instrument

diagram	
properties	isRef 0 con-com- tent plex
children	<u>instrumentInfoCoordinateType</u> <u>radarParameters</u> <u>settings</u>
annotation	documentati-Sensor specific parameters at the (raw data) time of the data acquisi- on tion.

element level1Product/instrument/instrumentInfoCoordinateType

diagram	
type	restriction of <u>string20</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 20 enumerati-RAW on enumerati-ZERODOPPLE on R enumerati-UNDEFINED on
annotation	documentati-raw data time tags (not zero Dop- on pler)

element level1Product/instrument/radarParameters

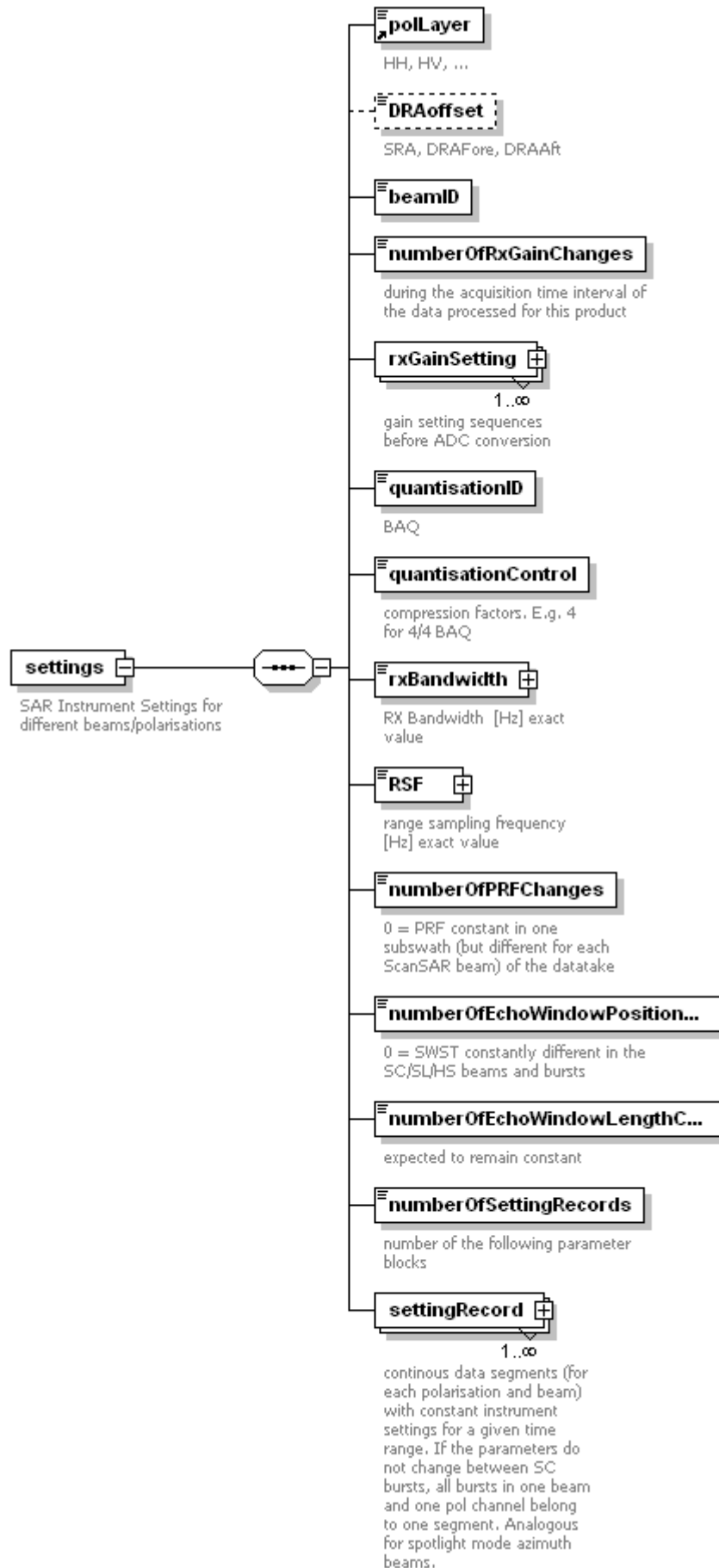
diagram	
properties	isRef 0 con-com- tent plex
children	<u>centerFrequency</u>

element level1Product/instrument/radarParameters/centerFrequency

diagram	
type	xs:double
properties	isRef 0 con-simp- tent le
annotation	documentati-[Hz] (9.65 on GHz)

element level1Product/instrument/settings

diagram



properties	isRef 0 con-com- tent plex
children	<u>pollLayer</u> <u>DRAoffset</u> <u>beamID</u> <u>numberOfRxGainChanges</u> <u>rxGainSetting</u> <u>quantisationID</u> <u>quantisationControl</u> <u>rxBand- width</u> <u>RSF</u> <u>numberOfPRFChanges</u> <u>numberOfEchoWindowPositionChanges</u> <u>numberOfEchoWindowLengthChang- es</u> <u>numberOfSettingRecords</u> <u>settingRecord</u>
annotation	documentati-SAR Instrument Settings for different on beams/polarisations

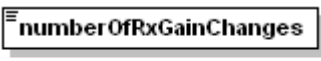
element level1Product/instrument/settings/DRAoffset

diagram	 SRA, DRAFore, DRAAft
type	restriction of xs:NMTOKENS
properties	isRef 0 con-simp- tent le
facets	enumerati-SRA on enumerati-DRAFore on enumerati-DRAAft on
annotation	documentati-SRA, DRAFore, on DRAAft

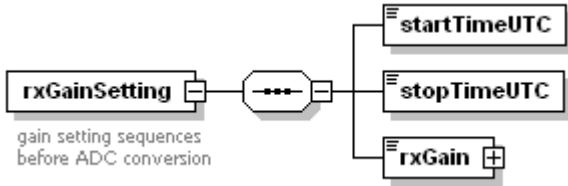
element level1Product/instrument/settings/beamID

diagram	
type	<u>string20</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 20

element level1Product/instrument/settings/numberOfRxGainChanges

diagram	 during the acquisition time interval of the data processed for this product
type	xs:int
properties	isRef 0 con-simp- tent le
annotation	documentati-during the acquisition time interval of the data processed for this prod- on uct

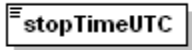
element level1Product/instrument/settings/rxGainSetting

diagram	 gain setting sequences before ADC conversion
properties	isRef 0 con-com- tent plex
children	<u>startTimeUTC</u> <u>stopTimeUTC</u> <u>rxGain</u>
annotation	documentati-gain setting sequences before ADC conver- on sion

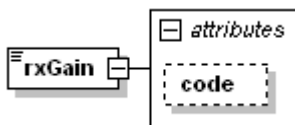
element level1Product/instrument/settings/rxGainSetting/startTimeUTC

diagram	
type	xs:dateTime
properties	isRef 0 con-simp- tent le

element level1Product/instrument/settings/rxGainSetting/stopTimeUTC

diagram	
type	xs:dateTime
properties	isRef 0 con-simp- tent le

element level1Product/instrument/settings/rxGainSetting/rxGain

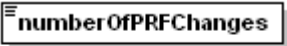
diagram						
type	extension of xs:float					
properties	isRef 0 con-com- tent plex					
attributes	Name code	Type	Use	Default	Fixed	Annotation

element level1Product/instrument/settings/quantisationID

diagram	 BAQ
type	<u>string20</u>

	code	<u>string20</u>	required	documentati-instru- on ment code
annotation	documentati-range sampling frequency [Hz] exact on value			

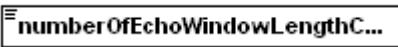
element level1Product/instrument/settings/numberOfPRFChanges

diagram	 0 = PRF constant in one subswath (but different for each ScanSAR beam) of the data take			
type	xs:int			
properties	isRef 0 con-simp- tent le			
annotation	documentati-0 = PRF constant in one subswath (but different for each ScanSAR beam) of the data- on take			

element level1Product/instrument/settings/numberOfEchoWindowPositionChanges

diagram	 0 = SWST constantly different in the SC/SL/HS beams and bursts			
type	xs:int			
properties	isRef 0 con-simp- tent le			
annotation	documentati-0 = SWST constantly different in the SC/SL/HS beams and on bursts			

element level1Product/instrument/settings/numberOfEchoWindowLengthChanges

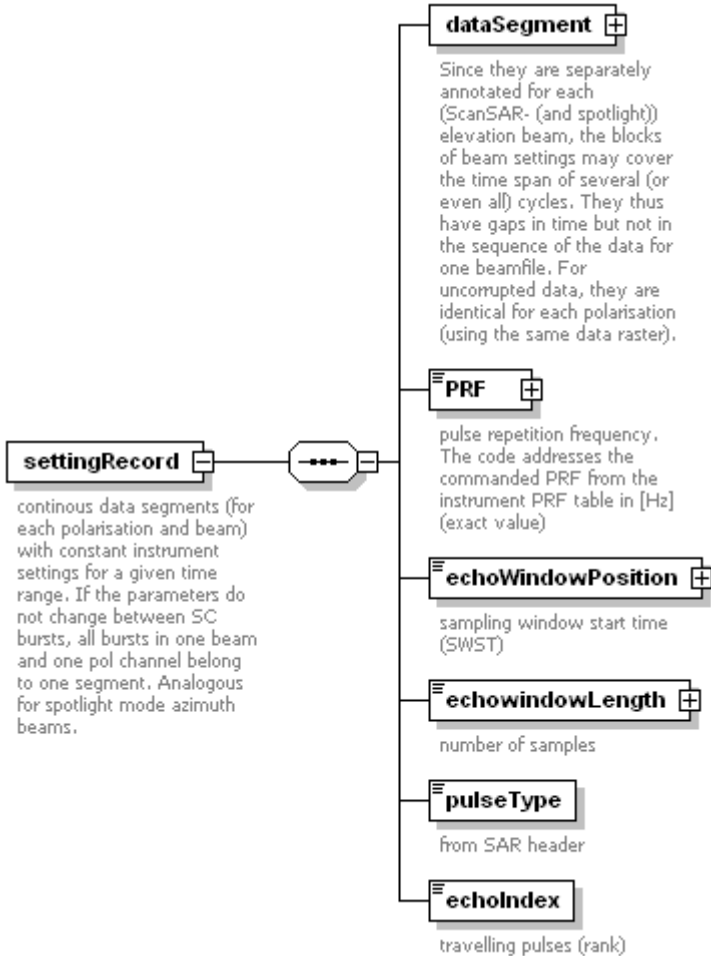
diagram	 expected to remain constant			
type	xs:int			
properties	isRef 0 con-simp- tent le			
annotation	documentati-expected to remain on constant			

element level1Product/instrument/settings/numberOfSettingRecords

diagram	 number of the following parameter blocks			
type	xs:int			

properties	isRef 0 con-sim- tent le
annotation	documentati-number of the following parameter on blocks

element level1Product/instrument/settings/settingRecord

diagram	
properties	isRef 0 con-com- tent plex
children	<u>dataSegment</u> <u>PRF</u> <u>echoWindowPosition</u> <u>echowindowLength</u> <u>pulseType</u> <u>echoIndex</u>
annotation	documentati-continous data segments (for each polarisation and beam) with constant instrument settings for a given on time range. If the parameters do not change between SC bursts, all bursts in one beam and one pol chan- nel belong to one segment. Analogous for spotlight mode azimuth beams.

element level1Product/instrument/settings/settingRecord/dataSegment

diagram	dataSegment Since they are separately annotated for each (ScanSAR- (and spotlight)) elevation beam, the blocks of beam settings may cover the time span of several (or even all) cycles. They thus have gaps in time but not in the sequence of the data for one beamfile. For uncorrupted data, they are identical for each polarisation (using the same data raster). attributes segmentID ... startTimeUTC stopTimeUTC numberOfRows												
properties	isRef 0 con-com- tent plex												
children	<u>startTimeUTC</u> <u>stopTimeUTC</u> <u>numberOfRows</u>												
attributes	<table><tr><th>Name</th><th>Type</th><th>Use</th><th>Default</th><th>Fixed</th><th>Annotation</th></tr><tr><td>segmentID</td><td>xs:int</td><td>required</td><td></td><td></td><td></td></tr></table>	Name	Type	Use	Default	Fixed	Annotation	segmentID	xs:int	required			
Name	Type	Use	Default	Fixed	Annotation								
segmentID	xs:int	required											
annotation	documentati- Since they are separately annotated for each (ScanSAR- (and spotlight)) elevation beam, the blocks of on beam settings may cover the time span of several (or even all) cycles. They thus have gaps in time but not in the sequence of the data for one beamfile. For uncorrupted data, they are identical for each polarisation (using the same data raster).												

element level1Product/instrument/settings/settingRecord/dataSegment/startTimeUTC

diagram	
type	xs:dateTime
properties	isRef 0 con-simp- tent le

element level1Product/instrument/settings/settingRecord/dataSegment/stopTimeUTC

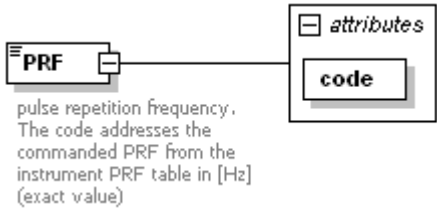
diagram	
type	xs:dateTime
properties	isRef 0 con-simp- tent le

element level1Product/instrument/settings/settingRecord/dataSegment/numberOfRows

diagram	
type	xs:int
properties	isRef 0 con-simp-

	tent le
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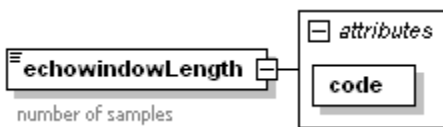
element level1Product/instrument/settings/settingRecord/PRF

diagram						
type	extension of xs:double					
properties	isRef 0 con-com- tent plex					
attributes	Name code	Type <u>string20</u>	Use required	Default	Fixed	Annotation
annotation	documentati-pulse repetition frequency. The code addresses the commanded PRF from the instrument PRF table in [Hz] on (exact value)					

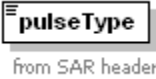
element level1Product/instrument/settings/settingRecord/echoWindowPosition

diagram						
type	extension of xs:double					
properties	isRef 0 con-com- tent plex					
attributes	Name code	Type <u>string20</u>	Use required	Default	Fixed	Annotation
annotation	documentati-sampling window start time on (SWST)					

element level1Product/instrument/settings/settingRecord/echowindowLength

diagram						
type	extension of xs:double					
properties	isRef 0 con-com- tent plex					
attributes	Name code	Type <u>string20</u>	Use required	Default	Fixed	Annotation
annotation	documentati-number of samp- on les					

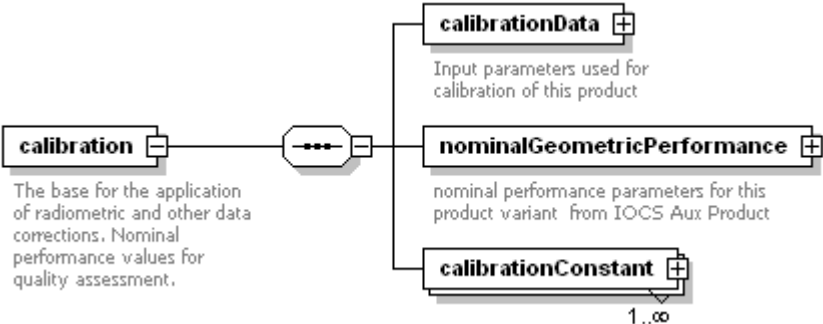
element level1Product/instrument/settings/settingRecord/pulseType

diagram	 from SAR header
type	<u>string20</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 20
annotation	documentati-from SAR hea- on der

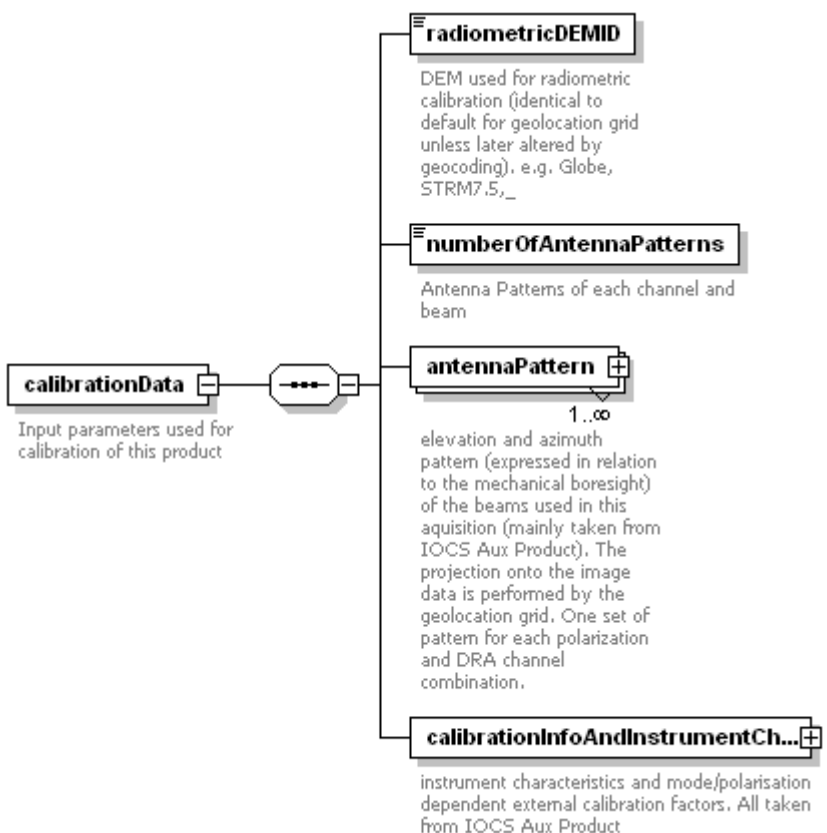
element level1Product/instrument/settings/settingRecord/echoIndex

diagram	 travelling pulses (rank)
type	xs:int
properties	isRef 0 con-simp- tent le
annotation	documentati-travelling pulses on (rank)

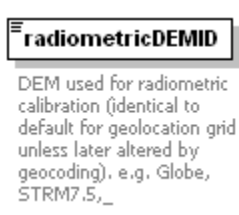
element level1Product/calibration

diagram	 The base for the application of radiometric and other data corrections. Nominal performance values for quality assessment.
properties	isRef 0 con-com- tent plex
children	<u>calibrationData</u> <u>nominalGeometricPerformance</u> <u>calibrationConstant</u>
annotation	documentati-The base for the application of radiometric and other data corrections. Nominal performance values for on quality assessment.

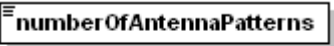
element level1Product/calibration/calibrationData

diagram	 <pre> classDiagram calibrationData -- radiometricDEMID calibrationData -- numberOfAntennaPatterns calibrationData -- antennaPattern : 1..∞ calibrationData -- calibrationInfoAndInstrumentCh... </pre> radiometricDEMID DEM used for radiometric calibration (identical to default for geolocation grid unless later altered by geocoding). e.g. Globe, STRM7.5, _ numberOfAntennaPatterns Antenna Patterns of each channel and beam calibrationData Input parameters used for calibration of this product antennaPattern 1..∞ elevation and azimuth pattern (expressed in relation to the mechanical boresight) of the beams used in this acquisition (mainly taken from IOCS Aux Product). The projection onto the image data is performed by the geolocation grid. One set of pattern for each polarization and DRA channel combination. calibrationInfoAndInstrumentCh... instrument characteristics and mode/polarisation dependent external calibration factors. All taken from IOCS Aux Product
properties	isRef 0 con-com- tent plex
children	<u>radiometricDEMID</u> <u>numberOfAntennaPatterns</u> <u>antennaPattern</u> <u>calibrationInfoAndInstrumentCharacteristics</u>
annotation	documentati-Input parameters used for calibration of this prod- on uct

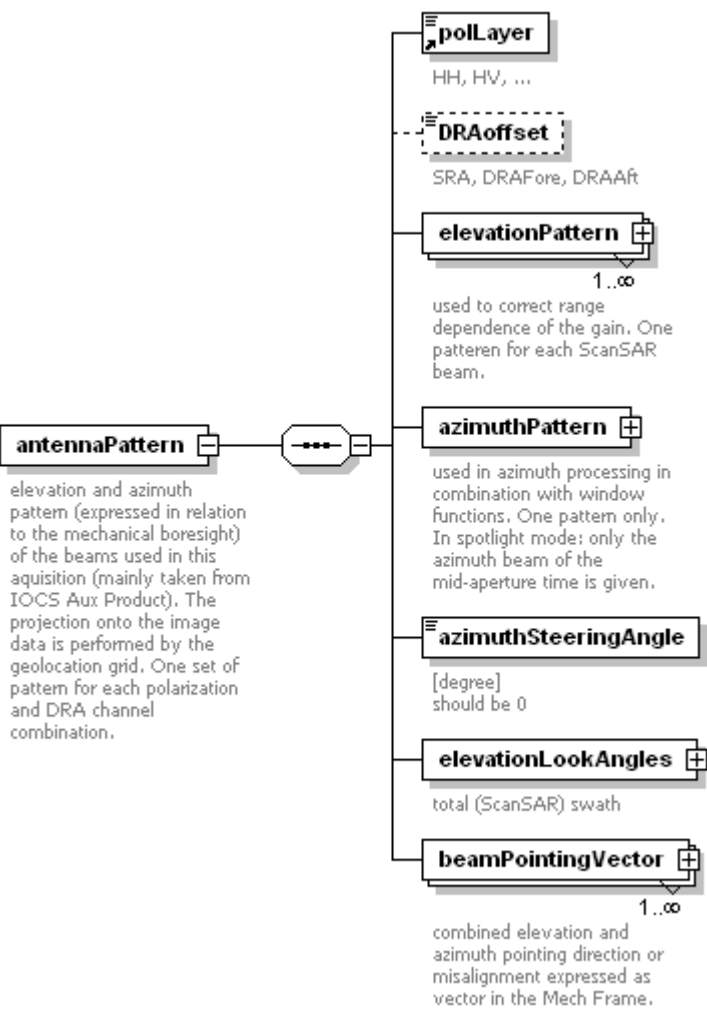
element level1Product/calibration/calibrationData/radiometricDEMID

diagram	 <pre> classDiagram radiometricDEMID </pre> radiometricDEMID DEM used for radiometric calibration (identical to default for geolocation grid unless later altered by geocoding). e.g. Globe, STRM7.5, _
type	extension of <u>string255</u>
properties	isRef 0 con-com- tent plex
facets	maxLength 255
annotation	documentati-DEM used for radiometric calibration (identical to default for geolocation grid unless later altered by ge- on ocoding). e.g. Globe, STRM7.5, _

element level1Product/calibration/calibrationData/numberOfAntennaPatterns

diagram	 Antenna Patterns of each channel and beam
type	xs:int
properties	isRef 0 con-sim- tent le
annotation	documentati-Antenna Patterns of each channel and on beam

element level1Product/calibration/calibrationData/antennaPattern

diagram	 The diagram shows the structure of the antennaPattern element. It is a container element with a port on the left and a connector on the right. Inside the container, there are several sub-elements: polLayer (with a list icon), DRAoffset (with a dashed border and list icon), elevationPattern (with a plus icon and a multiplicity of 1..∞), azimuthPattern (with a plus icon), azimuthSteeringAngle (with a list icon), elevationLookAngles (with a plus icon), and beamPointingVector (with a plus icon and a multiplicity of 1..∞). The polLayer element has a description: "HH, HV, ...". The DRAoffset element has a description: "SRA, DRAFore, DRAAft". The elevationPattern element has a description: "used to correct range dependence of the gain. One pattern for each ScanSAR beam." The azimuthPattern element has a description: "used in azimuth processing in combination with window functions. One pattern only. In spotlight mode: only the azimuth beam of the mid-aperture time is given." The azimuthSteeringAngle element has a description: "[degree] should be 0". The elevationLookAngles element has a description: "total (ScanSAR) swath". The beamPointingVector element has a description: "combined elevation and azimuth pointing direction or misalignment expressed as vector in the Mech Frame."
properties	isRef 0 con-com- tent plex
children	<u>polLayer</u> <u>DRAoffset</u> <u>elevationPattern</u> <u>azimuthPattern</u> <u>azimuthSteeringAngle</u> <u>elevationLookAngles</u> <u>beamPointingVector</u>
annotation	documentati-elevation and azimuth pattern (expressed in relation to the mechanical boresight) of the beams used in this on aquisition (mainly taken from IOCS Aux Product). The projection onto the image data is performed by the geolocation grid. One set of pattern for each polarization and DRA channel combination.

element **level1Product/calibration/calibrationData/antennaPattern/DRAoffset**

diagram	 SRA, DRAFore, DRAAft
type	restriction of xs:NMTOKENS
properties	isRef 0 con-simp- tent le
facets	enumerati-SRA on enumerati-DRAFore on enumerati-DRAAft on
annotation	documentati-SRA, DRAFore, on DRAAft

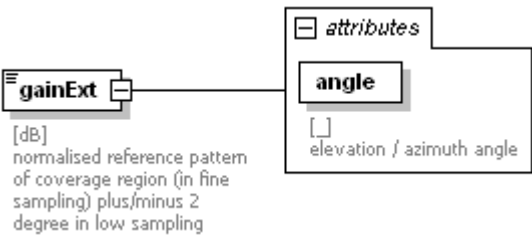
element **level1Product/calibration/calibrationData/antennaPattern/elevationPattern**

diagram						
properties	isRef 0 con-com- tent plex					
children	<u>referenceGain</u> <u>gainExt</u> <u>description</u>					
attributes	Name beamID	Type <u>string20</u>	Use required	Default	Fixed	Annotation documentati-(elevation) on beam ID
annotation	documentati-used to correct range dependence of the gain. One pattern for each ScanSAR on beam.					

element **level1Product/calibration/calibrationData/antennaPattern/elevationPattern/referenceGain**

diagram	
type	xs:float
properties	isRef 0 con-simp- tent le
annotation	documentati-for elevation: [dBi] on max. absolute 2-way gain

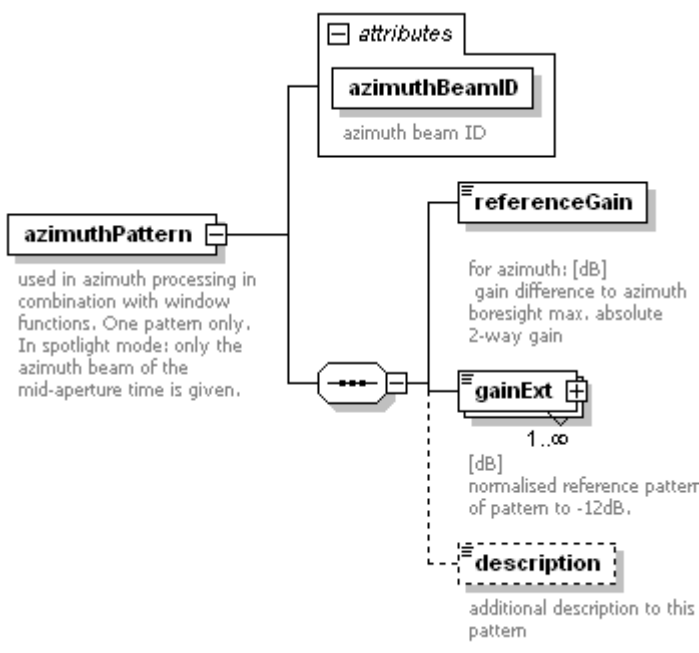
element **level1Product/calibration/calibrationData/antennaPattern/elevationPattern/gainExt**

diagram						
type	extension of xs:float					
properties	isRef 0 con-com- tent plex					
attributes	Name angle	Type xs:float	Use required	Default	Fixed	Annotation documentati-[] on elevation / azi- muth angle
annotation	documentati-[dB] on normalised reference pattern of coverage region (in fine sampling) plus/minus 2 degree in low sam- pling					

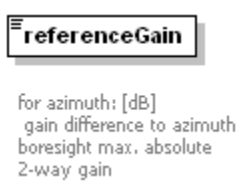
element **level1Product/calibration/calibrationData/antennaPattern/elevationPattern/description**

diagram	
type	string1024
properties	isRef 0 con-simp- tent le
facets	maxLength 1024
annotation	documentati-additional description to this pat- on tern

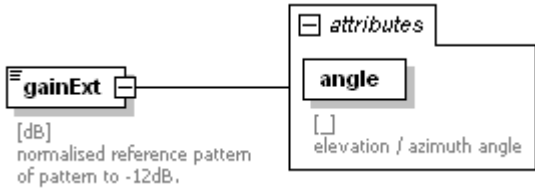
element **level1Product/calibration/calibrationData/antennaPattern/azimuthPattern**

diagram						
properties	isRef 0 con-com- tent plex					
children	referenceGain gainExt description					
attributes	Name	Type	Use	Default	Fixed	Annotation
	azimuthBeamID	<u>string20</u>	required			documentati-azi- on muth beam ID
annotation	documentati-used in azimuth processing in combination with window functions. One pattern only. In spotlight mode: only on the azimuth beam of the mid-aperture time is given.					

element level1Product/calibration/calibrationData/antennaPattern/azimuthPattern/referenceGain

diagram						
type	xs:float					
properties	isRef 0 con-simp- tent le					
annotation	documentati-on for azimuth: [dB] gain difference to azimuth boresight max. absolute 2-way gain					

element level1Product/calibration/calibrationData/antennaPattern/azimuthPattern/gainExt

diagram						
type	extension of xs:float					
properties	isRef 0 con-com- tent plex					
attributes	Name angle	Type xs:float	Use required	Default	Fixed	Annotation documentati-[] on elevation / azi- muth angle
annotation	documentati-[dB] on normalised reference pattern of pattern to - 12dB.					

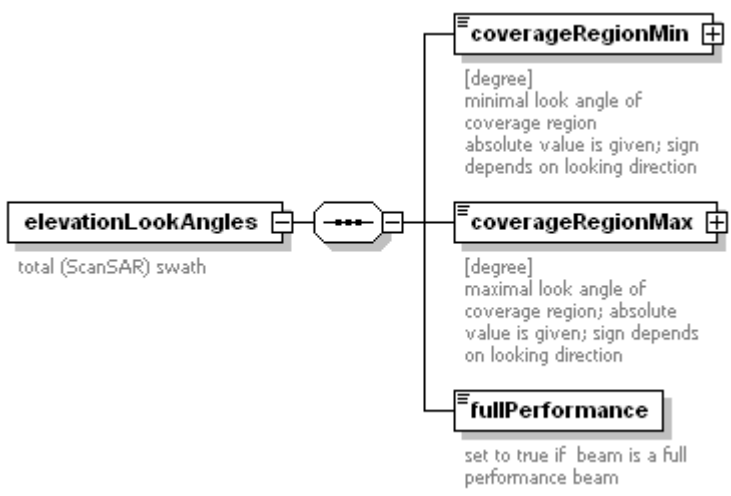
element **level1Product/calibration/calibrationData/antennaPattern/azimuthPattern/description**

diagram						
type	string1024					
properties	isRef 0 con-simp- tent le					
facets	maxLength 1024					
annotation	documentati-additional description to this pat- on tern					

element **level1Product/calibration/calibrationData/antennaPattern/azimuthSteeringAngle**

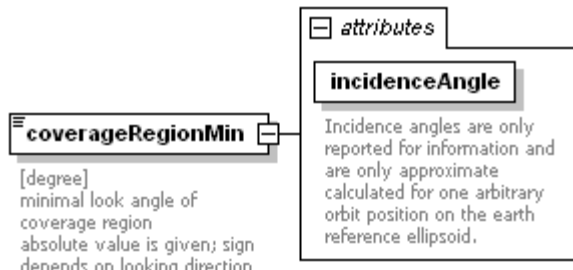
diagram						
type	xs:float					
properties	isRef 0 con-simp- tent le					
annotation	documentati-[degree] on should be 0					

element **level1Product/calibration/calibrationData/antennaPattern/elevationLookAngles**

diagram	
properties	isRef 0 con- tent plex
children	<u>coverageRegionMin</u> <u>coverageRegionMax</u> <u>fullPerformance</u>
annotation	documentati- total (ScanSAR) on swath

element lev-

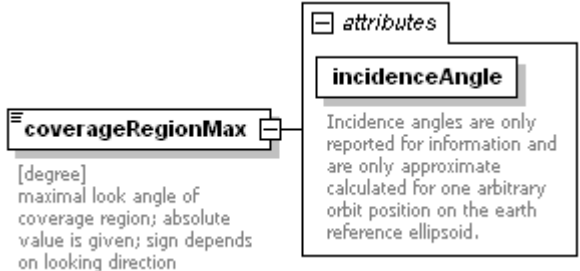
el1Product/calibration/calibrationData/antennaPattern/elevationLookAngles/coverageRegionMin

diagram						
type	extension of xs:float					
properties	isRef 0 con- tent plex					
attributes	Name incidenceAngle	Type xs:float	Use required	Default	Fixed	Annotation documentati- Incidence on angles are only report- ed for in- formation and are only approximate calculated for one arbitrary orbit posi- tion on the earth refer- ence ellip- soid.
annotation	documentati-[degree]					

	on minimal look angle of coverage region absolute value is given; sign depends on looking direction
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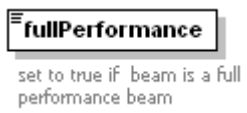
element lev-

el1Product/calibration/calibrationData/antennaPattern/elevationLookAngles/coverageRegionMax

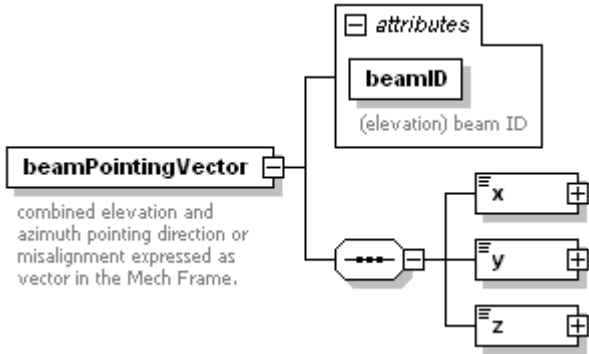
diagram						
type	extension of xs:float					
properties	isRef 0 con-com- tent plex					
attributes	Name incidenceAngle	Type xs:float	Use required	Default	Fixed	Annotation documentati-Incidence on angles are only report- ed for in- formation and are only approximate calculated for one arbitrary orbit posi- tion on the earth refer- ence ellip- soid.
annotation	documentati-[degree] on maximal look angle of coverage region; absolute value is given; sign depends on looking direc- tion					

element lev-

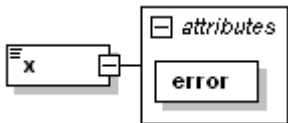
el1Product/calibration/calibrationData/antennaPattern/elevationLookAngles/fullPerformance

diagram						
type	xs:boolean					
properties	isRef 0 con-simp- tent le					
annotation	documentati-set to true if beam is a full performance on beam					

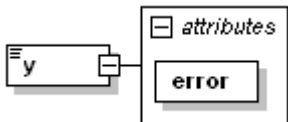
element level1Product/calibration/calibrationData/antennaPattern/beamPointingVector

diagram						
properties	isRef 0 con-com- tent plex					
children	x y z					
attributes	Name beamID	Type <u>string20</u>	Use required	Default	Fixed	Annotation documentati-(elevation) on beam ID
annotation	documentati-combined elevation and azimuth pointing direction or misalignment expressed as vector in the Mech on Frame.					

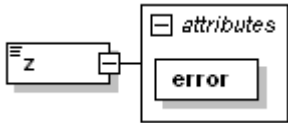
element level1Product/calibration/calibrationData/antennaPattern/beamPointingVector/x

diagram						
type	extension of xs:double					
properties	isRef 0 con-com- tent plex					
attributes	Name error	Type xs:double	Use required	Default	Fixed	Annotation

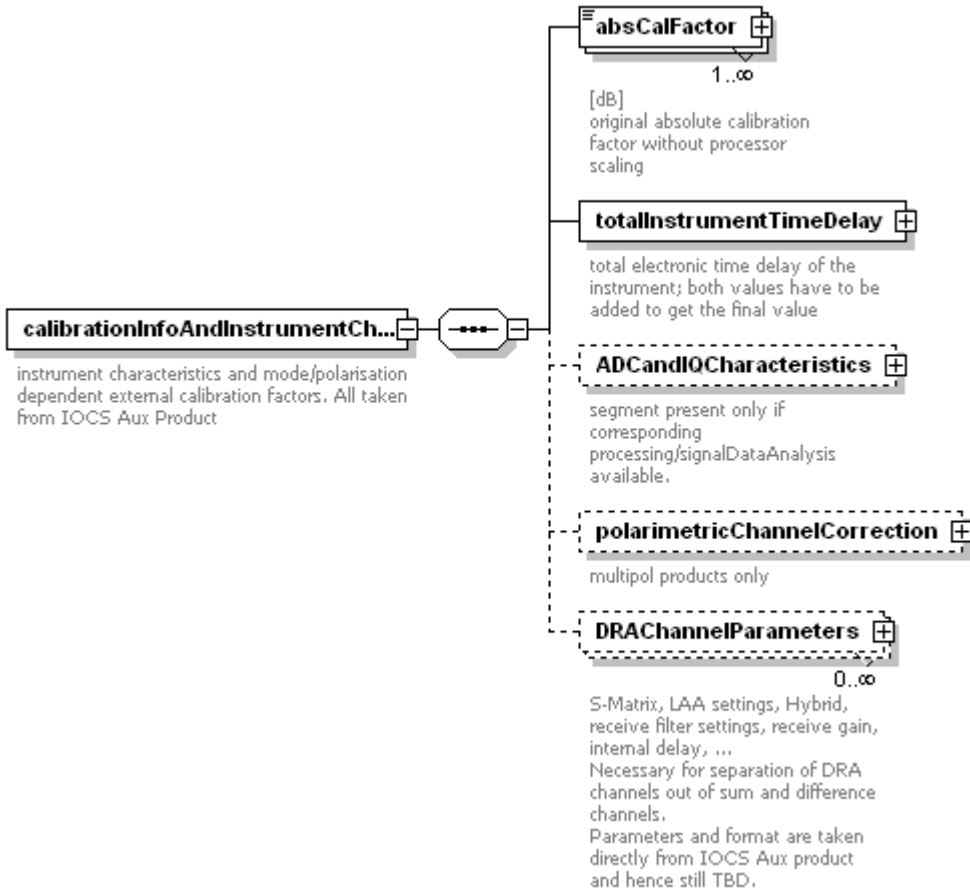
element level1Product/calibration/calibrationData/antennaPattern/beamPointingVector/y

diagram						
type	extension of xs:double					
properties	isRef 0 con-com- tent plex					
attributes	Name error	Type xs:double	Use required	Default	Fixed	Annotation

element level1Product/calibration/calibrationData/antennaPattern/beamPointingVector/z

diagram						
type	extension of xs:double					
properties	isRef 0 con-com- tent plex					
attributes	Name	Type	Use	Default	Fixed	Annotation
	error	xs:double	required			

element **level1Product/calibration/calibrationData/calibrationInfoAndInstrumentCharacteristics**

diagram						
properties	isRef 0 con-com- tent plex					
children	<u>absCalFactor</u> <u>totalInstrumentTimeDelay</u> <u>ADCandIQCharacteristics</u> <u>polarimetricChannelCorrection</u> <u>DRChannelParameters</u>					
annotation	documentati-instrument characteristics and mode/polarisation dependent external calibration factors. All taken from on IOCS Aux Product					

element **lev- el1Product/calibration/calibrationData/calibrationInfoAndInstrumentCharacteristics/absCalFactor**

diagram						
type	extension of xs:float					
properties	isRef 0 con-com- tent plex					
attributes	Name	Type	Use	Default	Fixed	Annotation
	imagingMode		required			documentati-strip_007, on spot_008
	beamID	<u>string20</u>	required			documentati-HH, VV, on HV, VH
	polarisationChan- nel		required			documentati-SRA, on DRAFore, DRAAft
	lookDirection		required			
	antennaMode		required			
annotation	documentati-[dB] on original absolute calibration factor without processor scal- ing					

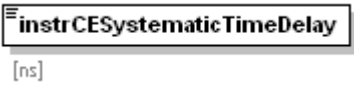
element lev-

e11Product/calibration/calibrationData/calibrationInfoAndInstrumentCharacteristics/totalInstrumentTimeDelay

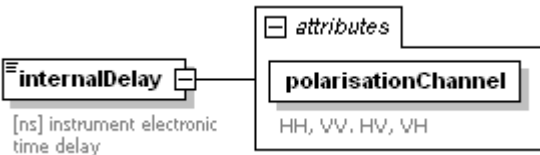
diagram						
properties	isRef 0 con-com- tent plex					
children	<u>instrCESystematicTimeDelay</u> <u>internalDelay</u>					
annotation	documentati-total electronic time delay of the instrument; both values have to be added to get the final on value					

element lev-

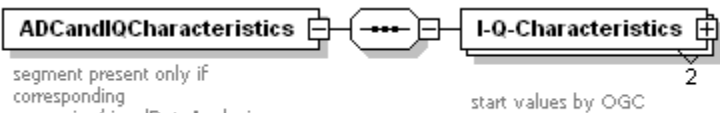
e11Product/calibration/calibrationData/calibrationInfoAndInstrumentCharacteristics/totalInstrumentTimeDelay/instrCESystematicTimeDelay

diagram	
type	xs:float
properties	isRef 0 con-simp- tent le default 1000
annotation	documentati-[ns on]

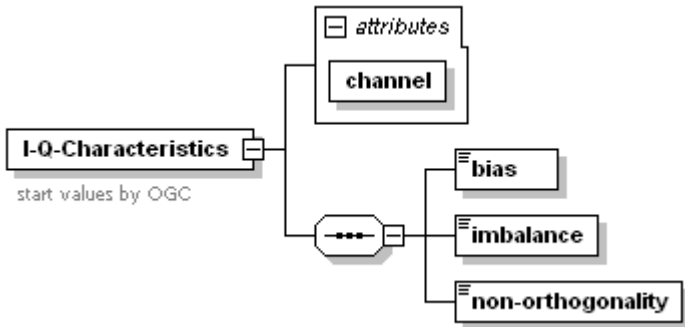
element **lev-**
e11Product/calibration/calibrationData/calibrationInfoAndInstrumentCharacteristics/totalInstrumentTimeDelay/internalDelay

diagram						
type	extension of xs:float					
properties	isRef 0 con-com- tent plex					
attributes	Name polarisationChan- nel	Type	Use required	Default	Fixed	Annotation documentati-HH, on VV, HV, VH
annotation	documentati-[ns] instrument electronic time on delay					

element **lev-**
e11Product/calibration/calibrationData/calibrationInfoAndInstrumentCharacteristics/ADCandIQCharacteristics

diagram						
properties	isRef 0 con-com- tent plex					
children	<u>I-Q-Characteristics</u>					
annotation	documentati-segment present only if corresponding processing/signalDataAnalysis availa- on ble.					

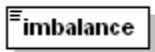
element **lev-**
e11Product/calibration/calibrationData/calibrationInfoAndInstrumentCharacteristics/ADCandIQCharacteristics/I-Q-Characteristics

diagram	 The diagram shows the structure of the I-Q-Characteristics element. It has a title box labeled "I-Q-Characteristics" with the text "start values by OGC" below it. To its right is a container box labeled "attributes" which contains a box labeled "channel". Below the "I-Q-Characteristics" box is a connector box (a circle with three dots). To the right of the connector box are three stacked boxes labeled "bias", "imbalance", and "non-orthogonality".					
properties	isRef 0 con-com- tent plex					
children	<u>bias imbalance non-orthogonality</u>					
attributes	Name	Type	Use	Default	Fixed	Annotation
	channel		required			
annotation	documentati-start values by on OGC					

element **lev-**
el1Product/calibration/calibrationData/calibrationInfoAndInstrumentCharacteristics/ADCandIQCharact
eristics/I-Q-Characteristics/bias

diagram	 The diagram shows the bias element as a simple box with the label "bias" and a small icon to its left.					
type	xs:double					
properties	isRef 0 con-simp- tent le					

element **lev-**
el1Product/calibration/calibrationData/calibrationInfoAndInstrumentCharacteristics/ADCandIQCharact
eristics/I-Q-Characteristics/imbalance

diagram	 The diagram shows the imbalance element as a box with the label "imbalance" and a small icon to its left.					
type	xs:double					
properties	isRef 0 con-simp- tent le					

element **lev-**
el1Product/calibration/calibrationData/calibrationInfoAndInstrumentCharacteristics/ADCandIQCharact
eristics/I-Q-Characteristics/non-orthogonality

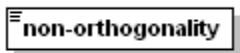
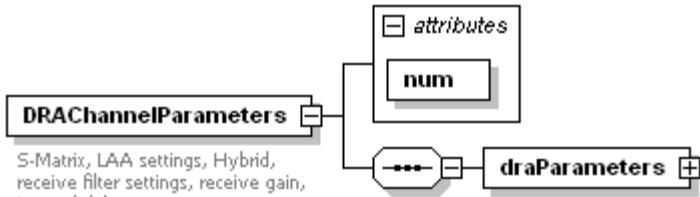
diagram	 The diagram shows the non-orthogonality element as a box with the label "non-orthogonality" and a small icon to its left.					
type	xs:double					
properties	isRef 0 con-simp-					

diagram	in dB 1. H versus V and 2. V versus H					
type	extension of xs:float					
properties	isRef 0 con-com- tent plex					
attributes	Name	Type	Use	Default	Fixed	Annotation

	polarisation required
annotation	documentati-in dB on 1. H versus V and 2. V versus H

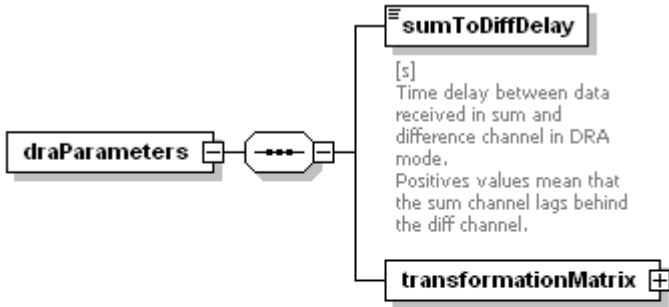
element lev-

el1Product/calibration/calibrationData/calibrationInfoAndInstrumentCharacteristics/DRChannelParameters

diagram	 S-Matrix, LAA settings, Hybrid, receive filter settings, receive gain, internal delay, ... Necessary for separation of DRA channels out of sum and difference channels. Parameters and format are taken directly from IOCS Aux product and hence still TBD.					
properties	isRef 0 con-com- tent plex					
children	<u>draParameters</u>					
attributes	Name num	Type xs:unsignedLong	Use required	Default	Fixed	Annotation
annotation	documentati-S-Matrix, LAA settings, Hybrid, receive filter settings, receive gain, internal delay, ... on Necessary for separation of DRA channels out of sum and difference channels. Parameters and format are taken directly from IOCS Aux product and hence still TBD.					

element lev-

el1Product/calibration/calibrationData/calibrationInfoAndInstrumentCharacteristics/DRChannelParameters/draParameters

diagram	 sumToDiffDelay [s] Time delay between data received in sum and difference channel in DRA mode. Positives values mean that the sum channel lags behind the diff channel. transformationMatrix $\begin{aligned} \text{Sum-Signal} &= h_{1_1} * \\ &\text{Fore-Signal} + \text{value}_{1_2} * \\ &\text{Aft-Signal} \\ \text{Diff-Signal} &= h_{2_1} * \\ &\text{Fore-Signal} + h_{2_2} * \\ &\text{Aft-Signal} \end{aligned}$ The measured value k1 (phase difference) has to be added to h_{1_1} and h_{1_2}.					
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properties	isRef 0 con-com- tent plex
children	<u>sumToDiffDelay</u> <u>transformationMatrix</u>

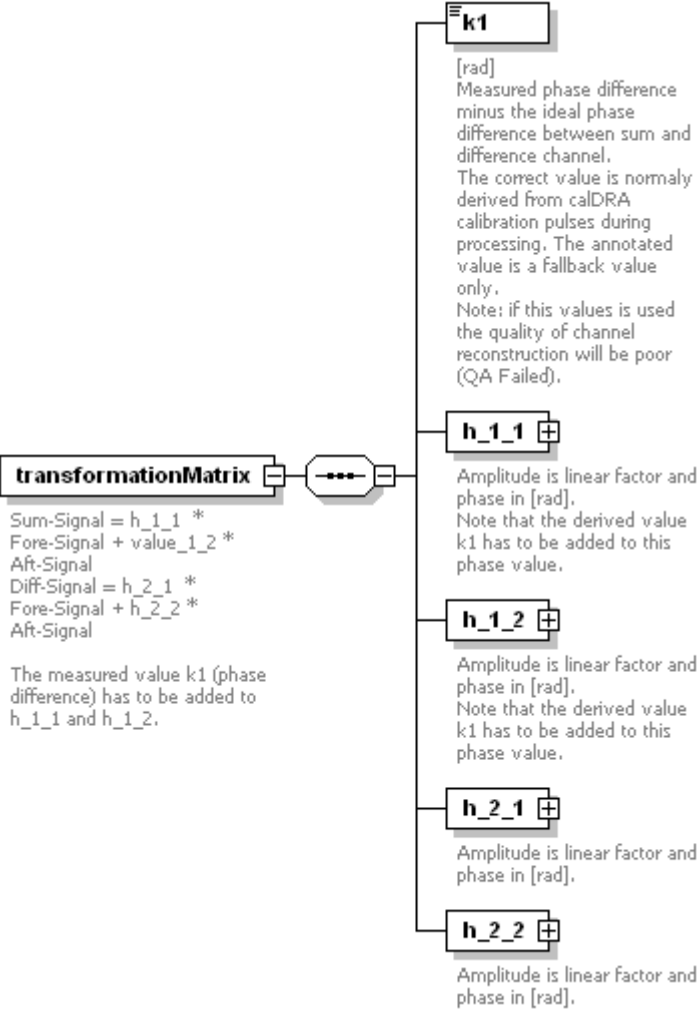
element **lev-**

el1Product/calibration/calibrationData/calibrationInfoAndInstrumentCharacteristics/DRACHannelParameters/draParameters/sumToDiffDelay

diagram	 [s] Time delay between data received in sum and difference channel in DRA mode. Positives values mean that the sum channel lags behind the diff channel.
type	xs:double
properties	isRef 0 con-simp- tent le
annotation	documentati-[s] on Time delay between data received in sum and difference channel in DRA mode. Positives values mean that the sum channel lags behind the diff channel.

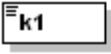
element **lev-**

el1Product/calibration/calibrationData/calibrationInfoAndInstrumentCharacteristics/DRACHannelParameters/draParameters/transformationMatrix

diagram	 transformationMatrix Sum-Signal = $h_{1_1} * \text{Fore-Signal} + \text{value_1_2} * \text{Aft-Signal}$ Diff-Signal = $h_{2_1} * \text{Fore-Signal} + h_{2_2} * \text{Aft-Signal}$ The measured value k1 (phase difference) has to be added to h_{1_1} and h_{1_2}. k1 [rad] Measured phase difference minus the ideal phase difference between sum and difference channel. The correct value is normally derived from calDRA calibration pulses during processing. The annotated value is a fallback value only. Note: if this values is used the quality of channel reconstruction will be poor (QA Failed). h_1_1 Amplitude is linear factor and phase in [rad]. Note that the derived value k1 has to be added to this phase value. h_1_2 Amplitude is linear factor and phase in [rad]. Note that the derived value k1 has to be added to this phase value. h_2_1 Amplitude is linear factor and phase in [rad]. h_2_2 Amplitude is linear factor and phase in [rad].
properties	isRef 0 con-com- tent plex
children	<u>k1 h_1_1 h_1_2 h_2_1 h_2_2</u>
annotation	documentati-Sum-Signal = $h_{1_1} * \text{Fore-Signal} + \text{value_1_2} * \text{Aft-Signal}$ on Diff-Signal = $h_{2_1} * \text{Fore-Signal} + h_{2_2} * \text{Aft-Signal}$ The measured value k1 (phase difference) has to be added to h_{1_1} and h_{1_2} .

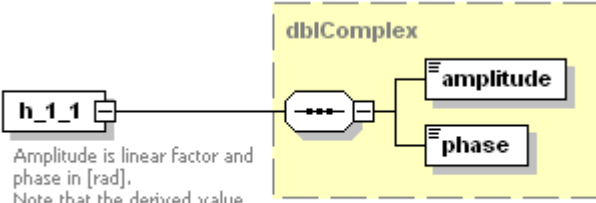
element lev-

el1Product/calibration/calibrationData/calibrationInfoAndInstrumentCharacteristics/DRChannelParameters/draParameters/transformationMatrix/k1

diagram	 [rad] Measured phase difference minus the ideal phase difference between sum and difference channel. The correct value is normally derived from calDRA calibration pulses during processing. The annotated value is a fallback value only. Note: if this values is used the quality of channel reconstruction will be poor (QA Failed).
type	xs:double
properties	isRef 0 con-sim- tent le
annotation	documentati-[rad] on Measured phase difference minus the ideal phase difference between sum and difference channel. The correct value is normally derived from calDRA calibration pulses during processing. The annotated value is a fallback value only. Note: if this values is used the quality of channel reconstruction will be poor (QA Failed).

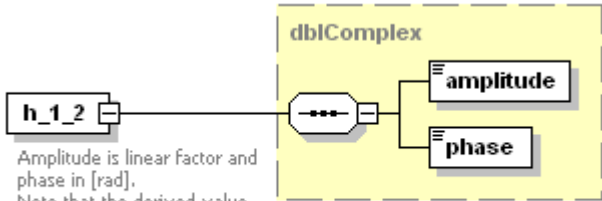
element lev-

el1Product/calibration/calibrationData/calibrationInfoAndInstrumentCharacteristics/DRACHannelParameters/draParameters/transformationMatrix/h_1_1

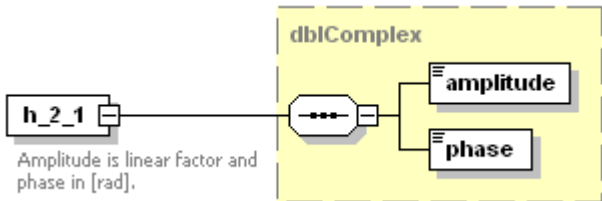
diagram	 Amplitude is linear factor and phase in [rad]. Note that the derived value k1 has to be added to this phase value.
type	<u>dbfComplex</u>
properties	isRef 0 con-com- tent plex
children	<u>amplitude phase</u>
annotation	documentati-Amplitude is linear factor and phase in [rad]. on Note that the derived value k1 has to be added to this phase value.

element lev-

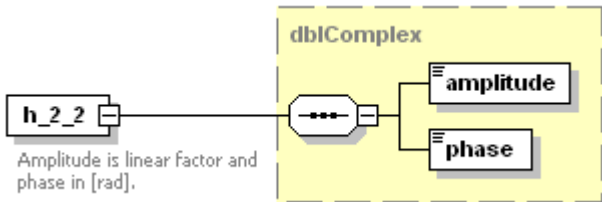
el1Product/calibration/calibrationData/calibrationInfoAndInstrumentCharacteristics/DRACHannelParameters/draParameters/transformationMatrix/h_1_2

diagram	 Amplitude is linear factor and phase in [rad]. Note that the derived value k1 has to be added to this phase value.
type	<u>dbfComplex</u>
properties	isRef 0 con-com- tent plex
children	<u>amplitude phase</u>
annotation	documentati-Amplitude is linear factor and phase in [rad]. on Note that the derived value k1 has to be added to this phase value.

element lev-
el1Product/calibration/calibrationData/calibrationInfoAndInstrumentCharacteristics/DRACHannelParameters/draParameters/transformationMatrix/h_2_1

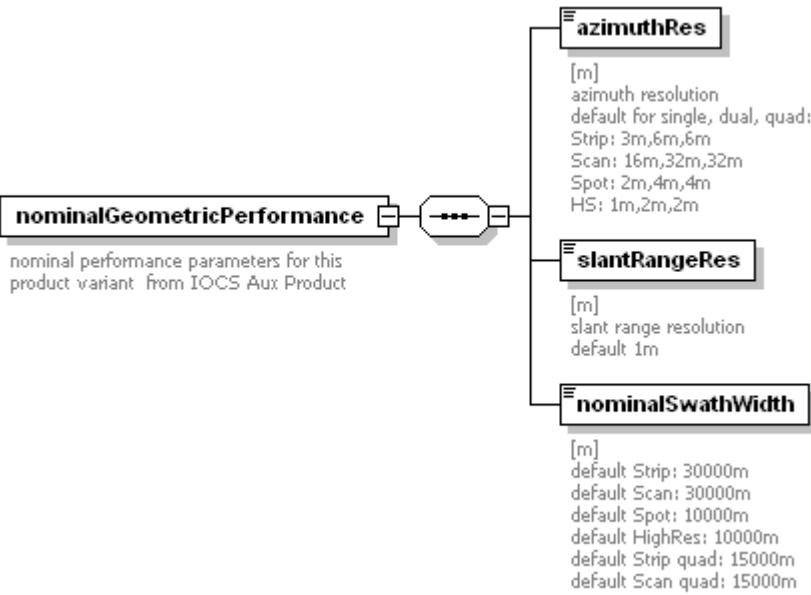
diagram	 Amplitude is linear factor and phase in [rad].
type	<u>dbfComplex</u>
properties	isRef 0 con-com- tent plex
children	<u>amplitude phase</u>
annotation	documentati-Amplitude is linear factor and phase in on [rad].

element lev-
el1Product/calibration/calibrationData/calibrationInfoAndInstrumentCharacteristics/DRACHannelParameters/draParameters/transformationMatrix/h_2_2

diagram	 Amplitude is linear factor and phase in [rad].
type	<u>dbfComplex</u>
properties	isRef 0 con-com- tent plex

children	<u>amplitude phase</u>
annotation	documentati-Amplitude is linear factor and phase in on [rad].

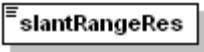
element level1Product/calibration/nominalGeometricPerformance

diagram	
properties	isRef 0 con-com- tent plex
children	<u>azimuthRes</u> <u>slantRangeRes</u> <u>nominalSwathWidth</u>
annotation	documentati-nominal performance parameters for this product variant from IOCS Aux Prod- on uct

element level1Product/calibration/nominalGeometricPerformance/azimuthRes

diagram	
type	xs:float
properties	isRef 0 con-simp- tent le
annotation	documentati-[m] on azimuth resolution default for single, dual, quad: Strip: 3m,6m,6m Scan: 16m,32m,32m Spot: 2m,4m,4m HS: 1m,2m,2m

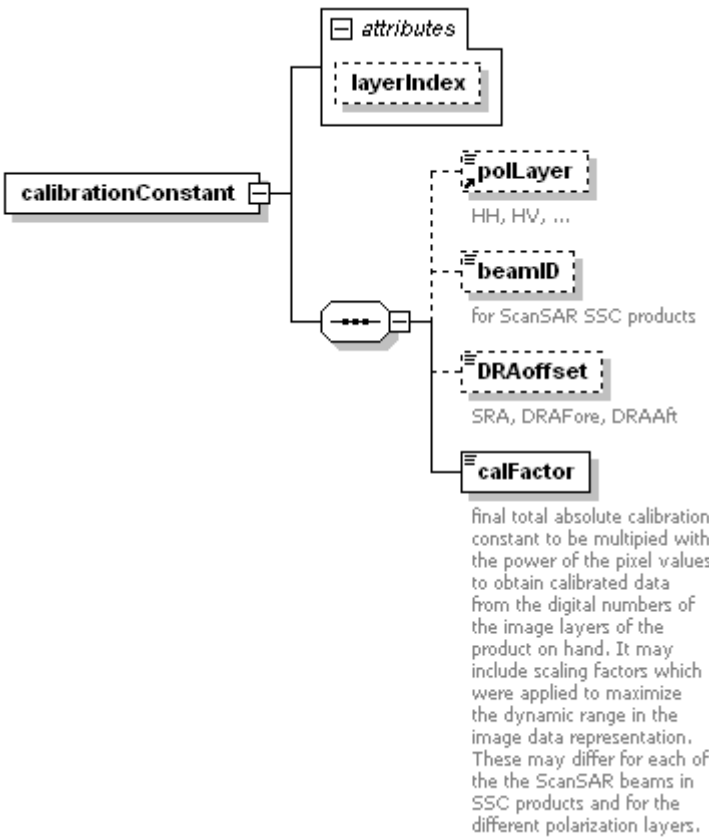
element **level1Product/calibration/nominalGeometricPerformance/slantRangeRes**

diagram	 [m] slant range resolution default 1m
type	xs:float
properties	isRef 0 con-simp- tent le
annotation	documentati-[m] on slant range resolu- tion default 1m

element **level1Product/calibration/nominalGeometricPerformance/nominalSwathWidth**

diagram	 [m] default Strip: 30000m default Scan: 30000m default Spot: 10000m default HighRes: 10000m default Strip quad: 15000m default Scan quad: 15000m
type	xs:float
properties	isRef 0 con-simp- tent le
annotation	documentati-[m] on default Strip: 30000m default Scan: 30000m default Spot: 10000m default HighRes: 10000m default Strip quad: 15000m default Scan quad: 15000m

element **level1Product/calibration/calibrationConstant**

diagram	 The diagram illustrates the structure of the calibrationConstant object. It features a main box labeled calibrationConstant with a small square icon on its right side. A line extends from this icon to a dashed box labeled attributes, which contains a dashed box labeled layerIndex. Another line extends from the bottom of the calibrationConstant box to a small circle containing three dots. From this circle, a line leads to a dashed box labeled polLayer (with a small square icon on its right side) containing the text "HH, HV, ...". Below polLayer is a dashed box labeled beamID (with a small square icon on its right side) containing the text "for ScanSAR SSC products". Below beamID is a dashed box labeled DRAoffset (with a small square icon on its right side) containing the text "SRA, DRAFore, DRAAft". Finally, a line leads from the bottom of the dotted circle to a solid box labeled calFactor (with a small square icon on its right side). Below calFactor is a detailed description: "final total absolute calibration constant to be multiplied with the power of the pixel values to obtain calibrated data from the digital numbers of the image layers of the product on hand. It may include scaling factors which were applied to maximize the dynamic range in the image data representation. These may differ for each of the the ScanSAR beams in SSC products and for the different polarization layers."												
properties	isRef 0 con-com- tent plex												
children	<u>polLayer</u> <u>beamID</u> <u>DRAoffset</u> <u>calFactor</u>												
attributes	<table><tr><th>Name</th><th>Type</th><th>Use</th><th>Default</th><th>Fixed</th><th>Annotation</th></tr><tr><td>layerIndex</td><td></td><td></td><td></td><td></td><td></td></tr></table>	Name	Type	Use	Default	Fixed	Annotation	layerIndex					
Name	Type	Use	Default	Fixed	Annotation								
layerIndex													

element level1Product/calibration/calibrationConstant/beamID

diagram	 The diagram shows a structure for beamID with the text "for ScanSAR SSC products".
type	<u>string20</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 20
annotation	documentati-for ScanSAR SSC pro- on ducts

element level1Product/calibration/calibrationConstant/DRAoffset

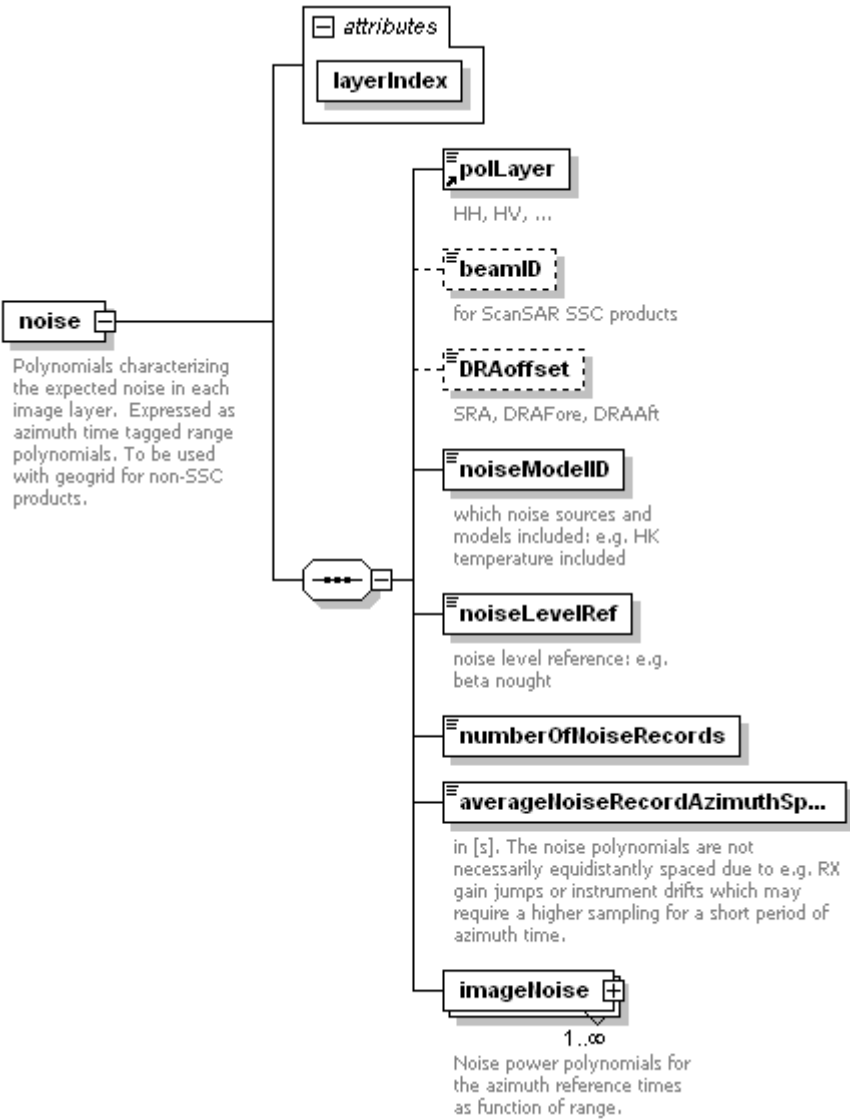
diagram	 The diagram shows a structure for DRAoffset with the text "SRA, DRAFore, DRAAft".
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type	restriction of xs:NMTOKENS
properties	isRef 0 con-simp- tent le
facets	enumerati-SRA on enumerati-DRAFore on enumerati-DRAAft on
annotation	documentati-SRA, DRAFore, on DRAAft

element **level1Product/calibration/calibrationConstant/calFactor**

diagram	 final total absolute calibration constant to be multiplied with the power of the pixel values to obtain calibrated data from the digital numbers of the image layers of the product on hand. It may include scaling factors which were applied to maximize the dynamic range in the image data representation. These may differ for each of the the ScanSAR beams in SSC products and for the different polarization layers.
type	extension of xs:double
properties	isRef 0 con-com- tent plex
annotation	documentati-final total absolute calibration constant to be multiplied with the power of the pixel values to obtain calibrated on data from the digital numbers of the image layers of the product on hand. It may include scaling factors which were applied to maximize the dynamic range in the image data representation. These may differ for each of the the ScanSAR beams in SSC products and for the different polarization layers.

element **level1Product/noise**

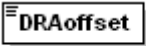
diagram						
properties	isRef 0 con-com- tent plex					
children	<u>polLayer</u> <u>beamID</u> <u>DRAoffset</u> <u>noiseModelID</u> <u>noiseLevelRef</u> <u>numberOfNoiseRecords</u> <u>averageNoiseRecordAzimuthSpacing</u> <u>imageNoise</u>					
attributes	Name	Type	Use	Default	Fixed	Annotation
	layerIndex	xs:int	required			
annotation	documentati-Polynomials characterizing the expected noise in each image layer. Expressed as azimuth time tagged on range polynomials. To be used with geogrid for non-SSC products.					

element level1Product/noise/beamID

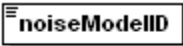
diagram	
type	<u>string20</u>
properties	isRef 0

	con-simp- tent le
facets	maxLength 20
annotation	documentati-for ScanSAR SSC pro- on ducts

element level1Product/noise/DRAoffset

diagram	 SRA, DRAFore, DRAAft
type	restriction of xs:NMTOKENS
properties	isRef 0 con-simp- tent le
facets	enumerati-SRA on enumerati-DRAFore on enumerati-DRAAft on
annotation	documentati-SRA, DRAFore, on DRAAft

element level1Product/noise/noiseModelID

diagram	 which noise sources and models included: e.g. HK temperature included
type	<u>string255</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 255
annotation	documentati-which noise sources and models included: e.g. HK temperature includ- on ed

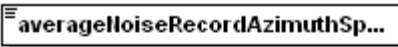
element level1Product/noise/noiseLevelRef

diagram	 noise level reference: e.g. beta nought
type	<u>string80</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 80
annotation	documentati-noise level reference: e.g. beta on nought

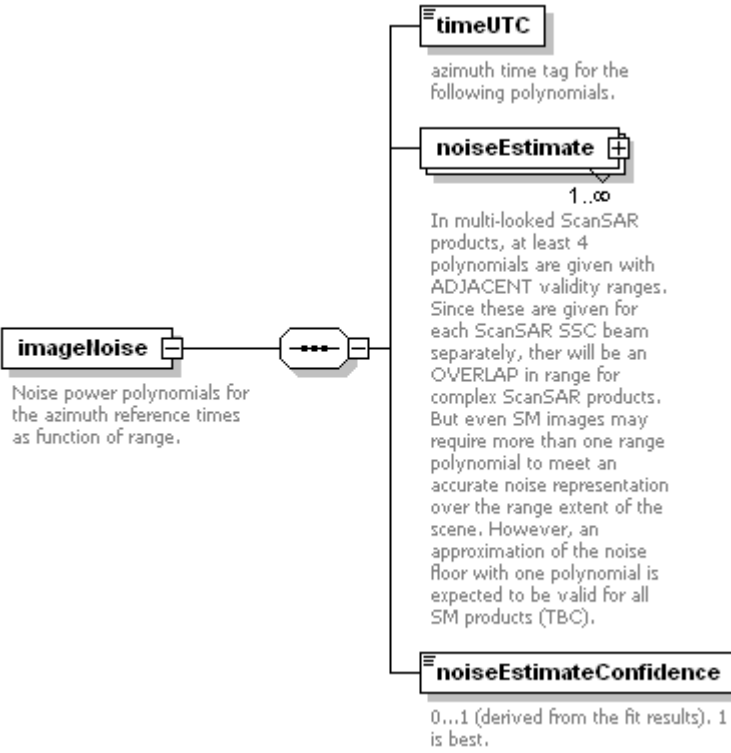
element level1Product/noise/numberOfNoiseRecords

diagram	
type	xs:int
properties	isRef 0 con-simp- tent le

element level1Product/noise/averageNoiseRecordAzimuthSpacing

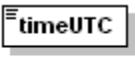
diagram	 in [s]. The noise polynomials are not necessarily equidistantly spaced due to e.g. RX gain jumps or instrument drifts which may require a higher sampling for a short period of azimuth time.
type	xs:float
properties	isRef 0 con-simp- tent le
annotation	documentati-in [s]. The noise polynomials are not necessarily equidistantly spaced due to e.g. RX gain jumps or instrument drifts which may require a higher sampling for a short period of azimuth time.

element level1Product/noise/imageNoise

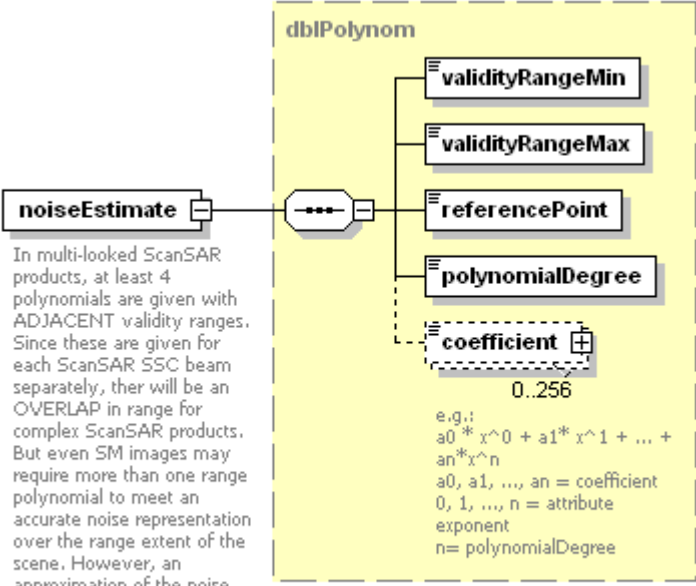
diagram	 imageNoise Noise power polynomials for the azimuth reference times as function of range. timeUTC azimuth time tag for the following polynomials. noiseEstimate 1..∞ In multi-looked ScanSAR products, at least 4 polynomials are given with ADJACENT validity ranges. Since these are given for each ScanSAR SSC beam separately, there will be an OVERLAP in range for complex ScanSAR products. But even SM images may require more than one range polynomial to meet an accurate noise representation over the range extent of the scene. However, an approximation of the noise floor with one polynomial is expected to be valid for all SM products (TBC). noiseEstimateConfidence 0...1 (derived from the fit results). 1 is best.
properties	isRef 0 con-com- tent plex

children	<u>timeUTC</u> <u>noiseEstimate</u> <u>noiseEstimateConfidence</u>
annotation	documentati-Noise power polynomials for the azimuth reference times as function of on range.

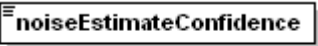
element level1Product/noise/imageNoise/timeUTC

diagram	 azimuth time tag for the following polynomials.
type	xs:dateTime
properties	isRef 0 con-simp- tent le
annotation	documentati-azimuth time tag for the following polynomi- on als.

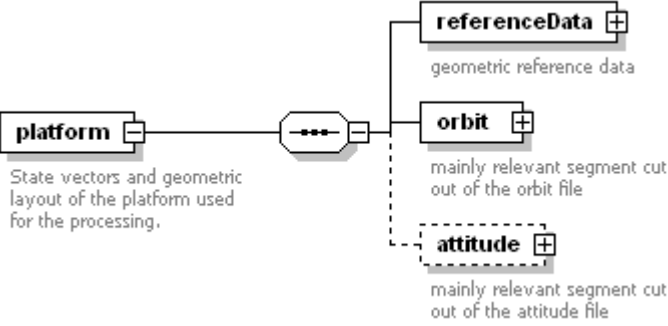
element level1Product/noise/imageNoise/noiseEstimate

diagram	 In multi-looked ScanSAR products, at least 4 polynomials are given with ADJACENT validity ranges. Since these are given for each ScanSAR SSC beam separately, there will be an OVERLAP in range for complex ScanSAR products. But even SM images may require more than one range polynomial to meet an accurate noise representation over the range extent of the scene. However, an approximation of the noise floor with one polynomial is expected to be valid for all SM products (TBC). dbiPolynom - validityRangeMin - validityRangeMax - referencePoint - polynomialDegree - coefficient (e.g., 0.256) e.g.: $a_0 * x^0 + a_1 * x^1 + ... + a_n * x^n$ $a_0, a_1, ..., a_n$ = coefficient $0, 1, ..., n$ = attribute exponent n = polynomialDegree
type	<u>dbiPolynom</u>
properties	isRef 0 con-com- tent plex
children	<u>validityRangeMin</u> <u>validityRangeMax</u> <u>referencePoint</u> <u>polynomialDegree</u> <u>coefficient</u>
annotation	documentati-In multi-looked ScanSAR products, at least 4 polynomials are given with ADJACENT validity ranges. Since on these are given for each ScanSAR SSC beam separately, there will be an OVERLAP in range for complex ScanSAR products. But even SM images may require more than one range polynomial to meet an accurate noise representation over the range extent of the scene. However, an approximation of the noise floor with one polynomial is expected to be valid for all SM products (TBC).

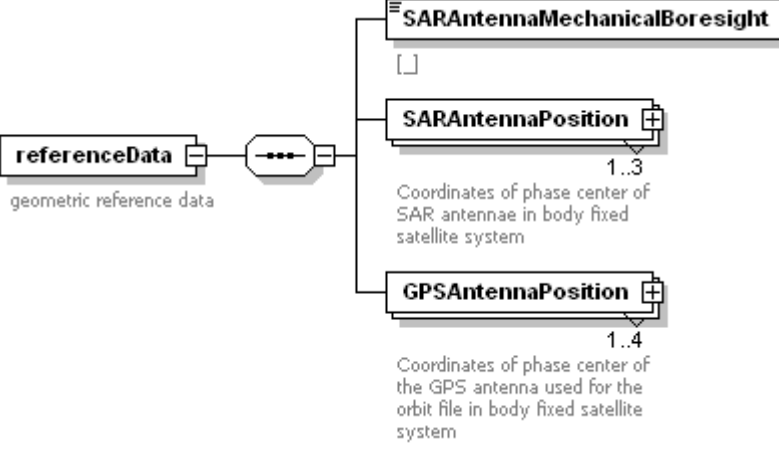
element level1Product/noise/imageNoise/noiseEstimateConfidence

diagram	 noiseEstimateConfidence 0...1 (derived from the fit results). 1 is best.
type	xs:float
properties	isRef 0 con-sim- tent le
annotation	documentati-0...1 (derived from the fit results). 1 is on best.

element level1Product/platform

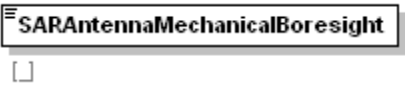
diagram	 platform State vectors and geometric layout of the platform used for the processing. referenceData geometric reference data orbit mainly relevant segment cut out of the orbit file attitude mainly relevant segment cut out of the attitude file
properties	isRef 0 con-com- tent plex
children	<u>referenceData</u> <u>orbit</u> <u>attitude</u>
annotation	documentati-State vectors and geometric layout of the platform used for the pro- on cessing.

element level1Product/platform/referenceData

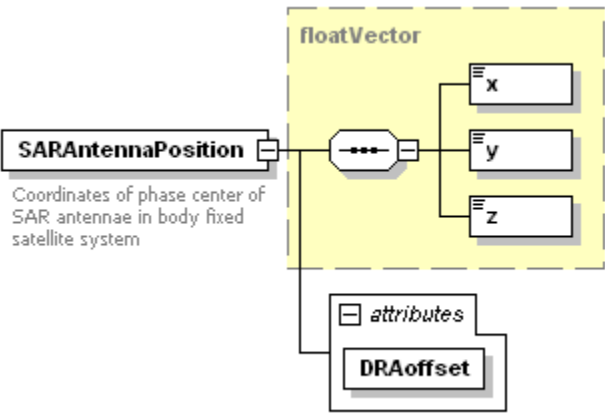
diagram	 referenceData geometric reference data SARAntennaMechanicalBoresight SARAntennaPosition 1..3 Coordinates of phase center of SAR antennae in body fixed satellite system GPSAntennaPosition 1..4 Coordinates of phase center of the GPS antenna used for the orbit file in body fixed satellite system
properties	isRef 0 con-com- tent plex
children	<u>SARAntennaMechanicalBoresight</u> <u>SARAntennaPosition</u> <u>GPSAntennaPosition</u>
annotation	documentati-geometric reference

	on data
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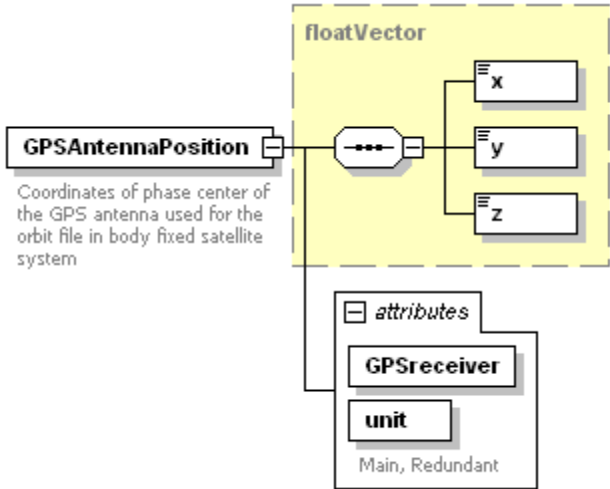
element level1Product/platform/referenceData/SARAntennaMechanicalBoresight

diagram	
type	xs:double
properties	isRef 0 con-simp- tent le
annotation	documentati- on]

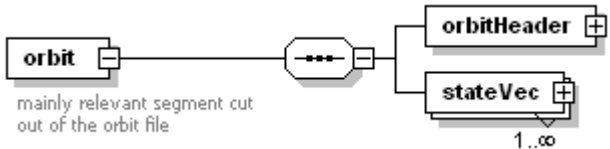
element level1Product/platform/referenceData/SARAntennaPosition

diagram						
type	extension of <u>floatVector</u>					
properties	isRef 0 con-com- tent plex					
children	<u>x y z</u>					
attributes	Name	Type	Use	Default	Fixed	Annotation
	DRAoffset		required			
annotation	documentati-Coordinates of phase center of SAR antennae in body fixed satellite sys- on tem					

element level1Product/platform/referenceData/GPSAntennaPosition

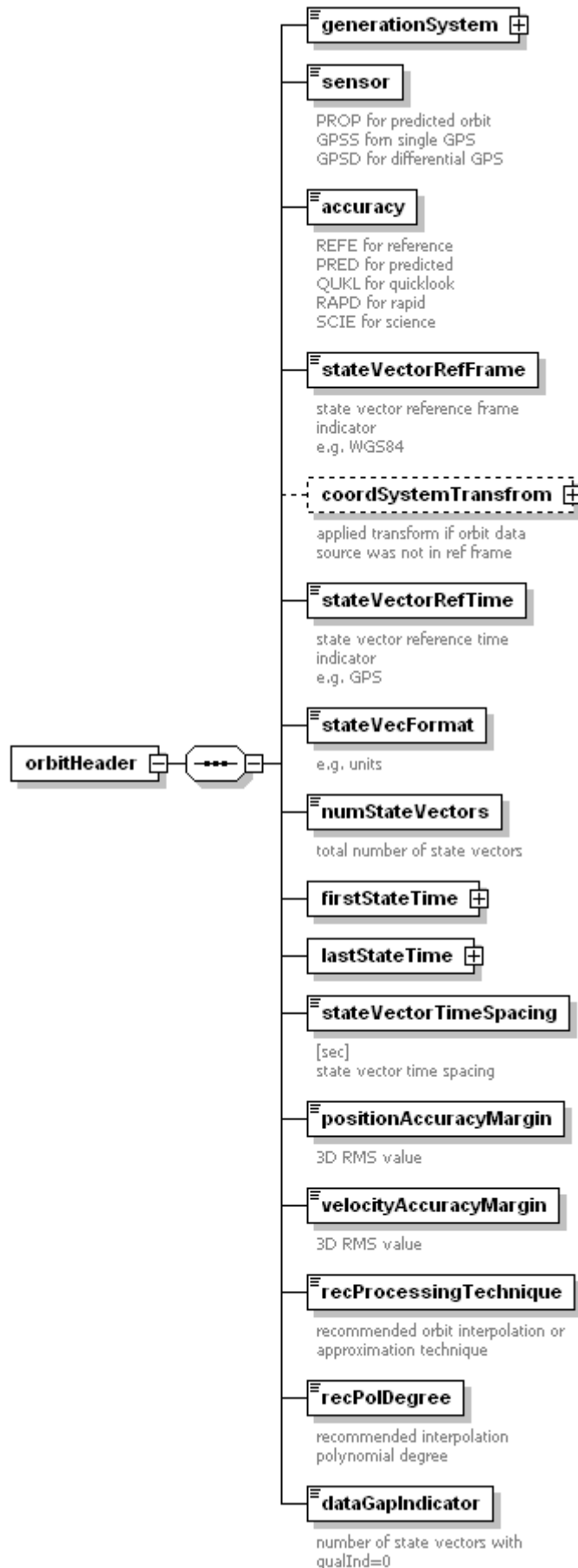
diagram						
type	extension of <u>floatVector</u>					
properties	isRef 0 con-com- tent plex					
children	<u>x y z</u>					
attributes	Name	Type	Use required	Default	Fixed	Annotation
	GPSreceiver unit		required			documentati-Main, on Redundant
annotation	documentati-Coordinates of phase center of the GPS antenna used for the orbit file in body fixed satellite sys- on tem					

element level1Product/platform/orbit

diagram						
properties	isRef 0 con-com- tent plex					
children	<u>orbitHeader stateVec</u>					
annotation	documentati-mainly relevant segment cut out of the orbit on file					

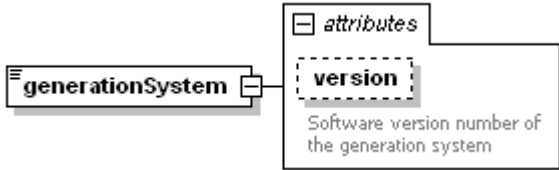
element level1Product/platform/orbit/orbitHeader

diagram



properties	isRef 0 con-com- tent plex
children	<u>generationSystem</u> <u>sensor</u> <u>accuracy</u> <u>stateVectorRefFrame</u> <u>coordSystemTransfrom</u> <u>stateVectorRefTime</u> <u>stateVecFormat</u> <u>numStateVectors</u> <u>firstStateTime</u> <u>lastStateTime</u> <u>stateVectorTimeSpacing</u> <u>positionAccuracyMargin</u> <u>velocityAccuracyMargin</u> <u>recProcessingTechnique</u> <u>recPolDegree</u> <u>dataGapIndicator</u>

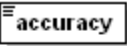
element **level1Product/platform/orbit/orbitHeader/generationSystem**

diagram						
type	extension of <u>string255</u>					
properties	isRef 0 con-com- tent plex					
facets	maxLength 255					
attributes	Name version	Type <u>string80</u>	Use	Default	Fixed	Annotation documentati-Software on version number of the gen- eration system

element **level1Product/platform/orbit/orbitHeader/sensor**

diagram						
type	restriction of xs:NMTOKEN					
properties	isRef 0 con-simp- tent le					
facets	enumerati-PRO on P enumerati-GPSS on enumerati-GPS on D					
annotation	documentati-PROP for predicted orbit on GPSS for single GPS GPSD for differential GPS					

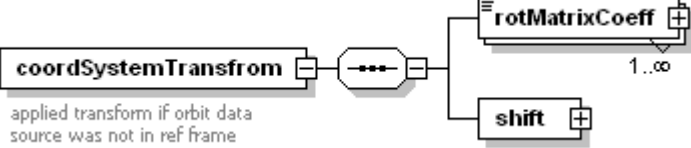
element **level1Product/platform/orbit/orbitHeader/accuracy**

diagram	 accuracy REFE for reference PRED for predicted QUKL for quicklook RAPD for rapid SCIE for science
type	restriction of xs:NMTOKEN
properties	isRef 0 con-simp- tent le
facets	enumerati-REFE on enumerati-PRE on D enumerati-QUKL on enumerati-RAP on D enumerati-SCIE on
annotation	documentati-REFE for refer- on ence PRED for predict- ed QUKL for quick- look RAPD for rapid SCIE for science

element **level1Product/platform/orbit/orbitHeader/stateVectorRefFrame**

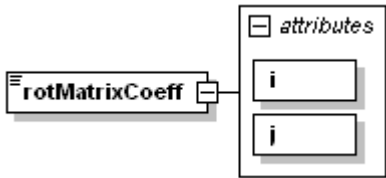
diagram	 state vector reference frame indicator e.g. WGS84
type	string80
properties	isRef 0 con-simp- tent le
facets	maxLength 80
annotation	documentati-state vector reference frame indica- on tor e.g. WGS84

element **level1Product/platform/orbit/orbitHeader/coordSystemTransfrom**

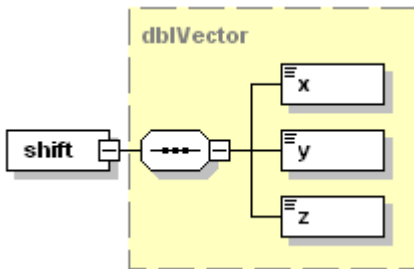
diagram	 coordSystemTransfrom applied transform if orbit data source was not in ref frame rotMatrixCoeff 1..∞ shift
properties	isRef 0 con-com- tent plex

children	<u>rotMatrixCoeff shift</u>
annotation	documentati-applied transform if orbit data source was not in ref on frame

element **level1Product/platform/orbit/orbitHeader/coordSystemTransfrom/rotMatrixCoeff**

diagram	 The diagram shows a box labeled 'rotMatrixCoeff' connected to an 'attributes' container. The 'attributes' container has two slots, both labeled 'i'.					
type	extension of xs:double					
properties	isRef 0 con-com- tent plex					
attributes	Name	Type	Use	Default	Fixed	Annotation
	i	xs:int	required			
	j	xs:int	required			

element **level1Product/platform/orbit/orbitHeader/coordSystemTransfrom/shift**

diagram	 The diagram shows a box labeled 'shift' connected to a dashed box labeled 'dblVector'. Inside 'dblVector' is a container with three slots labeled 'x', 'y', and 'z'.					
type	<u>dblVector</u>					
properties	isRef 0 con-com- tent plex					
children	<u>x y z</u>					

element **level1Product/platform/orbit/orbitHeader/stateVectorRefTime**

diagram	 The diagram shows a box labeled 'stateVectorRefTime' with the text 'state vector reference time indicator e.g. GPS' below it.					
type	<u>string20</u>					
properties	isRef 0 con-simp- tent le					
facets	maxLength 20					
annotation	documentati-state vector reference time indica- on tor e.g. GPS					

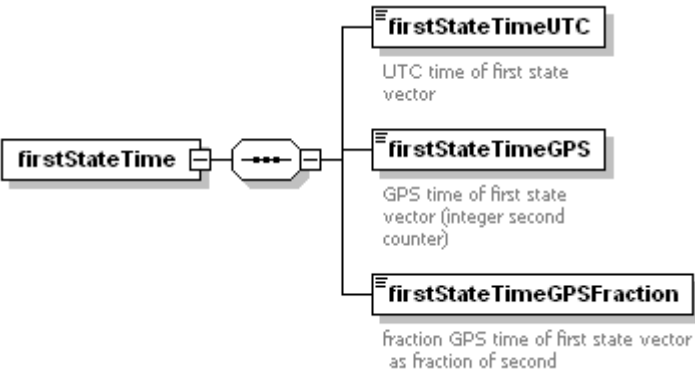
element **level1Product/platform/orbit/orbitHeader/stateVecFormat**

diagram	 e.g. units
type	string255
properties	isRef 0 con-simp- tent le
facets	maxLength 255
annotation	documentati-e.g. on units

element **level1Product/platform/orbit/orbitHeader/numStateVectors**

diagram	 total number of state vectors
type	xs:unsignedLong
properties	isRef 0 con-simp- tent le
annotation	documentati-total number of state vec- on tors

element **level1Product/platform/orbit/orbitHeader/firstStateTime**

diagram	
properties	isRef 0 con-com- tent plex
children	firstStateTimeUTC firstStateTimeGPS firstStateTimeGPSFraction

element **level1Product/platform/orbit/orbitHeader/firstStateTime/firstStateTimeUTC**

diagram	 UTC time of first state vector
type	xs:dateTime

properties	isRef 0 con-sim- tent le
annotation	documentati-UTC time of first state on vector

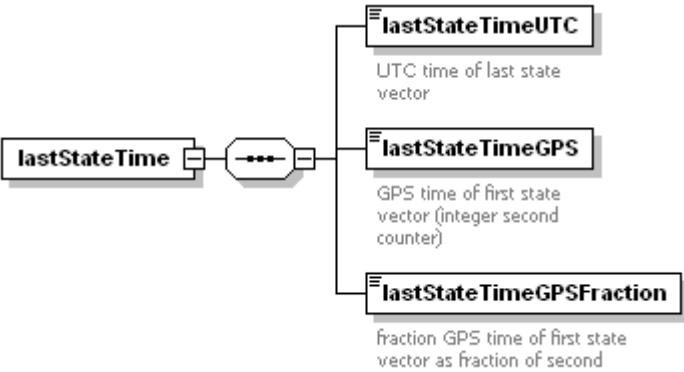
element level1Product/platform/orbit/orbitHeader/firstStateTime/firstStateTimeGPS

diagram	 firstStateTimeGPS GPS time of first state vector (integer second counter)
type	xs:unsignedInt
properties	isRef 0 con-sim- tent le
annotation	documentati-GPS time of first state vector (integer second coun- on ter)

element level1Product/platform/orbit/orbitHeader/firstStateTime/firstStateTimeGPSFraction

diagram	 firstStateTimeGPSFraction fraction GPS time of first state vector as fraction of second
type	xs:double
properties	isRef 0 con-sim- tent le
annotation	documentati-fraction GPS time of first state vector as fraction of sec- on ond

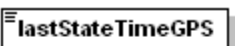
element level1Product/platform/orbit/orbitHeader/lastStateTime

diagram	 lastStateTime lastStateTimeUTC UTC time of last state vector lastStateTimeGPS GPS time of first state vector (integer second counter) lastStateTimeGPSFraction fraction GPS time of first state vector as fraction of second
properties	isRef 0 con-com- tent plex
children	<u>lastStateTimeUTC</u> <u>lastStateTimeGPS</u> <u>lastStateTimeGPSFraction</u>

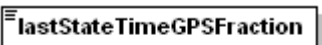
element level1Product/platform/orbit/orbitHeader/lastStateTime/lastStateTimeUTC

diagram	 UTC time of last state vector
type	xs:dateTime
properties	isRef 0 con-sim- tent le
annotation	documentati-UTC time of last state on vector

element level1Product/platform/orbit/orbitHeader/lastStateTime/lastStateTimeGPS

diagram	 GPS time of first state vector (integer second counter)
type	xs:unsignedInt
properties	isRef 0 con-sim- tent le
annotation	documentati-GPS time of first state vector (integer second coun- on ter)

element level1Product/platform/orbit/orbitHeader/lastStateTime/lastStateTimeGPSFraction

diagram	 fraction GPS time of first state vector as fraction of second
type	xs:double
properties	isRef 0 con-sim- tent le
annotation	documentati-fraction GPS time of first state vector as fraction of sec- on ond

element level1Product/platform/orbit/orbitHeader/stateVectorTimeSpacing

diagram	 [sec] state vector time spacing
type	xs:double
properties	isRef 0 con-sim- tent le
annotation	documentati-[sec] on state vector time spac- ing

element level1Product/platform/orbit/orbitHeader/positionAccuracyMargin

diagram	
type	xs:float
properties	isRef 0 con-simp- tent le
annotation	documentati-3D RMS value on

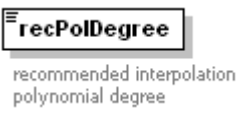
element level1Product/platform/orbit/orbitHeader/velocityAccuracyMargin

diagram	
type	xs:float
properties	isRef 0 con-simp- tent le
annotation	documentati-3D RMS value on

element level1Product/platform/orbit/orbitHeader/recProcessingTechnique

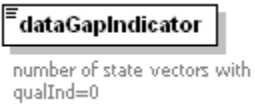
diagram	
type	string255
properties	isRef 0 con-simp- tent le
facets	maxLength 255
annotation	documentati-recommended orbit interpolation or approximation tech- on nique

element level1Product/platform/orbit/orbitHeader/recPolDegree

diagram	
type	restriction of xs:int
properties	isRef 0 con-simp- tent le
facets	minInclusive 1 maxInclusi-20 ve

annotation	documentati-recommended interpolation polynomial on degree
------------	---

element **level1Product/platform/orbit/orbitHeader/dataGapIndicator**

diagram	
type	xs:int
properties	isRef 0 con-simp- tent le
annotation	documentati-number of state vectors with qual- on Ind=0

element **level1Product/platform/orbit/stateVec**

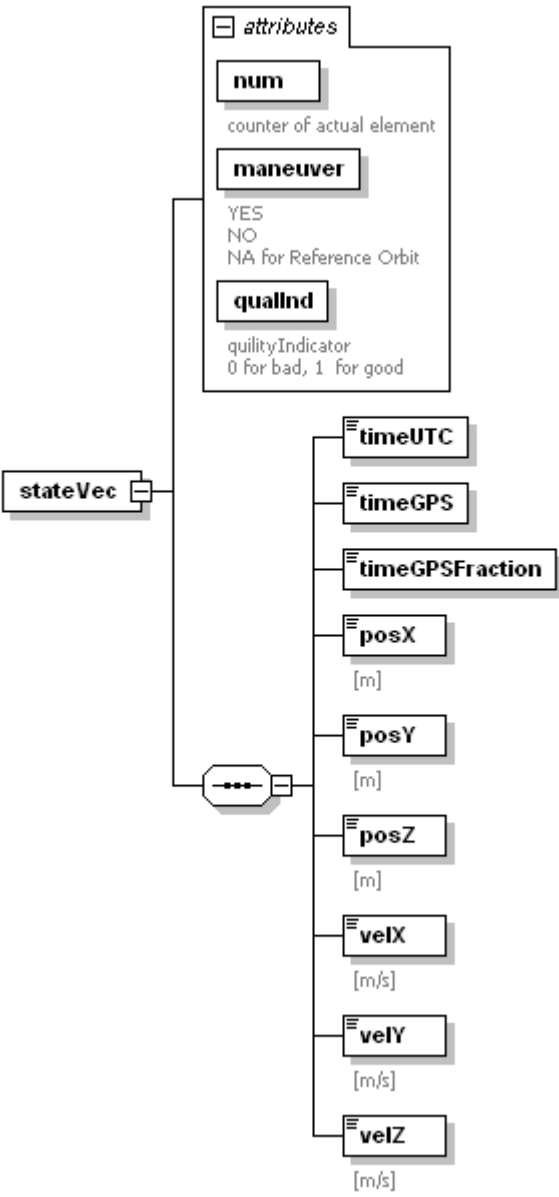
diagram						
properties	isRef 0 con-com- tent plex					
children	<u>timeUTC</u> <u>timeGPS</u> <u>timeGPSFraction</u> <u>posX</u> <u>posY</u> <u>posZ</u> <u>velX</u> <u>velY</u> <u>velZ</u>					
attributes	Name	Type	Use	Default	Fixed	Annotation
	num		required			documentati-counter of on actual ele- ment
	maneuver		required			documentati-YES on NO NA for Refer- ence Orbit
	qualInd		required			documentati-qualityIndica- on tor 0 for bad, 1 for good

diagram	
type	xs:dateTime
properties	isRef 0 con-simp- tent le

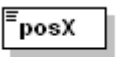
element level1Product/platform/orbit/stateVec/timeGPS

diagram	
type	xs:unsignedLong
properties	isRef 0 con-simp- tent le

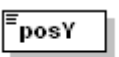
element level1Product/platform/orbit/stateVec/timeGPSFraction

diagram	
type	xs:double
properties	isRef 0 con-simp- tent le

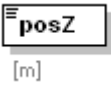
element level1Product/platform/orbit/stateVec/posX

diagram	 [m]
type	xs:double
properties	isRef 0 con-simp- tent le
annotation	documentati-[m on]

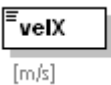
element level1Product/platform/orbit/stateVec/posY

diagram	 [m]
type	xs:double
properties	isRef 0 con-simp- tent le
annotation	documentati-[m on]

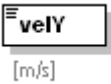
element level1Product/platform/orbit/stateVec/posZ

diagram	 [m]
type	xs:double
properties	isRef 0 con-simp- tent le
annotation	documentati-[m on]

element **level1Product/platform/orbit/stateVec/velX**

diagram	 [m/s]
type	xs:double
properties	isRef 0 con-simp- tent le
annotation	documentati-[m/s on]

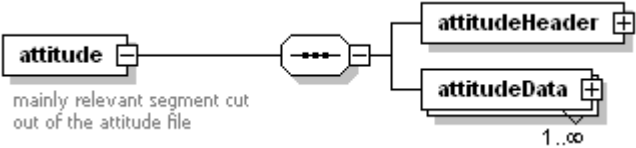
element **level1Product/platform/orbit/stateVec/velY**

diagram	 [m/s]
type	xs:double
properties	isRef 0 con-simp- tent le
annotation	documentati-[m/s on]

element **level1Product/platform/orbit/stateVec/velZ**

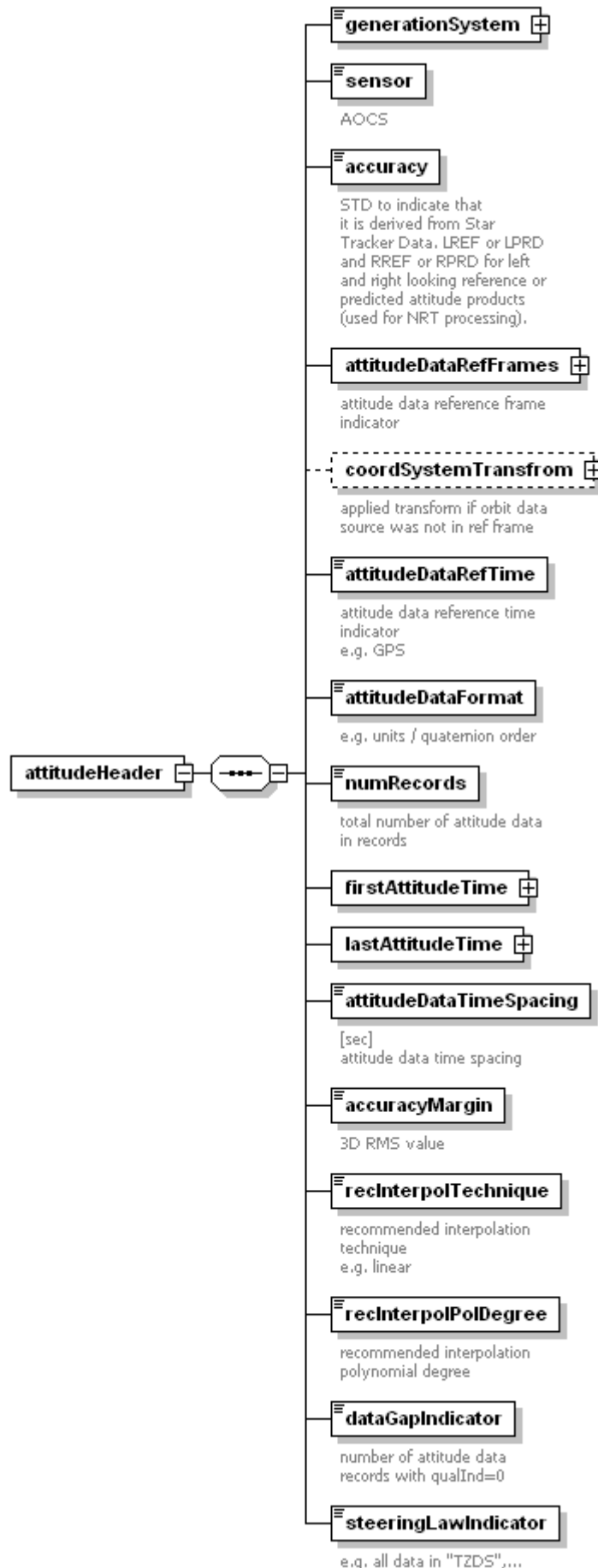
diagram	 [m/s]
type	xs:double
properties	isRef 0 con-simp- tent le
annotation	documentati-[m/s on]

element **level1Product/platform/attitude**

diagram	 mainly relevant segment cut out of the attitude file
properties	isRef 0 con-com- tent plex
children	<u>attitudeHeader</u> <u>attitudeData</u>
annotation	documentati-mainly relevant segment cut out of the attitude on file

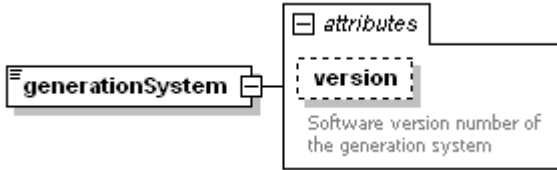
element **level1Product/platform/attitude/attitudeHeader**

diagram



properties	isRef 0 con-com- tent plex
children	<u>generationSystem</u> <u>sensor</u> <u>accuracy</u> <u>attitudeDataRefFrames</u> <u>coordSystemTransfrom</u> <u>attitudeDataRefTime</u> <u>attitudeDataFormat</u> <u>numRecords</u> <u>firstAttitudeTime</u> <u>lastAttitudeTime</u> <u>attitudeDataTimeSpacing</u> <u>accuracyMargin</u> <u>reclnterpolTechnique</u> <u>reclnterpolPolDegree</u> <u>dataGapIndicator</u> <u>steeringLawIndicator</u>

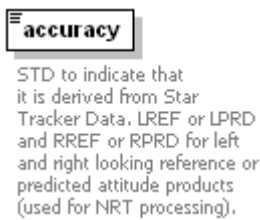
element **level1Product/platform/attitude/attitudeHeader/generationSystem**

diagram						
type	extension of <u>string255</u>					
properties	isRef 0 con-com- tent plex					
facets	maxLength 255					
attributes	Name version	Type <u>string80</u>	Use	Default	Fixed	Annotation documentati-Software on version number of the gen- eration system

element **level1Product/platform/attitude/attitudeHeader/sensor**

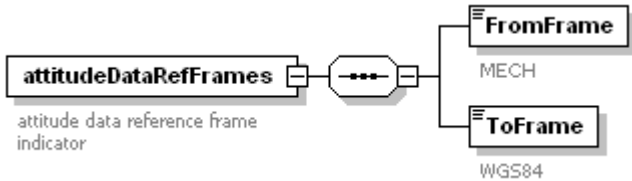
diagram						
type	restriction of xs:NMTOKEN					
properties	isRef 0 con-simp- tent le					
facets	enumerati-AOC on S					
annotation	documentati-AOC on S					

element **level1Product/platform/attitude/attitudeHeader/accuracy**

diagram						
type	restriction of xs:NMTOKEN					

properties	isRef 0 con-simp- tent le
facets	enumerati-STD on enumerati-RREF on enumerati-LREF on enumerati-REFE on enumerati-RPRD on enumerati-LPRD on enumerati-UNDEFINE on D
annotation	documentati-STD to indicate that on it is derived from Star Tracker Data. LREF or LPRD and RREF or RPRD for left and right looking reference or predicted attitude products (used for NRT processing).

element level1Product/platform/attitude/attitudeHeader/attitudeDataRefFrames

diagram	
properties	isRef 0 con-com- tent plex
children	<u>FromFrame ToFrame</u>
annotation	documentati-attitude data reference frame indica- on tor

element level1Product/platform/attitude/attitudeHeader/attitudeDataRefFrames/FromFrame

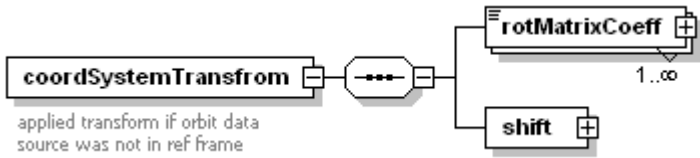
diagram	
type	<u>string20</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 20
annotation	documentati-MECH on

element level1Product/platform/attitude/attitudeHeader/attitudeDataRefFrames/ToFrame

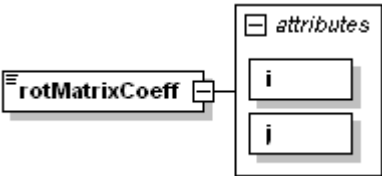
diagram	
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type	<u>string20</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 20
annotation	documentati-WGS8 on 4

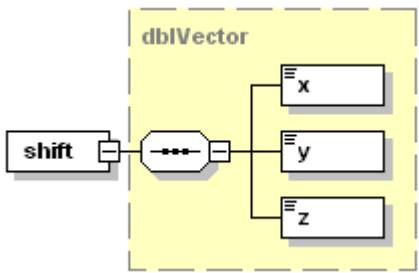
element **level1Product/platform/attitude/attitudeHeader/coordSystemTransfrom**

diagram	 Diagram description: A box labeled 'coordSystemTransfrom' with a note 'applied transform if orbit data source was not in ref frame' is connected via a dashed line to a box labeled 'rotMatrixCoeff' with a note '1..∞'. A 'shift' box is also connected to the 'rotMatrixCoeff' box.
properties	isRef 0 con-com- tent plex
children	<u>rotMatrixCoeff</u> <u>shift</u>
annotation	documentati-applied transform if orbit data source was not in ref on frame

element **level1Product/platform/attitude/attitudeHeader/coordSystemTransfrom/rotMatrixCoeff**

diagram						
type	extension of xs:double					
properties	isRef 0 con-com- tent plex					
attributes	Name	Type	Use	Default	Fixed	Annotation
	i	xs:int	required			
	j	xs:int	required			

element **level1Product/platform/attitude/attitudeHeader/coordSystemTransfrom/shift**

diagram	 Diagram description: A box labeled 'shift' is connected via a dashed line to a box labeled 'dblVector' which contains three boxes labeled 'x', 'y', and 'z'.
type	<u>dblVector</u>
properties	isRef 0

	con-com- tent plex
children	x y z

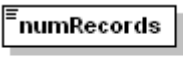
element level1Product/platform/attitude/attitudeHeader/attitudeDataRefTime

diagram	 attitude data reference time indicator e.g. GPS
type	<u>string20</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 20
annotation	documentati-attitude data reference time indica- on tor e.g. GPS

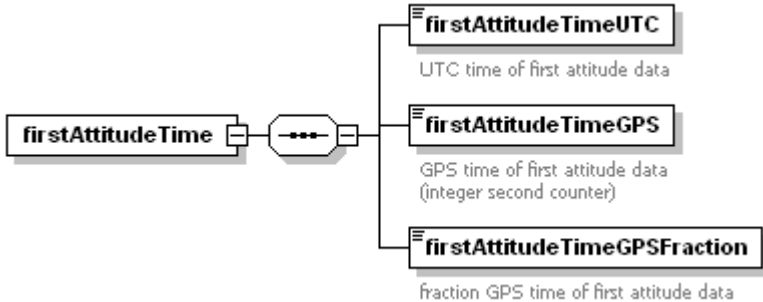
element level1Product/platform/attitude/attitudeHeader/attitudeDataFormat

diagram	 e.g. units / quaternion order
type	<u>string255</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 255
annotation	documentati-e.g. units / quaternion on order

element level1Product/platform/attitude/attitudeHeader/numRecords

diagram	 total number of attitude data in records
type	xs:unsignedLong
properties	isRef 0 con-simp- tent le
annotation	documentati-total number of attitude data in rec- on ords

element level1Product/platform/attitude/attitudeHeader/firstAttitudeTime

diagram	 <pre> graph LR firstAttitudeTime --> Complex subgraph Complex firstAttitudeTimeUTC firstAttitudeTimeGPS firstAttitudeTimeGPSFraction end </pre>
properties	isRef 0 con-com- tent plex
children	<u>firstAttitudeTimeUTC</u> <u>firstAttitudeTimeGPS</u> <u>firstAttitudeTimeGPSFraction</u>

element level1Product/platform/attitude/attitudeHeader/firstAttitudeTime/firstAttitudeTimeUTC

diagram	 UTC time of first attitude data
type	xs:dateTime
properties	isRef 0 con-simp- tent le
annotation	documentati-UTC time of first attitude on data

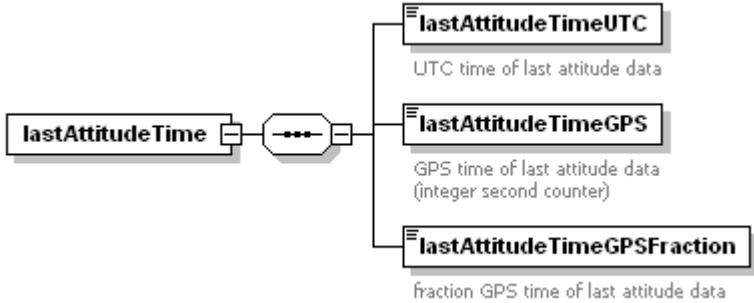
element level1Product/platform/attitude/attitudeHeader/firstAttitudeTime/firstAttitudeTimeGPS

diagram	 GPS time of first attitude data (integer second counter)
type	xs:unsignedInt
properties	isRef 0 con-simp- tent le
annotation	documentati-GPS time of first attitude on data (integer second counter)

element level1Product/platform/attitude/attitudeHeader/firstAttitudeTime/firstAttitudeTimeGPSFraction

diagram	 fraction GPS time of first attitude data
type	xs:double
properties	isRef 0 con-simp- tent le
annotation	documentati-fraction GPS time of first attitude on data

element level1Product/platform/attitude/attitudeHeader/lastAttitudeTime

diagram	 <pre> graph LR lastAttitudeTime[lastAttitudeTime] --- connector(()) connector --- lastAttitudeTimeUTC[lastAttitudeTimeUTC] connector --- lastAttitudeTimeGPS[lastAttitudeTimeGPS] connector --- lastAttitudeTimeGPSFraction[lastAttitudeTimeGPSFraction] </pre> The diagram shows a central box labeled lastAttitudeTime connected to a multi-ported connector (a circle with three dots). This connector is then connected to three separate boxes: lastAttitudeTimeUTC (with description "UTC time of last attitude data"), lastAttitudeTimeGPS (with description "GPS time of last attitude data (integer second counter)"), and lastAttitudeTimeGPSFraction (with description "fraction GPS time of last attitude data").
properties	isRef 0 con-com- tent plex
children	<u>lastAttitudeTimeUTC</u> <u>lastAttitudeTimeGPS</u> <u>lastAttitudeTimeGPSFraction</u>

element level1Product/platform/attitude/attitudeHeader/lastAttitudeTime/lastAttitudeTimeUTC

diagram	 The diagram shows a single box labeled lastAttitudeTimeUTC with the description "UTC time of last attitude data".
type	xs:dateTime
properties	isRef 0 con-simp- tent le
annotation	documentati-UTC time of last attitude on data

element level1Product/platform/attitude/attitudeHeader/lastAttitudeTime/lastAttitudeTimeGPS

diagram	 The diagram shows a single box labeled lastAttitudeTimeGPS with the description "GPS time of last attitude data (integer second counter)".
type	xs:unsignedInt
properties	isRef 0 con-simp- tent le
annotation	documentati-GPS time of last attitude on data (integer second counter)

element level1Product/platform/attitude/attitudeHeader/lastAttitudeTime/lastAttitudeTimeGPSFraction

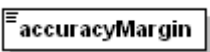
diagram	 The diagram shows a single box labeled lastAttitudeTimeGPSFraction with the description "fraction GPS time of last attitude data".
type	xs:double
properties	isRef 0 con-simp- tent le

annotation	documentati-fraction GPS time of last attitude on data
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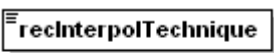
element level1Product/platform/attitude/attitudeHeader/attitudeDataTimeSpacing

diagram	 [sec] attitude data time spacing
type	xs:double
properties	isRef 0 con-simp- tent le
annotation	documentati-[sec] on attitude data time spac- ing

element level1Product/platform/attitude/attitudeHeader/accuracyMargin

diagram	 3D RMS value
type	xs:float
properties	isRef 0 con-simp- tent le
annotation	documentati-3D RMS value on

element level1Product/platform/attitude/attitudeHeader/recInterpolTechnique

diagram	 recommended interpolation technique e.g. linear
type	<u>string255</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 255
annotation	documentati-recommended interpolation tech- on nique e.g. linear

element level1Product/platform/attitude/attitudeHeader/recInterpolPolDegree

diagram	 recommended interpolation polynomial degree
type	restriction of xs:int

properties	isRef 0 con-simp- tent le
facets	minInclusive 1 maxInclusi-20 ve
annotation	documentati-recommended interpolation polynomial on degree

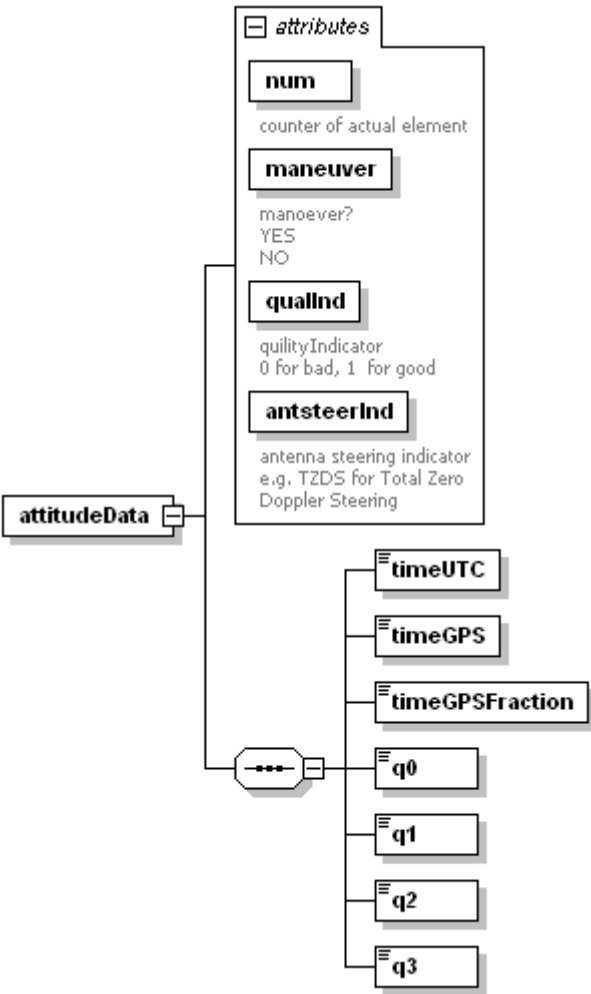
element level1Product/platform/attitude/attitudeHeader/dataGapIndicator

diagram	 number of attitude data records with qualInd=0
type	xs:int
properties	isRef 0 con-simp- tent le
annotation	documentati-number of attitude data records with qual- on Ind=0

element level1Product/platform/attitude/attitudeHeader/steeringLawIndicator

diagram	 e.g. all data in "TZDS",...
type	<u>string1024</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 1024
annotation	documentati-e.g. all data in on "TZDS",...

element level1Product/platform/attitude/attitudeData

diagram						
properties	isRef 0 con-com- tent plex					
children	<u>timeUTC</u> <u>timeGPS</u> <u>timeGPSFraction</u> <u>q0</u> <u>q1</u> <u>q2</u> <u>q3</u>					
attributes	Name	Type	Use	Default	Fixed	Annotation
	num		required			documentati-counter of on actual ele- ment
	maneuver		required			documentati-manoever? on YES NO
	qualInd		required			documentati-quilityIndica- on tor 0 for bad, 1 for good
	antsteerInd	<u>string20</u>	required			documentati-antenna on steering indicator e.g. TZDS for Total Zero Doppler Steering

element **level1Product/platform/attitude/attitudeData/timeUTC**

diagram	
type	xs:dateTime
properties	isRef 0 con-simp- tent le

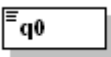
element level1Product/platform/attitude/attitudeData/timeGPS

diagram	
type	xs:unsignedLong
properties	isRef 0 con-simp- tent le

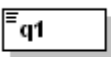
element level1Product/platform/attitude/attitudeData/timeGPSFraction

diagram	
type	xs:double
properties	isRef 0 con-simp- tent le

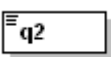
element level1Product/platform/attitude/attitudeData/q0

diagram	
type	xs:double
properties	isRef 0 con-simp- tent le

element level1Product/platform/attitude/attitudeData/q1

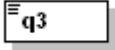
diagram	
type	xs:double
properties	isRef 0 con-simp- tent le

element level1Product/platform/attitude/attitudeData/q2

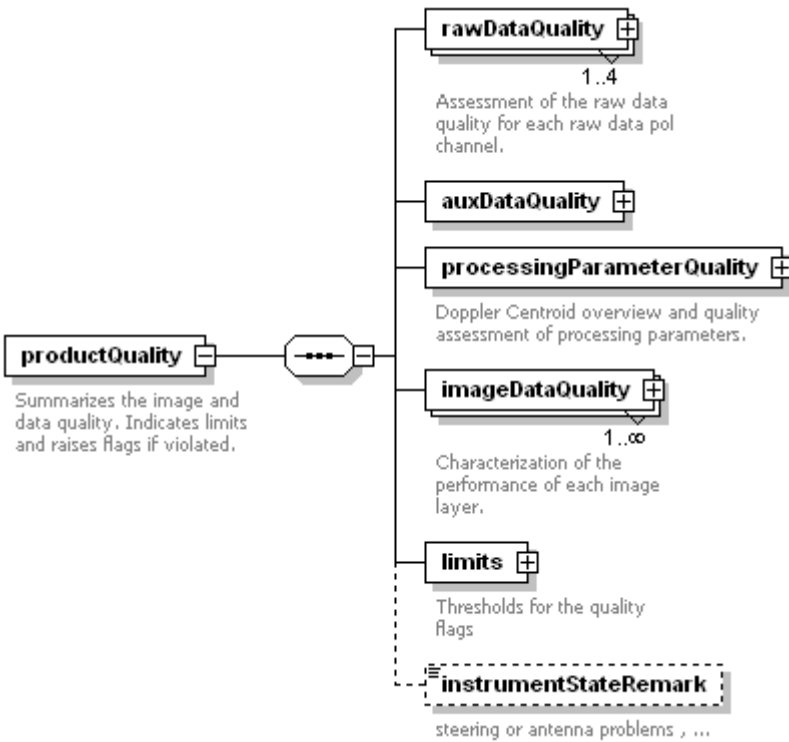
diagram	
type	xs:double
properties	isRef 0

	con-sim- tent le
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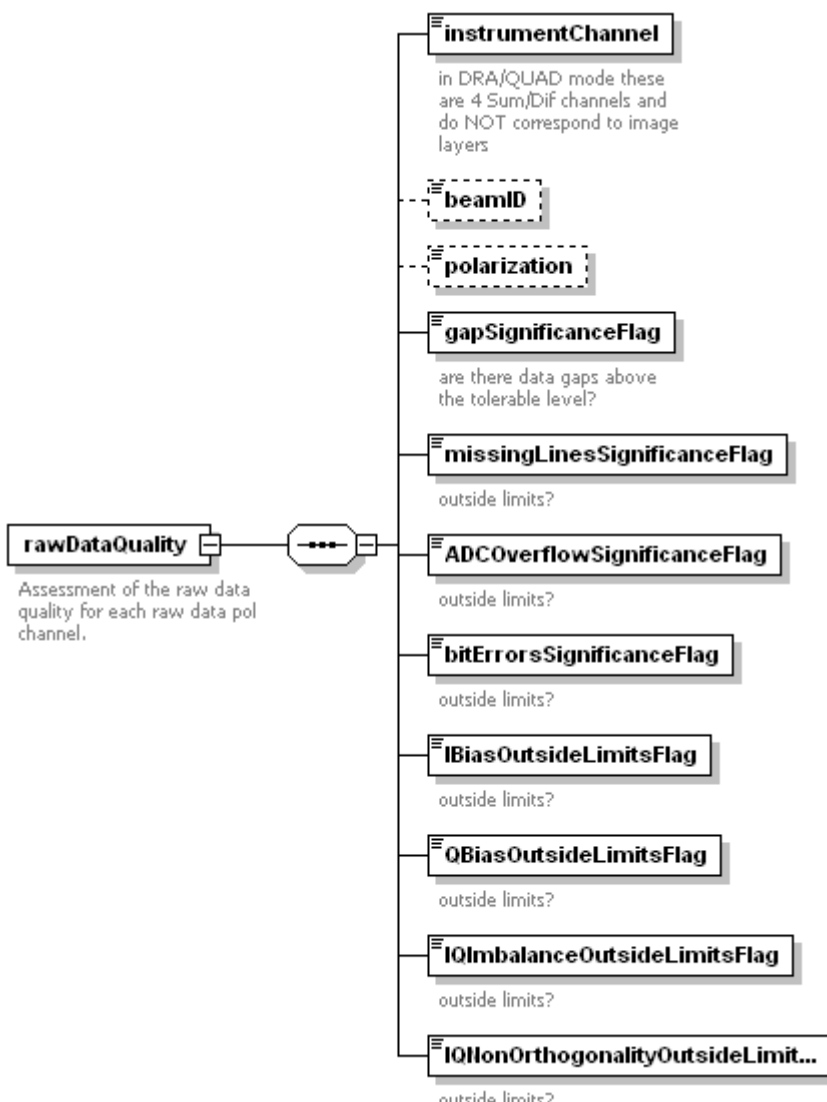
element **level1Product/platform/attitude/attitudeData/q3**

diagram	
type	xs:double
properties	isRef 0 con-sim- tent le

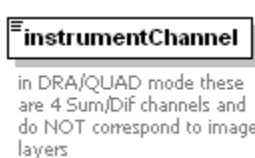
element **level1Product/productQuality**

diagram	 The diagram shows the structure of the productQuality element. It is a container element that contains several sub-elements: rawDataQuality (1..4), auxDataQuality, processingParameterQuality, imageDataQuality (1..∞), limits, and instrumentStateRemark (dashed box). The productQuality element is connected to a container element (represented by a circle with three dots) which then connects to the sub-elements. The instrumentStateRemark element is shown with a dashed border and a description: "steering or antenna problems , ...".
properties	isRef 0 con-com- tent plex
children	<u>rawDataQuality</u> <u>auxDataQuality</u> <u>processingParameterQuality</u> <u>imageDataQuality</u> <u>limits</u> <u>instrumentStateRemark</u>
annotation	documentati-Summarizes the image and data quality. Indicates limits and raises flags if violat- on ed.

element **level1Product/productQuality/rawDataQuality**

diagram	 rawDataQuality Assessment of the raw data quality for each raw data pol channel. instrumentChannel in DRA/QUAD mode these are 4 Sum/Dif channels and do NOT correspond to image layers beamID polarization gapSignificanceFlag are there data gaps above the tolerable level? missingLinesSignificanceFlag outside limits? ADCOverflowSignificanceFlag outside limits? bitErrorsSignificanceFlag outside limits? IBiasOutsideLimitsFlag outside limits? QBiasOutsideLimitsFlag outside limits? IQImbalanceOutsideLimitsFlag outside limits? IQNonOrthogonalityOutsideLimitsFlag outside limits?
properties	isRef 0 con-com- plex
children	<u>instrumentChannel</u> <u>beamID</u> <u>polarization</u> <u>gapSignificanceFlag</u> <u>missingLinesSignificanceFlag</u> <u>ADCOverflowSignificanceFlag</u> <u>bitErrorsSignificanceFlag</u> <u>IBiasOutsideLimitsFlag</u> <u>QBiasOutsideLimitsFlag</u> <u>IQImbalanceOutsideLimitsFlag</u> <u>IQNonOrthogonalityOutsideLimitsFlag</u>
annotation	documentati-Assessment of the raw data quality for each raw data pol channel.

element level1Product/productQuality/rawDataQuality/instrumentChannel

diagram	 instrumentChannel in DRA/QUAD mode these are 4 Sum/Dif channels and do NOT correspond to image layers
type	xs:string
properties	isRef 0

	con-simp- tent le
annotation	documentati-in DRA/QUAD mode these are 4 Sum/Dif channels and do NOT correspond to image on layers

element level1Product/productQuality/rawDataQuality/beamID

diagram	
type	<u>string20</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 20

element level1Product/productQuality/rawDataQuality/polarization

diagram	
type	<u>string20</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 20

element level1Product/productQuality/rawDataQuality/gapSignificanceFlag

diagram	 are there data gaps above the tolerable level?
type	xs:boolean
properties	isRef 0 con-simp- tent le
annotation	documentati-are there data gaps above the tolerable on level?

element level1Product/productQuality/rawDataQuality/missingLinesSignificanceFlag

diagram	 outside limits?
type	xs:boolean
properties	isRef 0 con-simp- tent le
annotation	documentati-outside li- on mits?

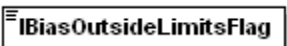
element **level1Product/productQuality/rawDataQuality/ADCOverflowSignificanceFlag**

diagram	 outside limits?
type	xs:boolean
properties	isRef 0 con-simp- tent le
annotation	documentati-outside li- on mits?

element **level1Product/productQuality/rawDataQuality/bitErrorsSignificanceFlag**

diagram	 outside limits?
type	xs:boolean
properties	isRef 0 con-simp- tent le
annotation	documentati-outside li- on mits?

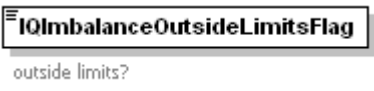
element **level1Product/productQuality/rawDataQuality/IBiasOutsideLimitsFlag**

diagram	 outside limits?
type	xs:boolean
properties	isRef 0 con-simp- tent le
annotation	documentati-outside li- on mits?

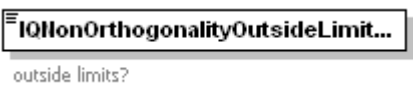
element **level1Product/productQuality/rawDataQuality/QBiasOutsideLimitsFlag**

diagram	 outside limits?
type	xs:boolean
properties	isRef 0 con-simp- tent le
annotation	documentati-outside li- on mits?

element **level1Product/productQuality/rawDataQuality/IQImbalanceOutsideLimitsFlag**

diagram	
type	xs:boolean
properties	isRef 0 con-sim- tent le
annotation	documentati-outside li- on mits?

element **level1Product/productQuality/rawDataQuality/IQNonOrthogonalityOutsideLimitsFlag**

diagram	
type	xs:boolean
properties	isRef 0 con-sim- tent le
annotation	documentati-outside li- on mits?

element **level1Product/productQuality/auxDataQuality**

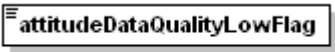
diagram	
properties	isRef 0 con-com- tent plex
children	<u>orbitDataQualityLowFlag</u> <u>attitudeDataQualityLowFlag</u> <u>DEMqualityLowFlag</u> <u>missingAuxDataFlag</u>

element **level1Product/productQuality/auxDataQuality/orbitDataQualityLowFlag**

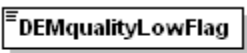
diagram	
type	xs:boolean
properties	isRef 0 con-sim-

	tent le
annotation	documentati-too many on gaps

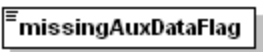
element **level1Product/productQuality/auxDataQuality/attitudeDataQualityLowFlag**

diagram	 too many gaps or missing
type	xs:boolean
properties	isRef 0 con-simp- tent le
annotation	documentati-too many gaps or miss- on ing

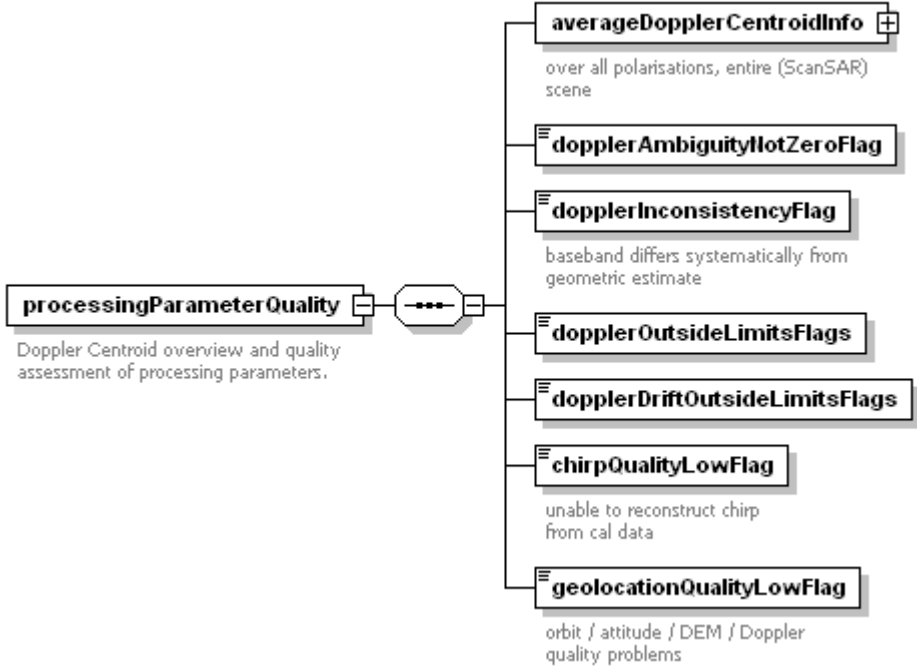
element **level1Product/productQuality/auxDataQuality/DEMqualityLowFlag**

diagram	 e.g. only low resolution DEM data available (poles)
type	xs:boolean
properties	isRef 0 con-simp- tent le
annotation	documentati-e.g. only low resolution DEM data available on (poles)

element **level1Product/productQuality/auxDataQuality/missingAuxDataFlag**

diagram	 No housekeeping data available, undefined values encountered, ...
type	xs:boolean
properties	isRef 0 con-simp- tent le
annotation	documentati-No housekeeping data available, undefined values encountered, on ...

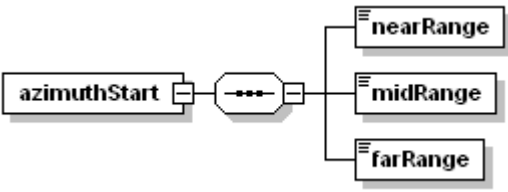
element **level1Product/productQuality/processingParameterQuality**

diagram	 processingParameterQuality Doppler Centroid overview and quality assessment of processing parameters. averageDopplerCentroidInfo over all polarisations, entire (ScanSAR) scene dopplerAmbiguityNotZeroFlag dopplerInconsistencyFlag baseband differs systematically from geometric estimate dopplerOutsideLimitsFlags dopplerDriftOutsideLimitsFlags chirpQualityLowFlag unable to reconstruct chirp from cal data geolocationQualityLowFlag orbit / attitude / DEM / Doppler quality problems
properties	isRef 0 con-com- tent plex
children	<u>averageDopplerCentroidInfo</u> <u>dopplerAmbiguityNotZeroFlag</u> <u>dopplerInconsistencyFlag</u> <u>dopplerOutsideLimitsFlags</u> <u>dopplerDriftOutsideLimitsFlags</u> <u>chirpQualityLowFlag</u> <u>geolocationQualityLowFlag</u>
annotation	documentati-Doppler Centroid overview and quality assessment of processing parame- on ters.

element **level1Product/productQuality/processingParameterQuality/averageDopplerCentroidInfo**

diagram	 averageDopplerCentroidInfo over all polarisations, entire (ScanSAR) scene azimuthStart azimuthCenter azimuthStop
properties	isRef 0 con-com- tent plex
children	<u>azimuthStart</u> <u>azimuthCenter</u> <u>azimuthStop</u>
annotation	documentati-over all polarisations, entire (ScanSAR) on scene

element **level1Product/productQuality/processingParameterQuality/averageDopplerCentroidInfo/azimuthStart**

diagram	
properties	isRef 0 con-com- tent plex
children	<u>nearRange</u> <u>midRange</u> <u>farRange</u>

element lev-

**el1Product/productQuality/processingParameterQuality/averageDopplerCentroidInfo/azimuthStart/nea
rRange**

diagram	
type	xs:double
properties	isRef 0 con-simp- tent le

element lev-

**el1Product/productQuality/processingParameterQuality/averageDopplerCentroidInfo/azimuthStart/mid
Range**

diagram	
type	xs:double
properties	isRef 0 con-simp- tent le

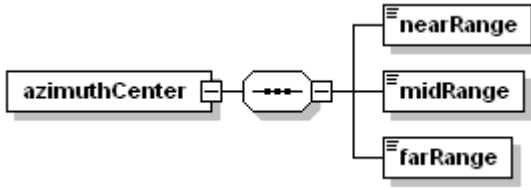
element lev-

**el1Product/productQuality/processingParameterQuality/averageDopplerCentroidInfo/azimuthStart/farR
ange**

diagram	
type	xs:double
properties	isRef 0 con-simp- tent le

element lev-

el1Product/productQuality/processingParameterQuality/averageDopplerCentroidInfo/azimuthCenter

diagram	
properties	isRef 0 con-com- tent plex
children	<u>nearRange</u> <u>midRange</u> <u>farRange</u>

element **lev-**
el1Product/productQuality/processingParameterQuality/averageDopplerCentroidInfo/azimuthCenter/ne
arRange

diagram	
type	xs:double
properties	isRef 0 con-simp- tent le

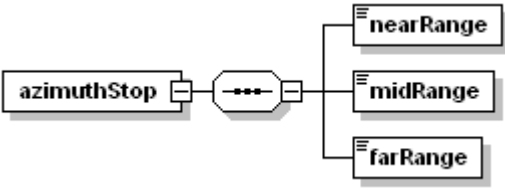
element **lev-**
el1Product/productQuality/processingParameterQuality/averageDopplerCentroidInfo/azimuthCenter/mi
dRange

diagram	
type	xs:double
properties	isRef 0 con-simp- tent le

element **lev-**
el1Product/productQuality/processingParameterQuality/averageDopplerCentroidInfo/azimuthCenter/fa
rRange

diagram	
type	xs:double
properties	isRef 0 con-simp- tent le

element **lev-**
el1Product/productQuality/processingParameterQuality/averageDopplerCentroidInfo/azimuthStop

diagram	
properties	isRef 0 con-com- tent plex
children	<u>nearRange</u> <u>midRange</u> <u>farRange</u>

element **lev-**

el1Product/productQuality/processingParameterQuality/averageDopplerCentroidInfo/azimuthStop/nearRange

diagram	
type	xs:double
properties	isRef 0 con-simp- tent le

element **lev-**

el1Product/productQuality/processingParameterQuality/averageDopplerCentroidInfo/azimuthStop/midRange

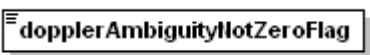
diagram	
type	xs:double
properties	isRef 0 con-simp- tent le

element **lev-**

el1Product/productQuality/processingParameterQuality/averageDopplerCentroidInfo/azimuthStop/farRange

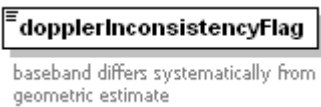
diagram	
type	xs:double
properties	isRef 0 con-simp- tent le

element **level1Product/productQuality/processingParameterQuality/dopplerAmbiguityNotZeroFlag**

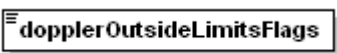
diagram	
type	xs:boolean
properties	isRef 0

	con-simp- tent le
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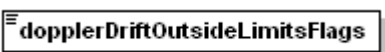
element **level1Product/productQuality/processingParameterQuality/dopplerInconsistencyFlag**

diagram	
type	xs:boolean
properties	isRef 0 con-simp- tent le
annotation	documentati-baseband differs systematically from geometric esti- on mate

element **level1Product/productQuality/processingParameterQuality/dopplerOutsideLimitsFlags**

diagram	
type	xs:boolean
properties	isRef 0 con-simp- tent le

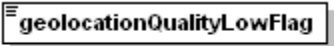
element **level1Product/productQuality/processingParameterQuality/dopplerDriftOutsideLimitsFlags**

diagram	
type	xs:boolean
properties	isRef 0 con-simp- tent le

element **level1Product/productQuality/processingParameterQuality/chirpQualityLowFlag**

diagram	
type	xs:boolean
properties	isRef 0 con-simp- tent le
annotation	documentati-unable to reconstruct chirp from cal on data

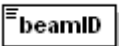
element **level1Product/productQuality/processingParameterQuality/geolocationQualityLowFlag**

diagram	 orbit / attitude / DEM / Doppler quality problems
type	xs:boolean
properties	isRef 0 con-sim- tent le
annotation	documentati-orbit / attitude / DEM / Doppler quality prob- on lems

element level1Product/productQuality/imageDataQuality

diagram	
properties	isRef 0 con-com- tent plex
children	<u>polLayer</u> <u>beamID</u> <u>DRAoffset</u> <u>imageDataStatistics</u> <u>nominalSNR</u> <u>imageMeanFlag</u> <u>imageStdDevFlag</u>
attributes	Name Type Use Default Fixed Annotation layerIndex xs:int required
annotation	documentati-Characterization of the performance of each image on layer.

element level1Product/productQuality/imageDataQuality/beamID

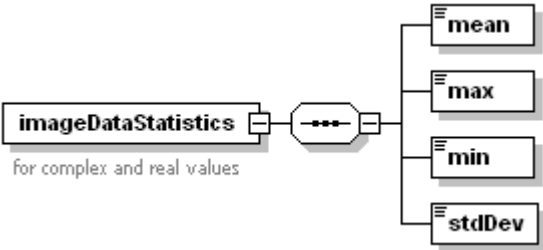
diagram	
type	string20

properties	isRef 0 con-sim- tent le
facets	maxLength 20

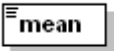
element **level1Product/productQuality/imageDataQuality/DRAoffset**

diagram	 SRA, DRAFore, DRAAft
type	restriction of xs:NMTOKENS
properties	isRef 0 con-sim- tent le
facets	enumerati-SRA on enumerati-DRAFore on enumerati-DRAAft on
annotation	documentati-SRA, DRAFore, on DRAAft

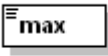
element **level1Product/productQuality/imageDataQuality/imageDataStatistics**

diagram	 for complex and real values
properties	isRef 0 con-com- tent plex
children	<u>mean</u> <u>max</u> <u>min</u> <u>stdDev</u>
annotation	documentati-for complex and real val- on ues

element **level1Product/productQuality/imageDataQuality/imageDataStatistics/mean**

diagram	
type	xs:double
properties	isRef 0 con-sim- tent le

element **level1Product/productQuality/imageDataQuality/imageDataStatistics/max**

diagram	
type	xs:double
properties	isRef 0 con-simp- tent le

element **level1Product/productQuality/imageDataQuality/imageDataStatistics/min**

diagram	
type	xs:double
properties	isRef 0 con-simp- tent le

element **level1Product/productQuality/imageDataQuality/imageDataStatistics/stdDev**

diagram	
type	xs:double
properties	isRef 0 con-simp- tent le

element **level1Product/productQuality/imageDataQuality/nominalSNR**

diagram	
type	xs:float
properties	isRef 0 con-simp- tent le

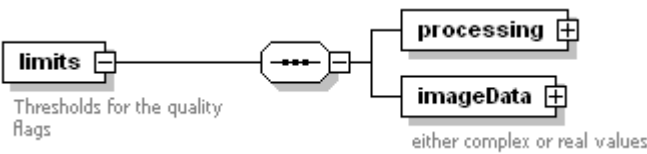
element **level1Product/productQuality/imageDataQuality/imageMeanFlag**

diagram	 outside limits?
type	xs:boolean
properties	isRef 0 con-simp- tent le
annotation	documentati-outside li- on mits?

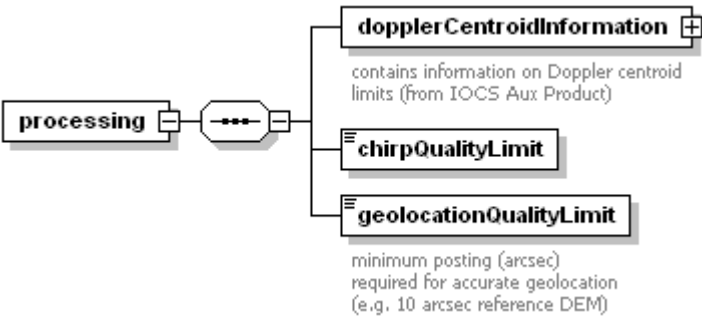
element **level1Product/productQuality/imageDataQuality/imageStdDevFlag**

diagram	 outside limits?
type	xs:boolean
properties	isRef 0 con-simp- tent le
annotation	documentati-outside li- on mits?

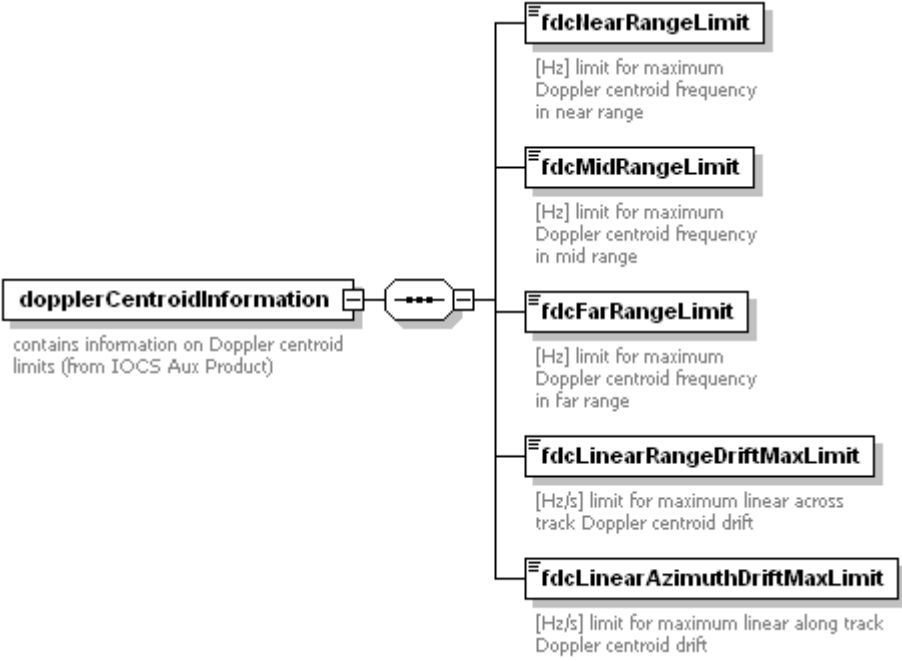
element level1Product/productQuality/limits

diagram	 Thresholds for the quality flags either complex or real values
properties	isRef 0 con-com- tent plex
children	<u>processing</u> <u>imageData</u>
annotation	documentati-Thresholds for the quality on flags

element level1Product/productQuality/limits/processing

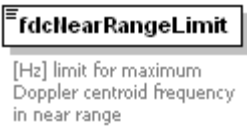
diagram	 contains information on Doppler centroid limits (from IOCS Aux Product) minimum posting (arcsec) required for accurate geolocation (e.g. 10 arcsec reference DEM)
properties	isRef 0 con-com- tent plex
children	<u>dopplerCentroidInformation</u> <u>chirpQualityLimit</u> <u>geolocationQualityLimit</u>

element level1Product/productQuality/limits/processing/dopplerCentroidInformation

diagram	 The diagram shows a central box labeled dopplerCentroidInformation with the description "contains information on Doppler centroid limits (from IOCS Aux Product)". To its right, a horizontal line with three dots connects to a vertical stack of five boxes: fdcNearRangeLimit, fdcMidRangeLimit, fdcFarRangeLimit, fdcLinearRangeDriftMaxLimit, and fdcLinearAzimuthDriftMaxLimit. Each box contains a description of its respective limit.
properties	isRef 0 con- tent plex
children	<u>fdcNearRangeLimit</u> <u>fdcMidRangeLimit</u> <u>fdcFarRangeLimit</u> <u>fdcLinearRangeDriftMaxLimit</u> <u>fdcLinearAzimuthDriftMaxLimit</u>
annotation	documentati-contains information on Doppler centroid limits (from IOCS Aux Prod- on uct)

element lev-

el1Product/productQuality/limits/processing/dopplerCentroidInformation/fdcNearRangeLimit

diagram	 The diagram shows a box labeled fdcNearRangeLimit with the description "[Hz] limit for maximum Doppler centroid frequency in near range".
type	xs:float
properties	isRef 0 con-simp- tent le
annotation	documentati-[Hz] limit for maximum Doppler centroid frequency in near on range

element level1Product/productQuality/limits/processing/dopplerCentroidInformation/fdcMidRangeLimit

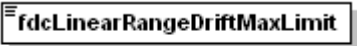
diagram	 The diagram shows a box labeled fdcMidRangeLimit with the description "[Hz] limit for maximum Doppler centroid frequency in mid range".
type	xs:float
properties	isRef 0

	con-simp- tent le
annotation	documentati-[Hz] limit for maximum Doppler centroid frequency in mid on range

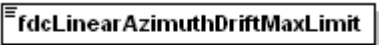
element **level1Product/productQuality/limits/processing/dopplerCentroidInformation/fdcFarRangeLimit**

diagram	 [Hz] limit for maximum Doppler centroid frequency in far range
type	xs:float
properties	isRef 0 con-simp- tent le
annotation	documentati-[Hz] limit for maximum Doppler centroid frequency in far on range

element **lev-
el1Product/productQuality/limits/processing/dopplerCentroidInformation/fdcLinearRangeDriftMaxLimit**

diagram	 [Hz/s] limit for maximum linear across track Doppler centroid drift
type	xs:float
properties	isRef 0 con-simp- tent le
annotation	documentati-[Hz/s] limit for maximum linear across track Doppler centroid on drift

element **lev-
el1Product/productQuality/limits/processing/dopplerCentroidInformation/fdcLinearAzimuthDriftMaxLi
mit**

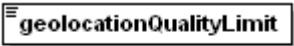
diagram	 [Hz/s] limit for maximum linear along track Doppler centroid drift
type	xs:float
properties	isRef 0 con-simp- tent le
annotation	documentati-[Hz/s] limit for maximum linear along track Doppler centroid on drift

element **level1Product/productQuality/limits/processing/chirpQualityLimit**

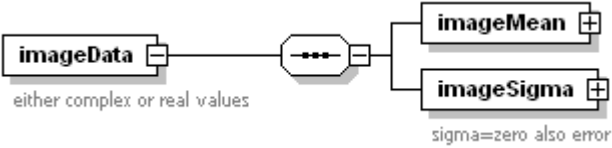
diagram	
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type	xs:float
properties	isRef 0 con-simp- tent le

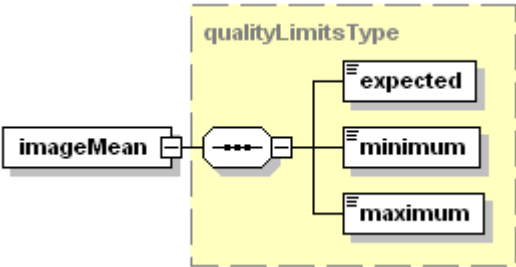
element **level1Product/productQuality/limits/processing/geolocationQualityLimit**

diagram	 minimum posting (arcsec) required for accurate geolocation (e.g. 10 arcsec reference DEM)
type	xs:float
properties	isRef 0 con-simp- tent le
annotation	documentati-minimum posting (arcsec) required for accurate geolocation (e.g. 10 arcsec reference on DEM)

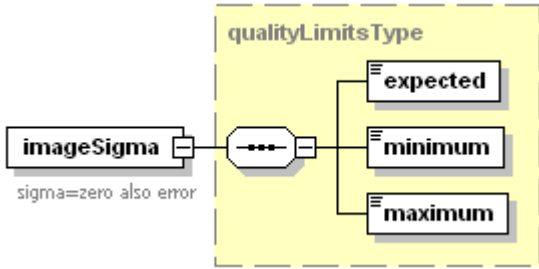
element **level1Product/productQuality/limits/imageData**

diagram	 either complex or real values imageMean + imageSigma + sigma=zero also error
properties	isRef 0 con-com- tent plex
children	imageMean imageSigma
annotation	documentati-either complex or real val- on ues

element **level1Product/productQuality/limits/imageData/imageMean**

diagram	 qualityLimitsType expected minimum maximum
type	qualityLimitsType
properties	isRef 0 con-com- tent plex
children	expected minimum maximum

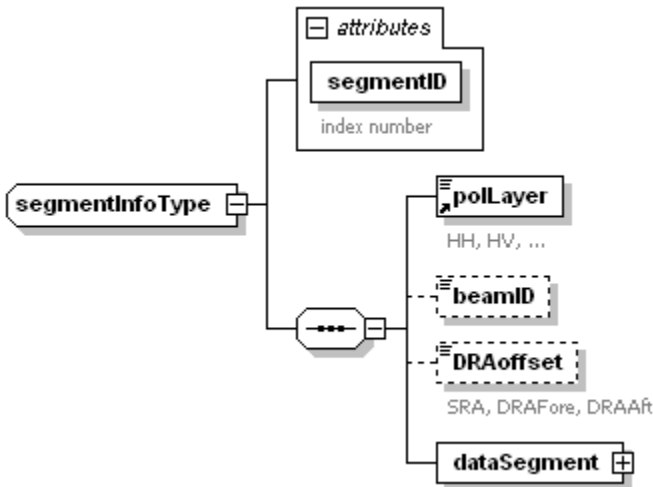
element **level1Product/productQuality/limits/imageData/imageSigma**

diagram	 The diagram shows a box labeled imageSigma with the text "sigma=zero also error" below it. This box is connected to a dashed box labeled qualityLimitsType. Inside this dashed box, there are three sub-elements: expected, minimum, and maximum, each with a small icon to its left.
type	<u>qualityLimitsType</u>
properties	isRef 0 con-com- tent plex
children	<u>expected</u> <u>minimum</u> <u>maximum</u>
annotation	documentati-sigma=zero also on error

element **level1Product/productQuality/instrumentStateRemark**

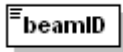
diagram	 The diagram shows a box labeled instrumentStateRemark with the text "steering or antenna problems , ..." below it.
type	<u>string1024</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 1024
annotation	documentati-steering or antenna problems , on ...

complexType **segmentInfoType**

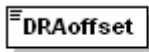
diagram	 The diagram shows a box labeled segmentInfoType. It is connected to a box labeled attributes which contains a sub-element segmentID with the text "index number" below it. The segmentInfoType box is also connected to a dashed box containing three sub-elements: polLayer (with text "HH, HV, ..."), beamID (with a dashed border), and DRAoffset (with a dashed border and text "SRA, DRAFore, DRAAft"). Finally, the dashed box is connected to a box labeled dataSegment with a plus sign icon to its right.
children	<u>polLayer</u> <u>beamID</u> <u>DRAoffset</u> <u>dataSegment</u>
used by	ele- lev- ment <u>el1Product/processing/processingParameter/rangeCompression/segmentInfo</u>

attributes	Name	Type	Use	Default	Fixed	Annotation
	segmentID	xs:int	required			documentati-index on num- ber

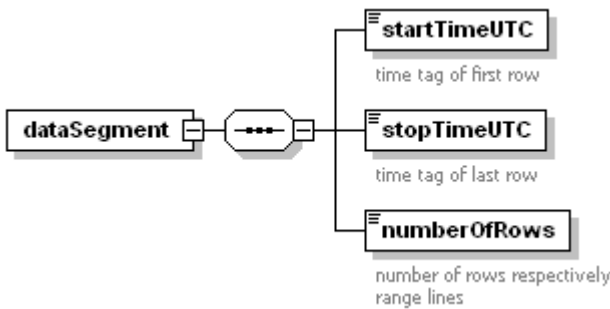
element segmentInfoType/beamID

diagram	
type	<u>string20</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 20

element segmentInfoType/DRAoffset

diagram	 SRA, DRAFore, DRAAft
type	restriction of xs:NMTOKENS
properties	isRef 0 con-simp- tent le
facets	enumerati-SRA on enumerati-DRAFore on enumerati-DRAAft on
annotation	documentati-SRA, DRAFore, on DRAAft

element segmentInfoType/dataSegment

diagram	
properties	isRef 0 con-com- tent plex
children	<u>startTimeUTC</u> <u>stopTimeUTC</u> <u>numberOfRows</u>

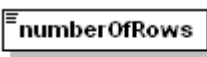
element segmentInfoType/dataSegment/startTimeUTC

diagram	 time tag of first row
type	xs:dateTime
properties	isRef 0 con-simp- tent le
annotation	documentati-time tag of first on row

element **segmentInfoType/dataSegment/stopTimeUTC**

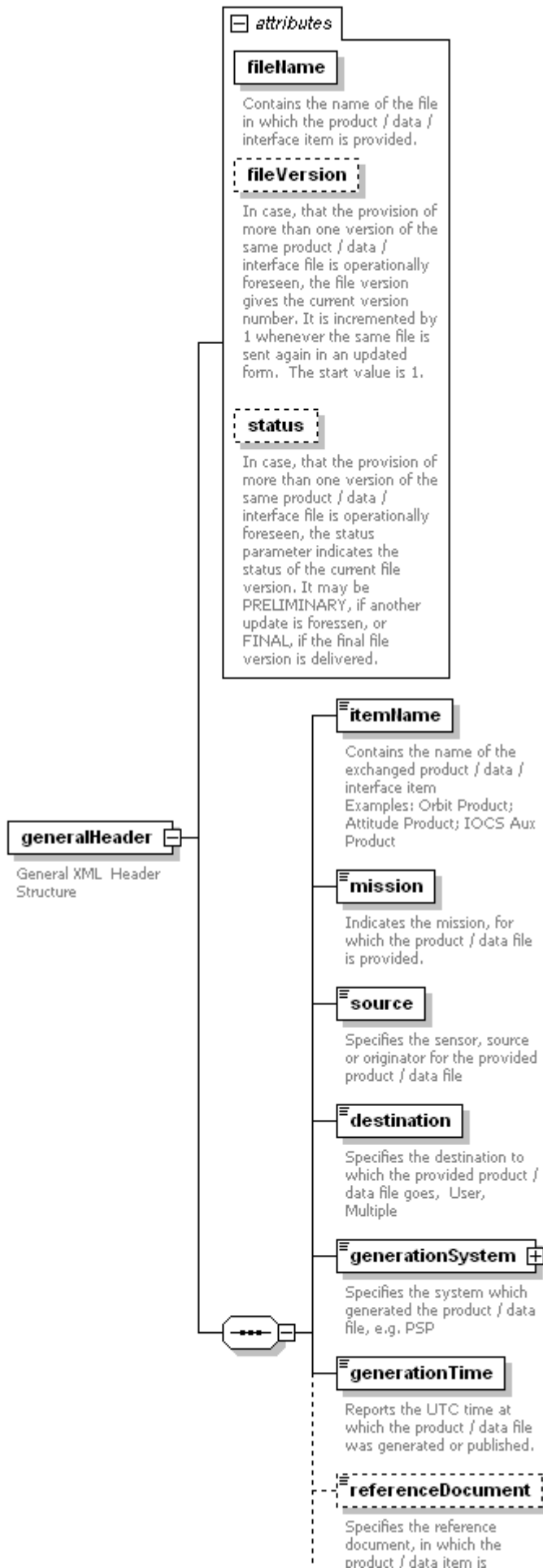
diagram	 time tag of last row
type	xs:dateTime
properties	isRef 0 con-simp- tent le
annotation	documentati-time tag of last on row

element **segmentInfoType/dataSegment/numberOfRows**

diagram	 number of rows respectively range lines
type	xs:int
properties	isRef 0 con-simp- tent le
annotation	documentati-number of rows respectively range on lines

element **generalHeader**

diagram

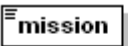


properties	con-com-plex					
children	<u>itemName</u> <u>mission</u> <u>source</u> <u>destination</u> <u>generationSystem</u> <u>generationTime</u> <u>referenceDocument</u> <u>revision</u> <u>revision-Comment</u> <u>remark</u>					
used by	ele-le-ment <u>vel1Product</u>					
attributes	Name	Type	Use	Default	Fixed	Annotation
	fileName	<u>string128</u>	required			documentati-Contains the on name of the file in which the product / data / interface item is provided.
	fileVersion	<u>string20</u>	optional			documentati-In case, that on the provision of more than one version of the same product / data / interface file is operationally foreseen, the file version gives the current version number. It is incremented by 1 whenever the same file is sent again in an updated form. The start value is 1.
	status	<u>string20</u>	optional			documentati-In case, that on the provision of more than one version of the same product / data / interface file is operationally foreseen, the status parameter indicates the status of the current file version. It may be PRELIMINARY, if another update is foressen, or FINAL, if the final file version is delivered.
annotation	documentati-General XML Header Structure on					

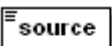
element **generalHeader/itemName**

diagram	 Contains the name of the exchanged product / data / interface item Examples: Orbit Product; Attitude Product; IOCS Aux Product
type	<u>string80</u>
properties	isRef 0 con-sim- tent le
facets	maxLength 80
annotation	documentati-Contains the name of the exchanged product / data / interface on item Examples: Orbit Product; Attitude Product; IOCS Aux Product

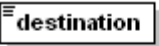
element **generalHeader/mission**

diagram	 Indicates the mission, for which the product / data file is provided.
type	<u>string20</u>
properties	isRef 0 con-sim- tent le
facets	maxLength 20
annotation	documentati-Indicates the mission, for which the product / data file is provid- on ed.

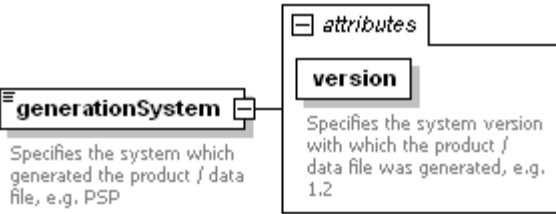
element **generalHeader/source**

diagram	 Specifies the sensor, source or originator for the provided product / data file
type	<u>string20</u>
properties	isRef 0 con-sim- tent le
facets	maxLength 20
annotation	documentati-Specifies the sensor, source or originator for the provided product / data on file

element **generalHeader/destination**

diagram	 Specifies the destination to which the provided product / data file goes, User, Multiple
type	<u>string20</u>
properties	isRef 0 con-sim- tent le
facets	maxLength 20
annotation	documentati-Specifies the destination to which the provided product / data file goes, User, Multi- on ple

element generalHeader/generationSystem

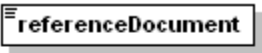
diagram	 Specifies the system which generated the product / data file, e.g. PSP Attributes: version: Specifies the system version with which the product / data file was generated, e.g. 1.2					
type	extension of <u>string80</u>					
properties	isRef 0 con-com- tent plex					
facets	maxLength 80					
attributes	Name version	Type <u>string20</u>	Use required	Default	Fixed	Annotation documentati-Specifies on the sys- tem ver- sion with which the product / data file was gen- erated, e.g. 1.2
annotation	documentati-Specifies the system which generated the product / data file, e.g. on PSP					

element generalHeader/generationTime

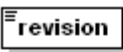
diagram	 Reports the UTC time at which the product / data file was generated or published.
type	xs:dateTime
properties	isRef 0 con-sim- tent le
annotation	documentati-Reports the UTC time at which the product / data file was generated or pub-

	on lished.
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element **generalHeader/referenceDocument**

diagram	 Specifies the reference document, in which the product / data item is specified with respect to its content and format.
type	<u>string255</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 255
annotation	documentati-Specifies the reference document, in which the product / data item is specified with respect to its content on and format.

element **generalHeader/revision**

diagram	 A handle to distinguish between different project phases (e.g. integration, testing, commissioning phase, operations) in order to separate test data from operational data
type	<u>string20</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 20
annotation	documentati-A handle to distinguish between different project phases (e.g. integration, testing, commissioning phase, on operations) in order to separate test data from operational data

element **generalHeader/revisionComment**

diagram	 Remark field for a narrative description of the revision field entry above.
type	<u>string1024</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 1024
annotation	documentati-Remark field for a narrative description of the revision field entry on above.

element **generalHeader/remark**

diagram	remark Remark field for a further narrative description of the product / data file.
type	string1024
properties	isRef 0 con-sim- tent le
facets	maxLength 1024
annotation	documentati-Remark field for a further narrative description of the product / data on file.

simpleType string1024

type	restriction of xs:string
used by	elements <u>level1Product/setup/inputData/attitudeProductFileName</u> <u>level1Product/setup/inputData/attitudeProductID</u> <u>level1Product/setup/inputData/configurationFileName</u> <u>level1Product/setup/inputData/configurationID</u> <u>level1Product/productInfo/generationInfo/copyrightInfo</u> <u>lev-</u> <u>el1Product/productInfo/generationInfo/deliveryInfo</u> <u>lev-</u> <u>el1Product/calibration/calibrationData/antennaPattern/azimuthPattern/description</u> <u>lev-</u> <u>el1Product/calibration/calibrationData/antennaPattern/elevationPattern/description</u> <u>lev-</u> <u>el1Product/productQuality/instrumentStateRemark</u> <u>lev-</u> <u>el1Product/setup/inputData/IOCSAuxProductFileName</u> <u>level1Product/setup/inputData/IOCSAuxProductID</u> <u>level1Product/setup/inputData/level0ProductID</u> <u>level1Product/setup/inputData/logicalDataTakeID</u> <u>lev-</u> <u>el1Product/productInfo/generationInfo/logicalProductID</u> <u>lev-</u> <u>el1Product/setup/inputData/orbitProductFileName</u> <u>level1Product/setup/inputData/orbitProductID</u> <u>lev-</u> <u>el1Product/productInfo/generationInfo/qualityInfo/qualityRemark</u> <u>generalHeader/remark</u> <u>general-</u> <u>Header/revisionComment</u> <u>level1Product/productInfo/sceneInfo/sceneID</u> <u>lev-</u> <u>el1Product/platform/attitude/attitudeHeader/steeringLawIndicator</u> <u>lev-</u> <u>el1Product/setup/inputData/uniqueDataTakeID</u>
facets	maxLength 1024

simpleType string128

type	restriction of xs:string
used by	elements <u>level1Product/setup/orderInfo/geocodingOrder/countryID</u> <u>lev-</u> <u>el1Product/setup/orderInfo/geocodingOrder/datumID</u> <u>lev-</u> <u>el1Product/productSpecific/complexImageInfo/imageCoordinateType</u> <u>lev-</u> <u>el1Product/processing/processingParameter/scanSARBeamOverlap/mergingMethod</u> <u>lev-</u> <u>el1Product/setup/orderInfo/orderType</u> <u>level1Product/productInfo/imageDataInfo/pixelValueID</u> <u>lev-</u> <u>el1Product/productSpecific/projectedImageInfo/mappingGridInfo/pixelValueID</u> <u>lev-</u> <u>el1Product/productSpecific/geocodedImageInfo/mappingGridInfo/pixelValueID</u> <u>lev-</u> <u>el1Product/productSpecific/geocodedImageInfo/incidenceAngleMaskDescription/pixelValueID</u> <u>lev-</u> <u>el1Product/productSpecific/geocodedImageInfo/DEMCoverageMapDescription/pixelValueID</u> <u>lev-</u> <u>el1Product/productInfo/productVariantInfo/productType</u> <u>lev-</u> <u>el1Product/productInfo/productVariantInfo/radiometricCorrection</u> <u>lev-</u> <u>el1Product/productInfo/sceneInfo/sceneLocalisationAccuracy/referenceProjection</u> <u>lev-</u> <u>el1Product/setup/processingSteps/software/softwareID</u> <u>lev-</u> <u>el1Product/setup/processingSteps/software/softwareVersion</u> attribute <u>generalHeader/@fileName</u>
facets	maxLength 128

simpleType string20

type	restriction of xs:string
used	elements <u>level1Product/platform/attitude/attitudeHeader/attitudeDataRefTime</u> <u>lev-</u>

by	<u>el1Product/productInfo/acquisitionInfo/imagingModeSpecificInfo/stripMap/azimuthBeamID lev-</u> <u>el1Product/productInfo/acquisitionInfo/imagingModeSpecificInfo/scanSAR/azimuthBeamID lev-</u> <u>el1Product/productInfo/acquisitionInfo/imagingModeSpecificInfo/spotLight/azimuthBeamIDFirst lev-</u> <u>el1Product/productInfo/acquisitionInfo/imagingModeSpecificInfo/spotLight/azimuthBeamIDLast lev-</u> <u>el1Product/processing/processingParameter/azimuthWindowID lev-</u> <u>el1Product/processing/geometry/velocityParameter/beamID lev-</u> <u>el1Product/processing/geometry/zeroDopplerVelocity/beamID lev-</u> <u>el1Product/processing/geometry/dopplerRate/beamID lev-</u> <u>el1Product/processing/doppler/dopplerCentroid/beamID lev-</u> <u>el1Product/processing/processingParameter/beamID lev</u> <u>el1Product/instrument/settings/beamID lev-</u> <u>el1Product/calibration/calibrationConstant/beamID lev</u> <u>el1Product/noise/beamID lev-</u> <u>el1Product/productQuality/rawDataQuality/beamID lev</u> <u>el1Product/productQuality/imageDataQuality/beamID</u> <u>segmentInfoType/beamID lev</u> <u>el1Product/productComponents/imageData/beamID lev-</u> <u>el1Product/productInfo/acquisitionInfo/imagingModeSpecificInfo/scanSAR/beamList/beamID lev-</u> <u>el1Product/productInfo/previewInfo/quicklooks/imageDataScaling/beamID lev-</u> <u>el1Product/productComponents/quicklooks/beamID lev-</u> <u>el1Product/productInfo/previewInfo/compositeQuicklook/polLayerCode/colour lev-</u> <u>el1Product/productInfo/imageDataInfo/columnContent generalHeader/destination lev-</u> <u>el1Product/processing/doppler/dopplerCentroidCoordinateType lev-</u> <u>el1Product/setup/orderInfo/elevationBeamConfiguration lev-</u> <u>el1Product/productInfo/acquisitionInfo/elevationBeamConfiguration lev-</u> <u>el1Product/platform/attitude/attitudeHeader/attitudeDataRefFrames/FromFrame lev-</u> <u>el1Product/productSpecific/geocodedImageInfo/mapProjection/geodeticDatumID lev-</u> <u>el1Product/processing/geometry/geometryCoordinateType lev-</u> <u>el1Product/productSpecific/geocodedImageInfo/geoParameter/imageResamplingMethod lev-</u> <u>el1Product/instrument/instrumentInfoCoordinateType lev-</u> <u>el1Product/productInfo/generationInfo/level0ProcessingFacility lev-</u> <u>el1Product/productInfo/generationInfo/level1ProcessingFacility generalHeader/mission lev-</u> <u>el1Product/productInfo/missionInfo/mission lev</u> <u>el1Product/productQuality/rawDataQuality/polarization lev-</u> <u>el1Product/processing/processingParameter/processingInfoCoordinateType lev-</u> <u>el1Product/setup/orderInfo/processingPriority lev-</u> <u>el1Product/productSpecific/geocodedImageInfo/mapProjection/projectionID lev-</u> <u>el1Product/instrument/settings/settingRecord/pulseType lev-</u> <u>el1Product/instrument/settings/quantisationControl lev</u> <u>el1Product/instrument/settings/quantisationID lev-</u> <u>el1Product/processing/processingParameter/rangeWindowID lev-</u> <u>el1Product/productInfo/generationInfo/receivingStation generalHeader/revision lev-</u> <u>el1Product/productInfo/imageDataInfo/rowContent lev</u> <u>el1Product/productInfo/acquisitionInfo/sensor lev-</u> <u>el1Product/productSpecific/geocodedImageInfo/geocodingSetup/softwareVersion generalHeader/source</u> <u>level1Product/platform/orbit/orbitHeader/stateVectorRefTime lev-</u> <u>el1Product/platform/attitude/attitudeHeader/attitudeDataRefFrames/ToFrame lev-</u> <u>el1Product/productSpecific/geocodedImageInfo/mapProjection/zoneID</u> <u>level1Product/platform/attitude/attitudeData/@antsteerInd lev-</u> <u>el1Product/calibration/calibrationData/antennaPattern/beamPointingVector/@beamID lev-</u> <u>el1Product/productInfo/imageDataInfo/imageRaster/@beamID lev-</u> <u>el1Product/productInfo/previewInfo/quicklooks/imageRaster/@beamID lev-</u> <u>el1Product/productSpecific/complexImageInfo/@beamID lev-</u> <u>el1Product/calibration/calibrationData/antennaPattern/elevationPattern/@beamID lev-</u> <u>el1Product/calibration/calibrationData/antennaPattern/beamPointingVector/@beamID lev-</u> <u>el1Product/calibration/calibrationData/calibrationInfoAndInstrumentCharacteristics/absCalFactor/@beamID</u> <u>level1Product/instrument/settings/rxBandwidth/@code lev</u> <u>el1Product/instrument/settings/RSF/@code lev-</u> <u>el1Product/instrument/settings/settingRecord/PRF/@code lev-</u> <u>el1Product/instrument/settings/settingRecord/echoWindowPosition/@code lev-</u> <u>el1Product/instrument/settings/settingRecord/echoWindowLength/@code generalHeader/@fileVersion gen-</u> <u>eralHeader/@status generalHeader/generationSystem/@version</u>
facets	maxLength 20

simpleType string255

type	restriction of xs:string
used by	elements <u>level1Product/setup/processingSteps/software/algorithm lev-</u> <u>el1Product/platform/attitude/attitudeHeader/attitudeDataFormat lev-</u> <u>el1Product/processing/doppler/dopplerBasebandEstimationMethod lev-</u> <u>el1Product/processing/doppler/dopplerGeometricEstimationMethod lev-</u> <u>el1Product/platform/attitude/attitudeHeader/generationSystem lev-</u> <u>el1Product/platform/orbit/orbitHeader/generationSystem lev-</u> <u>el1Product/productSpecific/geocodedImageInfo/DEMCoverageMapDescription/imageDataFormat lev-</u>

	el1Product/productSpecific/geocodedImageInfo/incidenceAngleMaskDescription/imageDataFormat lev-el1Product/productSpecific/geocodedImageInfo/mappingGridInfo/imageDataFormat lev-el1Product/productSpecific/projectedImageInfo/mappingGridInfo/imageDataFormat lev-el1Product/productInfo/previewInfo/browseImage/imageDataFormat lev-el1Product/productInfo/previewInfo/compositeQuicklook/imageDataFormat lev-el1Product/productInfo/previewInfo/quicklooks/imageDataFormat lev-el1Product/productInfo/imageDataInfo/imageDataFormat lev-el1Product/productInfo/previewInfo/mapPlotFormat level1Product/noise/noiseModelID lev-el1Product/productInfo/generationInfo/qualityInfo/qualityInspection lev-el1Product/calibration/calibrationData/radiometricDEMID lev-el1Product/platform/attitude/attitudeHeader/recInterpolTechnique lev-el1Product/platform/orbit/orbitHeader/recProcessingTechnique generalHeader/referenceDocument lev-el1Product/platform/orbit/orbitHeader/stateVecFormat lev-el1Product/productComponents/auxRasterFiles/type level1Product/productComponents/annotation/type
facets	maxLength 255

simpleType string80

type	restriction of xs:string
used by	elements level1Product/productSpecific/geocodedImageInfo/elevationData/DEM-DB-ContentVersion generalHeader/generationSystem lev-el1Product/productSpecific/geocodedImageInfo/geocodingSetup/geocodingFacility lev-el1Product/setup/inputData/IOCSAuxProductVersion generalHeader/itemName lev-el1Product/noise/noiseLevelRef lev-el1Product/productInfo/previewInfo/compositeQuicklook/polLayerCode/polarisation lev-el1Product/processing/processingParameter/rangeCompression/chirps/referenceChirp/pulseType lev-el1Product/platform/orbit/orbitHeader/stateVectorRefFrame attributes level1Product/platform/orbit/orbitHeader/generationSystem/@version level1Product/platform/attitude/attitudeHeader/generationSystem/@version
facets	maxLength 80

element antennaReceiveConfiguration

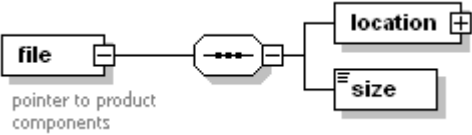
diagram	 SRA DRA
type	restriction of xs:NMTOKENS
properties	con-simp- tent le
used by	elements level1Product/productInfo/acquisitionInfo lev-el1Product/setup/orderInfo
facets	enumerati-SRA on enumerati-DRA on enumerati-UNDEFINE on D
annotation	documentati-SRA on DRA

element chirpSlope

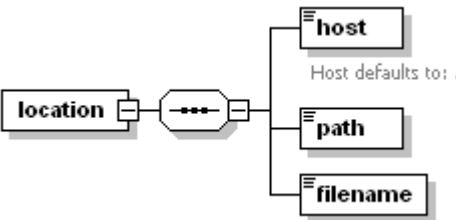
diagram	 [Up/Down/UpDown] chirp slope
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type	restriction of xs:NMTOKEN
properties	con-sim- tent le
used by	ele- lev- ment el1Product/processing/processingParameter/rangeCompression/chirps/referenceChirp
facets	enumerati-UP on enumerati-DOWN on enumerati-UPDOWN on N
annotation	documentati-[Up/Down/UpDown] chirp slope on

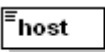
element file

diagram	 pointer to product components
properties	con-com- tent plex
children	location size
used by	ele- level1Product/productComponents/annotation level1Product/productComponents/auxRasterFiles lev- ments el1Product/productComponents/browseImage level1Product/productComponents/compositeQuicklook level1Product/productComponents/imageData level1Product/productComponents/mapPlot lev- el1Product/productComponents/quicklooks
annotation	documentati-pointer to product compo- on nents

element file/location

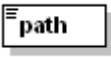
diagram	 Host defaults to: .
properties	isRef 0 con-com- tent plex
children	host path filename

element file/location/host

diagram	 Host defaults to: .
type	xs:string

properties	isRef 0 con-simp- tent le
annotation	documentati-Host defaults to: on .

element file/location/path

diagram	
type	xs:string
properties	isRef 0 con-simp- tent le

element file/location/filename

diagram	
type	xs:string
properties	isRef 0 con-simp- tent le

element file/size

diagram	
type	xs:long
properties	isRef 0 con-simp- tent le

element imagingMode

diagram	 SM, SC, HS, SL
type	restriction of xs:NMTOKENS
properties	con-simp- tent le
used by	ele- <u>level1Product/productInfo/acquisitionInfo</u> lev- ments <u>el1Product/setup/orderInfo</u>
facets	enumerati-SM on enumerati-SL on enumerati-SC on enumerati-HS on enumerati-UNDEFINE on D

annotation	documentati-SM, SC, HS, on SL
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element lookDirection

diagram	
type	restriction of xs:NMTOKEN
properties	con-simp- tent le
used by	ele- <u>level1Product/productInfo/acquisitionInfo</u> lev- ments <u>el1Product/setup/orderInfo</u>
facets	enumerati-LEFT on enumerati-RIGHT on enumerati-UNDEFINE on D
annotation	documentati-left on right

element polarisationMode

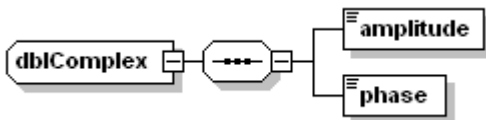
diagram	
type	restriction of xs:NMTOKENS
properties	con-simp- tent le
used by	ele- <u>level1Product/productInfo/acquisitionInfo</u> lev- ments <u>el1Product/setup/orderInfo</u>
facets	enumerati-SINGL on E enumerati-DUAL on enumerati-TWIN on enumerati-QUAD on
annotation	documentati-single dual twin on quad

element polLayer

diagram	
type	restriction of xs:string
properties	con-simp- tent le
used by	elements <u>level1Product/calibration/calibrationData/antennaPattern</u> lev-

	<u>el1Product/calibration/calibrationConstant lev-</u> <u>el1Product/processing/processingParameter/correctedInstrumentDelay lev-</u> <u>el1Product/processing/doppler/dopplerCentroid level1Product/productComponents/imageData lev-</u> <u>el1Product/productQuality/imageDataQuality lev-</u> <u>el1Product/productInfo/previewInfo/quicklooks/imageDataScaling level1Product/noise lev-</u> <u>el1Product/productInfo/acquisitionInfo/polarisationList level1Product/setup/orderInfo/polList lev-</u> <u>el1Product/productComponents/quicklooks level1Product/instrument/settings</u> <u>segmentInfoType</u> complexType
facets	enumerati-HH on enumerati-HV on enumerati-VH on enumerati-VV on enumerati-UNDEFINE on D
annotation	documentati-HH, HV, on ...

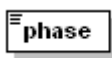
complexType dbIComplex

diagram	
children	<u>amplitude</u> <u>phase</u>
used by	ele- <u>lev-</u> ments <u>el1Product/calibration/calibrationData/calibrationInfoAndInstrumentCharacteristics/DRACchannelParameters/draParameters</u> <u>lev-</u> <u>el1Product/calibration/calibrationData/calibrationInfoAndInstrumentCharacteristics/DRACchannelParameters/draParameters</u> <u>lev-</u> <u>el1Product/calibration/calibrationData/calibrationInfoAndInstrumentCharacteristics/DRACchannelParameters/draParameters</u> <u>lev-</u> <u>el1Product/calibration/calibrationData/calibrationInfoAndInstrumentCharacteristics/DRACchannelParameters/draParameters</u>

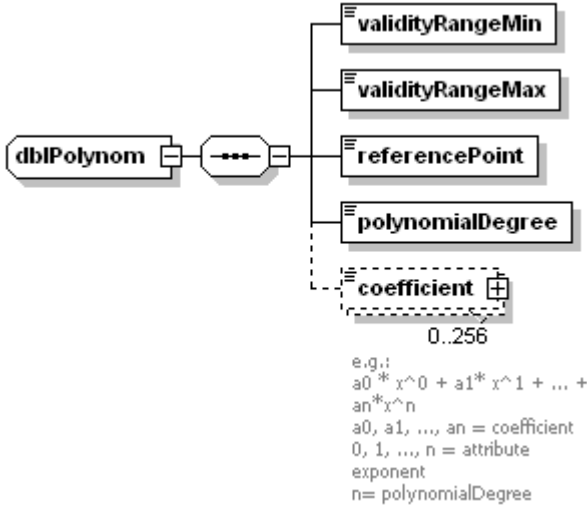
element dbIComplex/amplitude

diagram	
type	xs:double
properties	isRef 0 con-simp- tent le

element dbIComplex/phase

diagram	
type	xs:double
properties	isRef 0 con-simp- tent le

complexType dbIPolynomial

diagram	 e.g.: $a_0 \cdot x^0 + a_1 \cdot x^1 + \dots + a_n \cdot x^n$ $a_0, a_1, \dots, a_n$ = coefficient $0, 1, \dots, n$ = attribute exponent n = polynomialDegree
children	<u>validityRangeMin</u> <u>validityRangeMax</u> <u>referencePoint</u> <u>polynomialDegree</u> <u>coefficient</u>
used by	elements <u>level1Product/processing/processingParameter/rangeCompression/chirps/referenceChirp/amplitude</u> <u>level1Product/processing/doppler/dopplerCentroid/dopplerEstimate/basebandDoppler</u> <u>lev-</u> <u>el1Product/processing/geometry/dopplerRate/dopplerRatePolynomial</u> <u>lev-</u> <u>el1Product/processing/doppler/dopplerCentroid/dopplerEstimate/geometricDoppler</u> <u>lev-</u> <u>el1Product/noise/imageNoise/noiseEstimate</u> <u>lev-</u> <u>el1Product/processing/processingParameter/rangeCompression/chirps/referenceChirp/phase</u> <u>lev-</u> <u>el1Product/productSpecific/projectedImageInfo/slantToGroundRangeProjection</u> <u>lev-</u> <u>el1Product/processing/geometry/velocityParameter/velocityParameterPolynomial</u>

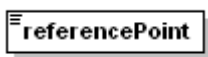
element dbIPolynomial/validityRangeMin

diagram	
type	xs:double
properties	isRef 0 con-simp- tent le

element dbIPolynomial/validityRangeMax

diagram	
type	xs:double
properties	isRef 0 con-simp- tent le

element dbIPolynomial/referencePoint

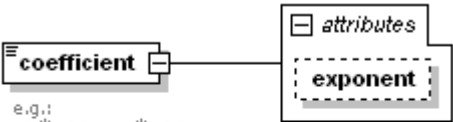
diagram	
type	xs:double

properties	isRef 0 con-simp- tent le
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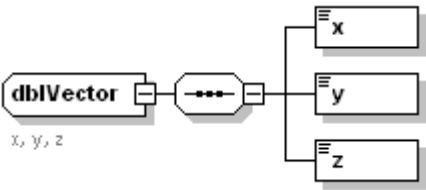
element dbIPolynom/polynomialDegree

diagram	
type	xs:unsignedInt
properties	isRef 0 con-simp- tent le

element dbIPolynom/coefficient

diagram	 e.g.: $a_0 * x^0 + a_1 * x^1 + \dots + a_n * x^n$ $a_0, a_1, \dots, a_n$ = coefficient $0, 1, \dots, n$ = attribute exponent n = polynomialDegree					
type	extension of xs:double					
properties	isRef 0 con-com- tent plex					
attributes	Name exponent	Type xs:unsignedInt	Use	Default	Fixed	Annotation
annotation	documentati-e.g.: $a_0 * x^0 + a_1 * x^1 + \dots + a_n * x^n$ $a_0, a_1, \dots, a_n$ = coefficient $0, 1, \dots, n$ = attribute exponent n = polynomialDegree					

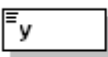
complexType dbIVector

diagram	 x, y, z					
children	x y z					
used by	ele- ments <u>level1Product/platform/orbit/orbitHeader/coordSystemTransfrom/shift lev-</u> <u>el1Product/platform/attitude/attitudeHeader/coordSystemTransfrom/shift</u>					
annotation	documentati-x, y, z on					

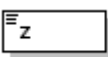
element dbIVector/x

diagram	
type	xs:double
properties	isRef 0 con-simp- tent le

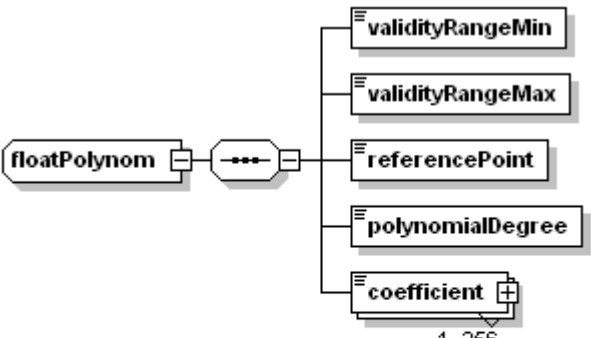
element **dbIVector/y**

diagram	
type	xs:double
properties	isRef 0 con-simp- tent le

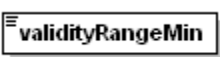
element **dbIVector/z**

diagram	
type	xs:double
properties	isRef 0 con-simp- tent le

complexType **floatPolynom**

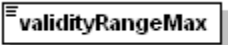
diagram	 $a_0 \cdot x^0 + a_1 \cdot x^1 + \dots + a_n \cdot x^n$ e.g.: $a_0 \cdot x^0 + a_1 \cdot x^1 + \dots + a_n \cdot x^n$ $a_0, a_1, \dots, a_n$ = coefficient $0, 1, \dots, n$ = attribute exponent n = polynomialDegree
children	<u>validityRangeMin</u> <u>validityRangeMax</u> <u>referencePoint</u> <u>polynomialDegree</u> <u>coefficient</u>

element **floatPolynom/validityRangeMin**

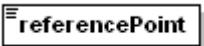
diagram	
type	xs:float

properties	isRef 0 con-sim- tent le
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element floatPolynom/validityRangeMax

diagram	
type	xs:float
properties	isRef 0 con-sim- tent le

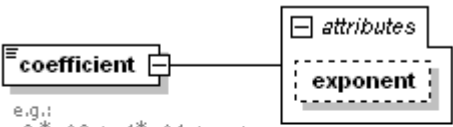
element floatPolynom/referencePoint

diagram	
type	xs:float
properties	isRef 0 con-sim- tent le

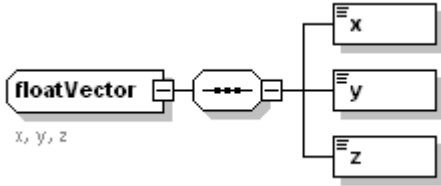
element floatPolynom/polynomialDegree

diagram	
type	xs:unsignedInt
properties	isRef 0 con-sim- tent le

element floatPolynom/coefficient

diagram	 e.g.: $a_0 * x^0 + a_1 * x^1 + \dots + a_n * x^n$ $a_0, a_1, \dots, a_n$ = coefficient $0, 1, \dots, n$ = attribute exponent n = polynomialDegree					
type	extension of xs:float					
properties	isRef 0 con-com- tent plex					
attributes	Name exponent	Type xs:unsignedInt	Use	Default	Fixed	Annotation
annotation	documentati-e.g.: $a_0 * x^0 + a_1 * x^1 + \dots + a_n * x^n$ $a_0, a_1, \dots, a_n$ = coefficient $0, 1, \dots, n$ = attribute exponent n = polynomialDegree					

complexType floatVector

diagram	
children	x y z
used by	elements level1Product/platform/referenceData/GPSAntennaPosition level1Product/platform/referenceData/SARAntennaPosition
annotation	documentation x, y, z

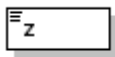
element floatVector/x

diagram	
type	xs:float
properties	isRef 0 con-sim- tent le

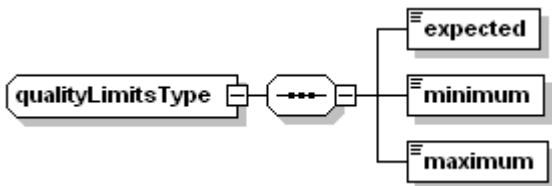
element floatVector/y

diagram	
type	xs:float
properties	isRef 0 con-sim- tent le

element floatVector/z

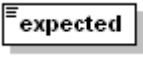
diagram	
type	xs:float
properties	isRef 0 con-sim- tent le

complexType qualityLimitsType

diagram	
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children	<u>expected</u> <u>minimum</u> <u>maximum</u>
used by	elements <u>level1Product/productQuality/limits/imageData/imageMean</u> <u>level1Product/productQuality/limits/imageData/imageSigma</u>

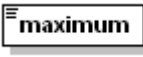
element qualityLimitsType/expected

diagram	
type	xs:float
properties	isRef 0 con-sim- tent le

element qualityLimitsType/minimum

diagram	
type	xs:float
properties	isRef 0 con-sim- tent le

element qualityLimitsType/maximum

diagram	
type	xs:float
properties	isRef 0 con-sim- tent le

simpleType latitudeDegType

type	restriction of xs:float
used by	elements <u>level1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCenterCoordsGeographic/centerCoordLatitude</u> <u>level1Product/productInfo/sceneInfo/sceneCenterCoord/lat</u> <u>level1Product/productInfo/sceneInfo/sceneCornerCoord/lat</u> <u>level1Product/setup/orderInfo/orderedScene/sceneCenterCoord/lat</u> <u>level1Product/productInfo/sceneInfo/sceneLocalisationAccuracy/latError</u> <u>level1Product/productSpecific/geocodedImageInfo/mapProjection/projectionCenter/latitude</u> <u>level1Product/productSpecific/geocodedImageInfo/geoParameter/frameCoordsGeographic/lowerLeftLatitude</u> <u>level1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCoordsGeographic/lowerLeftLatitude</u> <u>level1Product/productSpecific/geocodedImageInfo/geoParameter/frameCoordsGeographic/lowerRightLatitude</u> <u>level1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCoordsGeographic/lowerRightLatitude</u> <u>level1Product/productSpecific/geocodedImageInfo/geoParameter/frameCoordsGeographic/upperLeftLatitude</u> <u>level1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCoordsGeographic/upperLeftLatitude</u> <u>level1Product/productSpecific/geocodedImageInfo/geoParameter/frameCoordsGeographic/upperRightLatitude</u> <u>level1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCoordsGeographic/upperRightLatitude</u>
facets	minInclusive -90 maxInclusive 90 ve

simpleType longitudeDegType

type	restriction of xs:float
used by	elements <u>lev-</u> <u>el1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCenterCoordsGeographic/centerCoordLongitude</u> <u>level1Product/productInfo/sceneInfo/sceneCenterCoord/lon</u> <u>level1Product/productInfo/sceneInfo/sceneCornerCoord/lon</u> <u>level1Product/setup/orderInfo/orderedScene/sceneCenterCoord/lon</u> <u>lev-</u> <u>el1Product/productInfo/sceneInfo/sceneLocalisationAccuracy/lonError</u> <u>lev-</u> <u>el1Product/productSpecific/geocodedImageInfo/mapProjection/projectionCenter/longitude</u> <u>lev-</u> <u>el1Product/productSpecific/geocodedImageInfo/geoParameter/frameCoordsGeographic/lowerLeftLongitude</u> <u>lev-</u> <u>el1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCoordsGeographic/lowerLeftLongitude</u> <u>lev-</u> <u>el1Product/productSpecific/geocodedImageInfo/geoParameter/frameCoordsGeographic/lowerRightLongitude</u> <u>lev-</u> <u>el1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCoordsGeographic/lowerRightLongitude</u> <u>lev-</u> <u>el1Product/productSpecific/geocodedImageInfo/geoParameter/frameCoordsGeographic/upperLeftLongitude</u> <u>lev-</u> <u>el1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCoordsGeographic/upperLeftLongitude</u> <u>lev-</u> <u>el1Product/productSpecific/geocodedImageInfo/geoParameter/frameCoordsGeographic/upperRightLongitude</u> <u>lev-</u> <u>el1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCoordsGeographic/upperRightLongitude</u>
facets	minInclusive -180 maxInclusive -180 ve

8.2 Georeferencing Annotation Component

This is an external annotation component in order to facilitate data handling. The geolocation grid contained within may comprise a large number (100s) of grid points.

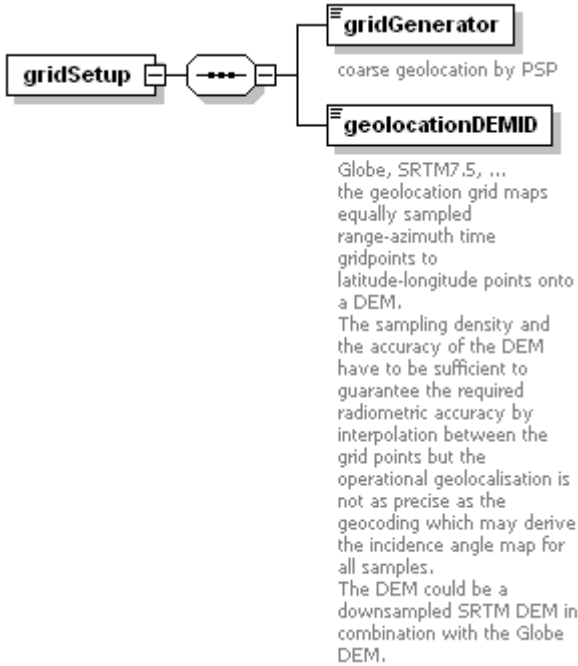
Schema **geoReference.xsd**

element **geoReference**

diagram						
properties	con-com- tent plex					
children	<u>gridSetup</u> <u>platformParameterProcessing</u> <u>referenceFrames</u> <u>signalPropagationEffects</u> <u>geolocationGrid</u>					
attributes	Name mainAnnotationFileNa- me	Type <u>string1024</u>	Use	Default	Fixed	Annotation documentati-points on back to the

		main product
annotation	documentati-This XML file contains the meta data related to geolocation and reference frames of the level 1 processed on complex images in slant-range geometry used for e.g. geometric processing parameter calculation, noise projection and calibration. It is also included in projected and geocoded products accompanied by an additional binary mapping grid to reference image positions to times.	

element **geoReference/gridSetup**

diagram	 Globe, SRTM7.5, ... the geolocation grid maps equally sampled range-azimuth time gridpoints to latitude-longitude points onto a DEM. The sampling density and the accuracy of the DEM have to be sufficient to guarantee the required radiometric accuracy by interpolation between the grid points but the operational geolocalisation is not as precise as the geocoding which may derive the incidence angle map for all samples. The DEM could be a downsampled SRTM DEM in combination with the Globe DEM.	
properties	isRef 0 con-com- tent plex	
children	<u>gridGenerator</u> <u>geolocationDEMID</u>	

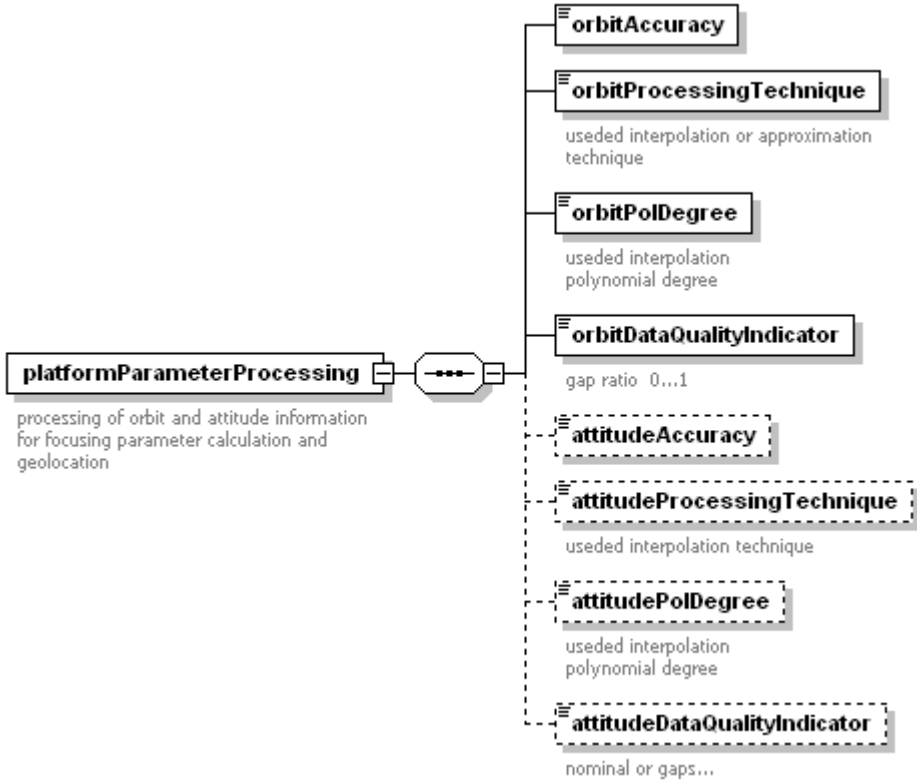
element **geoReference/gridSetup/gridGenerator**

diagram		
type	<u>string80</u>	
properties	isRef 0 con-simp- tent le	
facets	maxLength 80	
annotation	documentati-coarse geolocation by on PSP	

element **geoReference/gridSetup/geolocationDEMID**

diagram	geolocationDEMID Globe, SRTM7.5, ... the geolocation grid maps equally sampled range-azimuth time gridpoints to latitude-longitude points onto a DEM. The sampling density and the accuracy of the DEM have to be sufficient to guarantee the required radiometric accuracy by interpolation between the grid points but the operational geolocalisation is not as precise as the geocoding which may derive the incidence angle map for all samples. The DEM could be a downsampled SRTM DEM in combination with the Globe DEM.
type	<u>string255</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 255
annotation	documentati-Globe, SRTM7.5, ... on the geolocation grid maps equally sampled range-azimuth time gridpoints to latitude-longitude points onto a DEM. The sampling density and the accuracy of the DEM have to be sufficient to guarantee the required radio-metric accuracy by interpolation between the grid points but the operational geolocalisation is not as precise as the geocoding which may derive the incidence angle map for all samples. The DEM could be a downsampled SRTM DEM in combination with the Globe DEM.

element **geoReference/platformParameterProcessing**

diagram	
properties	isRef 0 con-com- tent plex
children	<u>orbitAccuracy</u> <u>orbitProcessingTechnique</u> <u>orbitPolDegree</u> <u>orbitDataQualityIndicator</u> <u>attitudeAccuracy</u> <u>attitudeProcessingTechnique</u> <u>attitudePolDegree</u> <u>attitudeDataQualityIndicator</u>
annotation	documentati-processing of orbit and attitude information for focusing parameter calculation and geoloca- on tion

element geoReference/platformParameterProcessing/orbitAccuracy

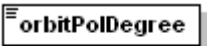
diagram	
type	<u>string20</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 20

element geoReference/platformParameterProcessing/orbitProcessingTechnique

diagram	
type	<u>string255</u>
properties	isRef 0 con-simp-

	tent le
facets	maxLength 255
annotation	documentati-used interpolation or approximation tech- on nique

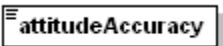
element **geoReference/platformParameterProcessing/orbitPolDegree**

diagram	 used interpolation polynomial degree
type	restriction of xs:int
properties	isRef 0 con-simp- tent le
facets	minInclusive 1 maxInclusi-20 ve
annotation	documentati-used interpolation polynomial on degree

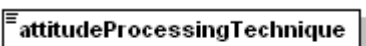
element **geoReference/platformParameterProcessing/orbitDataQualityIndicator**

diagram	 gap ratio 0...1
type	xs:float
properties	isRef 0 con-simp- tent le
annotation	documentati-gap ratio on 0...1

element **geoReference/platformParameterProcessing/attitudeAccuracy**

diagram	
type	string20
properties	isRef 0 con-simp- tent le
facets	maxLength 20

element **geoReference/platformParameterProcessing/attitudeProcessingTechnique**

diagram	 used interpolation technique
type	string255
properties	isRef 0

	con-simp- tent le
facets	maxLength 255
annotation	documentati-used interpolation techni- on que

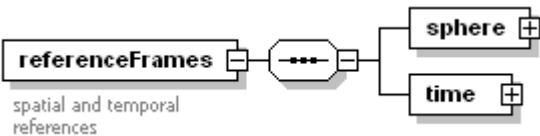
element **geoReference/platformParameterProcessing/attitudePolDegree**

diagram	
type	restriction of xs:int
properties	isRef 0 con-simp- tent le
facets	minInclusive 1 maxInclusi-20 ve
annotation	documentati-used interpolation polynomial on degree

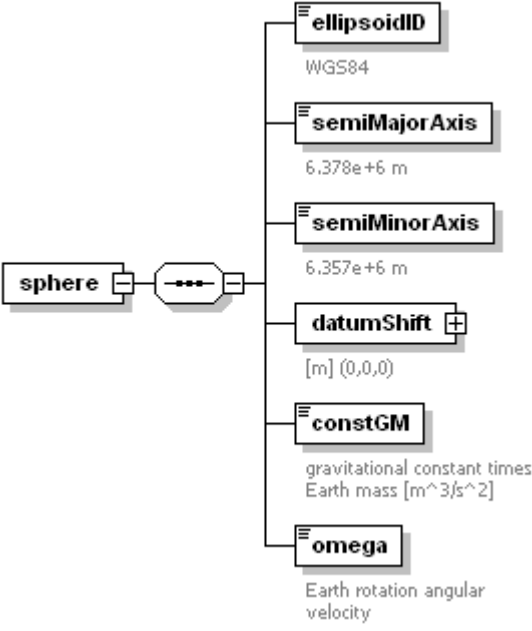
element **geoReference/platformParameterProcessing/attitudeDataQualityIndicator**

diagram	
type	xs:float
properties	isRef 0 con-simp- tent le
annotation	documentati-nominal or on gaps...

element **geoReference/referenceFrames**

diagram	
properties	isRef 0 con-com- tent plex
children	<u>sphere</u> <u>time</u>
annotation	documentati-spatial and temporal refe- on rences

element **geoReference/referenceFrames/sphere**

diagram	
properties	isRef 0 con-com- tent plex
children	ellipsoidID semiMajorAxis semiMinorAxis datumShift constGM omega

element [geoReference/referenceFrames/sphere/ellipsoidID](#)

diagram	
type	string20
properties	isRef 0 con-simp- tent le
facets	maxLength 20
annotation	documentati-WGS8 on 4

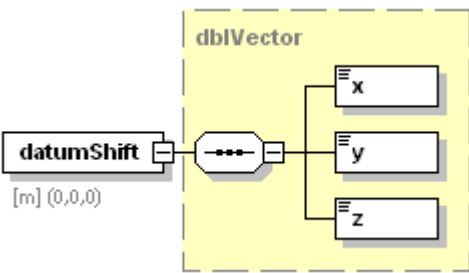
element [geoReference/referenceFrames/sphere/semiMajorAxis](#)

diagram	
type	xs:double
properties	isRef 0 con-simp- tent le
annotation	documentati-6.378e+6 on m

element [geoReference/referenceFrames/sphere/semiMinorAxis](#)

diagram	 6.357e+6 m
type	xs:double
properties	isRef 0 con-simp- tent le
annotation	documentati-6.357e+6 on m

element geoReference/referenceFrames/sphere/datumShift

diagram	
type	<u>dbfVector</u>
properties	isRef 0 con-com- tent plex
children	<u>x y z</u>
annotation	documentati-[m] on (0,0,0)

element geoReference/referenceFrames/sphere/constGM

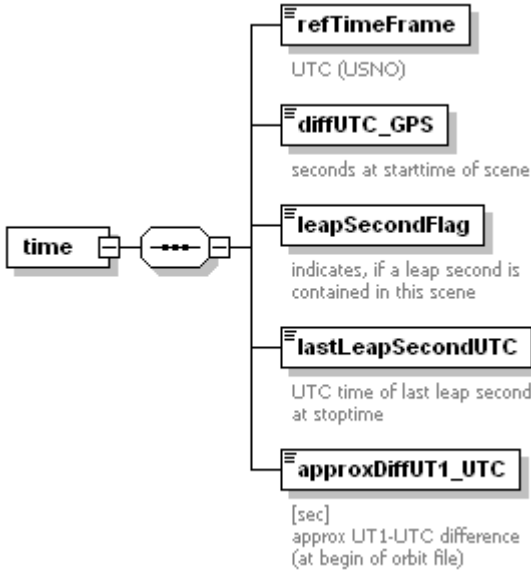
diagram	 gravitational constant times Earth mass [m^3/s^2]
type	xs:double
properties	isRef 0 con-simp- tent le
annotation	documentati-gravitational constant times Earth mass on [m^3/s^2]

element geoReference/referenceFrames/sphere/omega

diagram	 Earth rotation angular velocity
type	xs:double
properties	isRef 0 con-simp-

	tent le
annotation	documentati-Earth rotation angular veloci- on ty

element **geoReference/referenceFrames/time**

diagram	
properties	isRef 0 con-com- tent plex
children	<u>refTimeFrame</u> <u>diffUTC</u> <u>GPS</u> <u>leapSecondFlag</u> <u>lastLeapSecondUTC</u> <u>approxDiffUT1_UTC</u>

element **geoReference/referenceFrames/time/refTimeFrame**

diagram	
type	<u>string20</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 20
annotation	documentati-UTC (USNO) on

element **geoReference/referenceFrames/time/diffUTC_GPS**

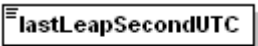
diagram	
type	xs:float
properties	isRef 0 con-simp- tent le

annotation	documentati-seconds at starttime of on scene
------------	---

element **geoReference/referenceFrames/time/leapSecondFlag**

diagram	 indicates, if a leap second is contained in this scene
type	restriction of xs:int
properties	isRef 0 con-simp- tent le
facets	minInclusive -1 maxInclusi-1 ve
annotation	documentati-indicates, if a leap second is contained in this on scene

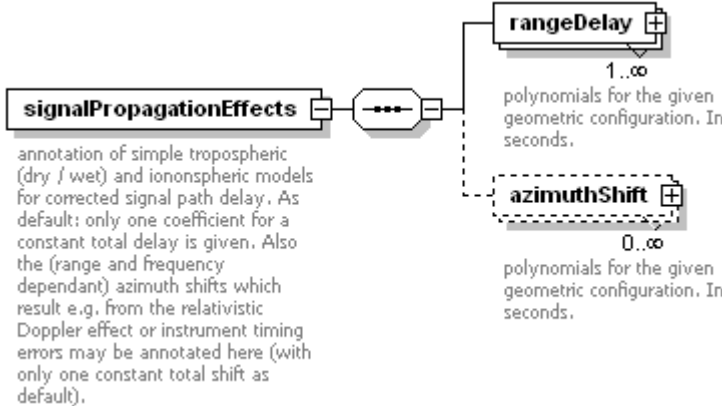
element **geoReference/referenceFrames/time/lastLeapSecondUTC**

diagram	 UTC time of last leap second at stoptime
type	xs:dateTime
properties	isRef 0 con-simp- tent le
annotation	documentati-UTC time of last leap second at stop- on time

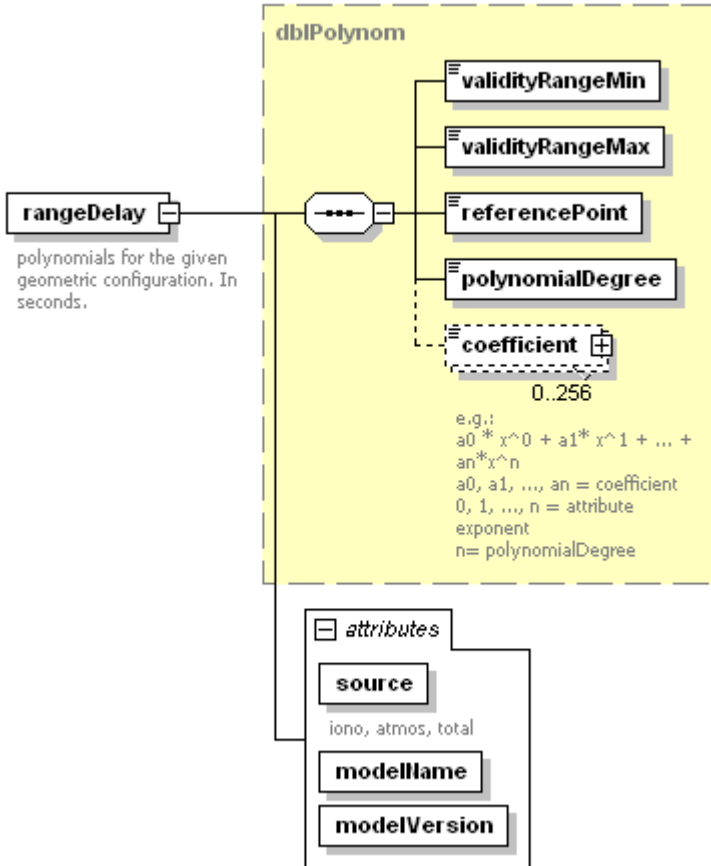
element **geoReference/referenceFrames/time/approxDiffUT1_UTC**

diagram	 [sec] approx UT1-UTC difference (at begin of orbit file)
type	xs:float
properties	isRef 0 con-simp- tent le
annotation	documentati-[sec] on approx UT1-UTC difference (at begin of orbit file)

element **geoReference/signalPropagationEffects**

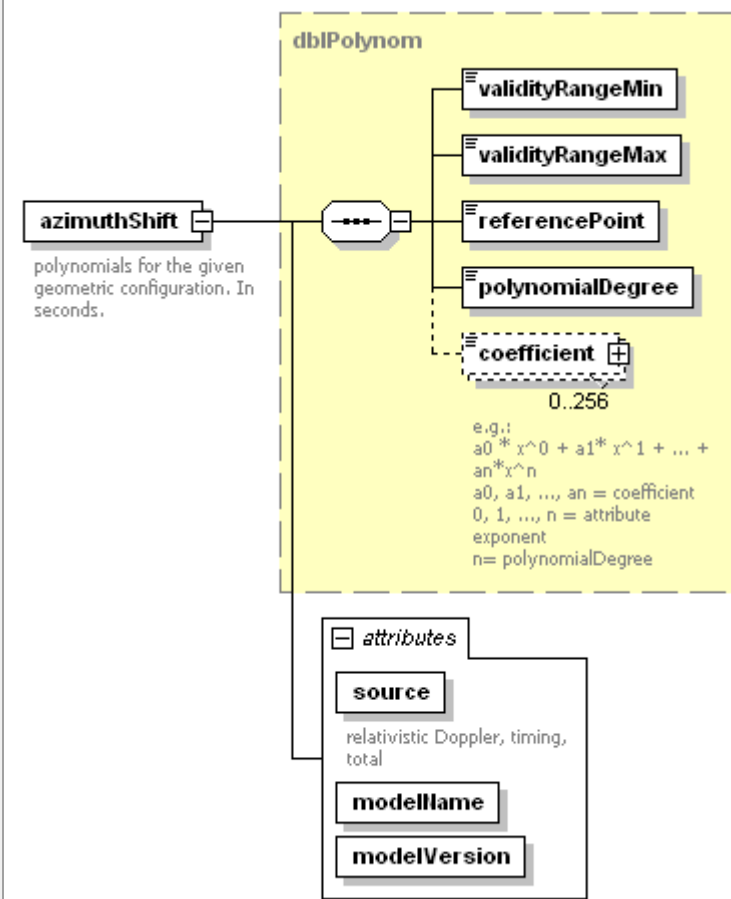
diagram	 signalPropagationEffects annotation of simple tropospheric (dry / wet) and ionospheric models for corrected signal path delay. As default: only one coefficient for a constant total delay is given. Also the (range and frequency dependant) azimuth shifts which result e.g. from the relativistic Doppler effect or instrument timing errors may be annotated here (with only one constant total shift as default). rangeDelay 1..∞ polynomials for the given geometric configuration. In seconds. azimuthShift 0..∞ polynomials for the given geometric configuration. In seconds.
properties	isRef 0 con-com- tent plex
children	rangeDelay azimuthShift
annotation	documentati-annotation of simple tropospheric (dry / wet) and ionospheric models for corrected signal path delay. As on default: only one coefficient for a constant total delay is given. Also the (range and frequency dependant) azimuth shifts which result e.g. from the relativistic Doppler effect or instrument timing errors may be annotated here (with only one constant total shift as default).

element geoReference/signalPropagationEffects/rangeDelay

diagram	 rangeDelay polynomials for the given geometric configuration. In seconds. dbiPolynom validityRangeMin validityRangeMax referencePoint polynomialDegree coefficient 0..256 e.g.: $a_0 * x^0 + a_1 * x^1 + \dots + a_n * x^n$ $a_0, a_1, \dots, a_n = \text{coefficient}$ $0, 1, \dots, n = \text{attribute exponent}$ $n = \text{polynomialDegree}$ attributes source iono, atmos, total modelName modelVersion
type	extension of dbiPolynom

properties	isRef 0 con-com- tent plex					
children	<u>validityRangeMin</u> <u>validityRangeMax</u> <u>referencePoint</u> <u>polynomialDegree</u> <u>coefficient</u>					
attributes	Name	Type	Use required	Default	Fixed	Annotation documentati- on at- mos, total
	source					
	modelName	<u>string255</u>	required			
	modelVersion	<u>string80</u>	required			
annotation	documentati-polynomials for the given geometric configuration. In se- on conds.					

element **geoReference/signalPropagationEffects/azimuthShift**

diagram						
type	extension of <u>dbiPolynom</u>					
properties	isRef 0 con-com- tent plex					
children	<u>validityRangeMin</u> <u>validityRangeMax</u> <u>referencePoint</u> <u>polynomialDegree</u> <u>coefficient</u>					
attributes	Name	Type	Use required	Default	Fixed	Annotation documentati-relativis- on tic Dopp- ler, ti-
	source					

deskewed pixel positions in azimuth but to non-continuous and rounded, individual range sample positions due to possible RSF changes between the subswathes. The grid may comprise several 100 points.

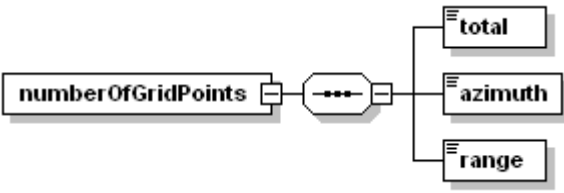
element **geoReference/geolocationGrid/beamID**

diagram	
type	string20
properties	isRef 0 con-sim- tent le
facets	maxLength 20

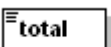
element **geoReference/geolocationGrid/DRAoffset**

diagram	 SRA, DRAFore, DRAAft
type	restriction of xs:NMTOKENS
properties	isRef 0 con-sim- tent le
facets	enumerati-SRA on enumerati-DRAFore on enumerati-DRAAft on
annotation	documentati-SRA, DRAFore, on DRAAft

element **geoReference/geolocationGrid/numberOfGridPoints**

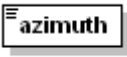
diagram	
properties	isRef 0 con-com- tent plex
children	total azimuth range

element **geoReference/geolocationGrid/numberOfGridPoints/total**

diagram	
type	xs:int
properties	isRef 0 con-sim-

	tent le
--	---------

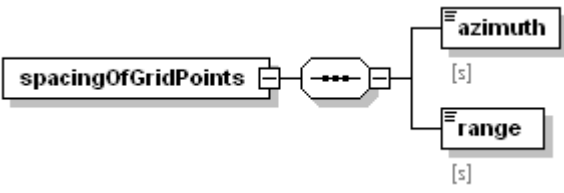
element **geoReference/geolocationGrid/numberOfGridPoints/azimuth**

diagram	
type	xs:int
properties	isRef 0 con-simp- tent le

element **geoReference/geolocationGrid/numberOfGridPoints/range**

diagram	
type	xs:int
properties	isRef 0 con-simp- tent le

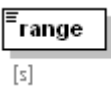
element **geoReference/geolocationGrid/spacingOfGridPoints**

diagram	
properties	isRef 0 con-com- tent plex
children	azimuth range

element **geoReference/geolocationGrid/spacingOfGridPoints/azimuth**

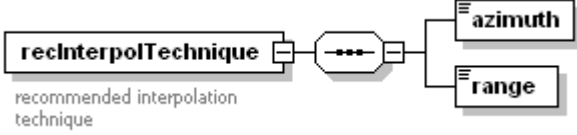
diagram	
type	xs:float
properties	isRef 0 con-simp- tent le
annotation	documentati-[s on]

element **geoReference/geolocationGrid/spacingOfGridPoints/range**

diagram	
type	xs:float

properties	isRef 0 con-simp- tent le
annotation	documentati-[s on]

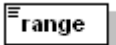
element geoReference/geolocationGrid/recInterpolTechnique

diagram	 recommended interpolation technique
properties	isRef 0 con-com- tent plex
children	<u>azimuth</u> <u>range</u>
annotation	documentati-recommended interpolation techni- on que

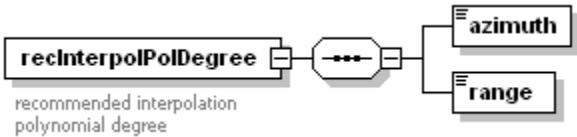
element geoReference/geolocationGrid/recInterpolTechnique/azimuth

diagram	
type	<u>string255</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 255

element geoReference/geolocationGrid/recInterpolTechnique/range

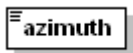
diagram	
type	<u>string255</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 255

element geoReference/geolocationGrid/recInterpolPolDegree

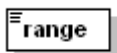
diagram	 recommended interpolation polynomial degree
properties	isRef 0 con-com- tent plex
children	<u>azimuth</u> <u>range</u>

annotation	documentati-recommended interpolation polynomial on degree
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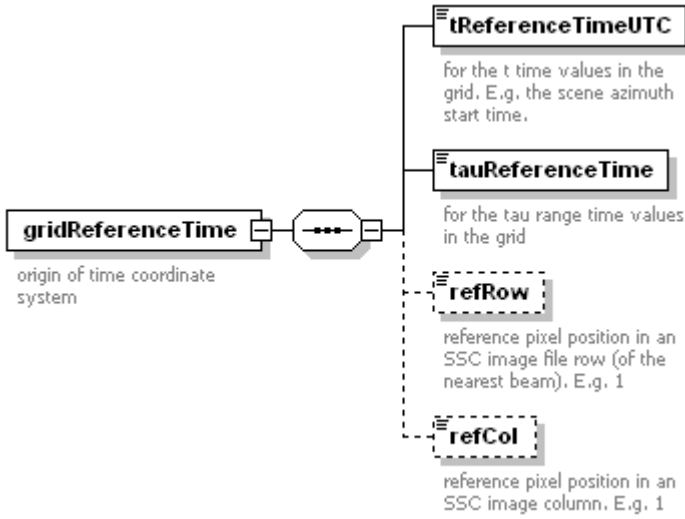
element **geoReference/geolocationGrid/recInterpolPolDegree/azimuth**

diagram	
type	xs:int
properties	isRef 0 con-simp- tent le

element **geoReference/geolocationGrid/recInterpolPolDegree/range**

diagram	
type	xs:int
properties	isRef 0 con-simp- tent le

element **geoReference/geolocationGrid/gridReferenceTime**

diagram	
properties	isRef 0 con-com- tent plex
children	<u>tReferenceTimeUTC</u> <u>tauReferenceTime</u> <u>refRow</u> <u>refCol</u>
annotation	documentati-origin of time coordinate sys- on tem

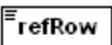
element **geoReference/geolocationGrid/gridReferenceTime/tReferenceTimeUTC**

diagram	 for the t time values in the grid. E.g. the scene azimuth start time.
type	xs:dateTime
properties	isRef 0 con-sim- tent le
annotation	documentati-for the t time values in the grid. E.g. the scene azimuth start on time.

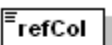
element geoReference/geolocationGrid/gridReferenceTime/tauReferenceTime

diagram	 for the tau range time values in the grid
type	xs:double
properties	isRef 0 con-sim- tent le
annotation	documentati-for the tau range time values in the on grid

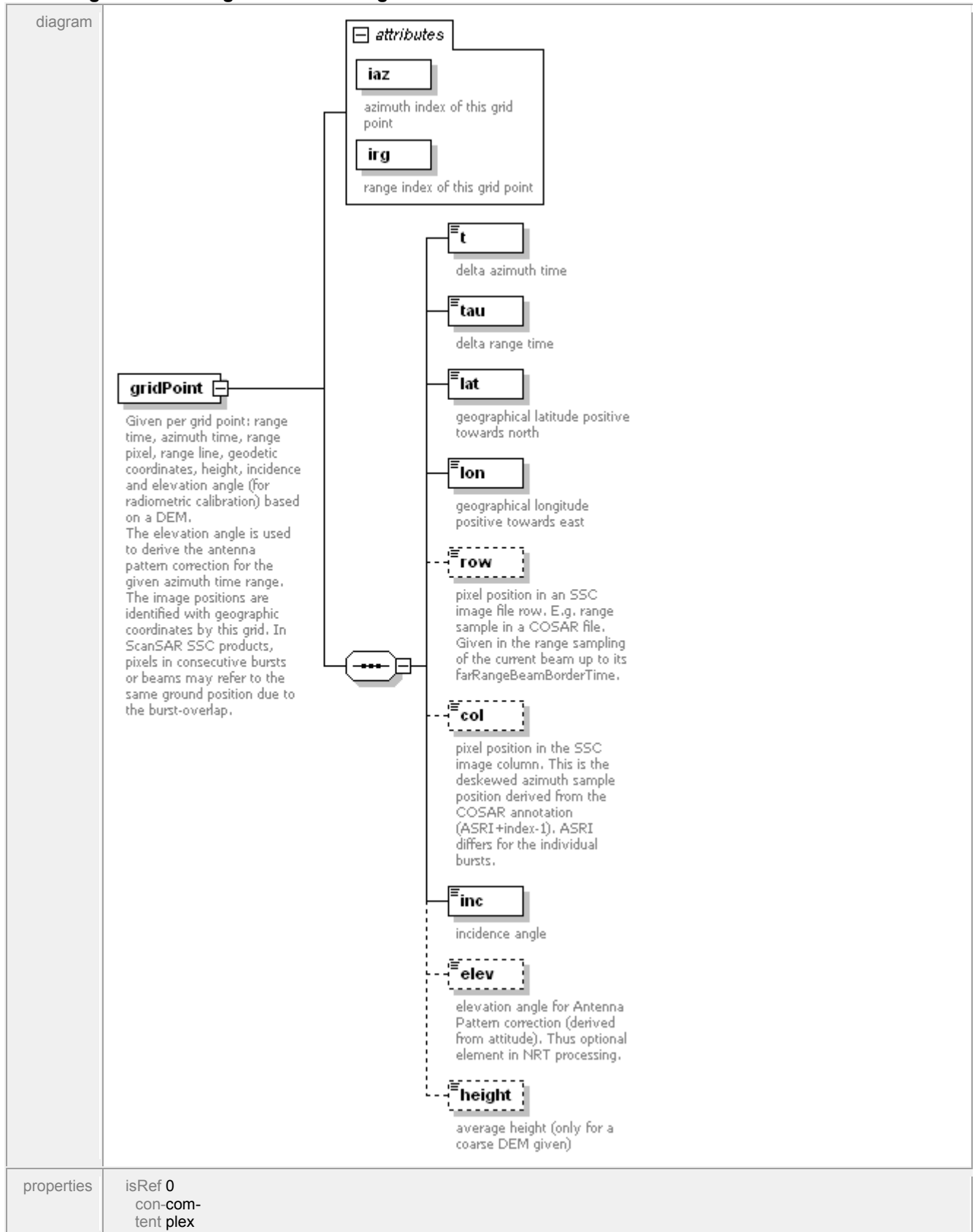
element geoReference/geolocationGrid/gridReferenceTime/refRow

diagram	 reference pixel position in an SSC image file row (of the nearest beam). E.g. 1
type	xs:long
properties	isRef 0 con-sim- tent le
annotation	documentati-reference pixel position in an SSC image file row (of the nearest beam). E.g. on 1

element geoReference/geolocationGrid/gridReferenceTime/refCol

diagram	 reference pixel position in an SSC image column. E.g. 1
type	xs:long
properties	isRef 0 con-sim- tent le
annotation	documentati-reference pixel position in an SSC image column. E.g. on 1

element geoReference/geolocationGrid/gridPoint

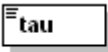


children	t tau lat lon row col inc elev height					
attributes	Name	Type	Use	Default	Fixed	Annotation
	iaz	xs:int	required			documentati-on azimuth index of this grid point
	irg	xs:int	required			documentati-range on index of this grid point
annotation	documentati-Given per grid point: range time, azimuth time, range pixel, range line, geodetic coordinates, height, incidence and elevation angle (for radiometric calibration) based on a DEM. The elevation angle is used to derive the antenna pattern correction for the given azimuth time range. The image positions are identified with geographic coordinates by this grid. In ScanSAR SSC products, pixels in consecutive bursts or beams may refer to the same ground position due to the burst-overlap.					

element **geoReference/geolocationGrid/gridPoint/t**

diagram	 delta azimuth time
type	xs:double
properties	isRef 0 con-simp- tent le
annotation	documentati-delta azimuth on time

element **geoReference/geolocationGrid/gridPoint/tau**

diagram	 delta range time
type	xs:double
properties	isRef 0 con-simp- tent le
annotation	documentati-delta range on time

element **geoReference/geolocationGrid/gridPoint/lat**

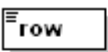
diagram	 geographical latitude positive towards north
type	<u>latitudeDegType</u>
properties	isRef 0 con-simp- tent le
facets	minInclusive -90 maxInclusi-90

	ve
annotation	documentati-geographical latitude positive towards on north

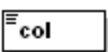
element geoReference/geolocationGrid/gridPoint/ion

diagram	 geographical longitude positive towards east
type	<u>longitudeDegType</u>
properties	isRef 0 con-simp- tent le
facets	minInclusive -180 maxInclusi-180 ve
annotation	documentati-geographical longitude positive towards on east

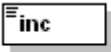
element geoReference/geolocationGrid/gridPoint/row

diagram	 pixel position in an SSC image file row. E.g. range sample in a COSAR file. Given in the range sampling of the current beam up to its farRangeBeamBorderTime.
type	xs:long
properties	isRef 0 con-simp- tent le
annotation	documentati-pixel position in an SSC image file row. E.g. range sample in a COSAR file. Given in the range sampling of on the current beam up to its farRangeBeamBorderTime.

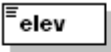
element geoReference/geolocationGrid/gridPoint/col

diagram	 pixel position in the SSC image column. This is the deskewed azimuth sample position derived from the COSAR annotation (ASRI+index-1). ASRI differs for the individual bursts.
type	xs:long
properties	isRef 0 con-simp- tent le
annotation	documentati-pixel position in the SSC image column. This is the deskewed azimuth sample position derived from the on COSAR annotation (ASRI+index-1). ASRI differs for the individual bursts.

element **geoReference/geolocationGrid/gridPoint/inc**

diagram	 incidence angle
type	xs:double
properties	isRef 0 con-simp- tent le
annotation	documentati-incidence on angle

element **geoReference/geolocationGrid/gridPoint/elev**

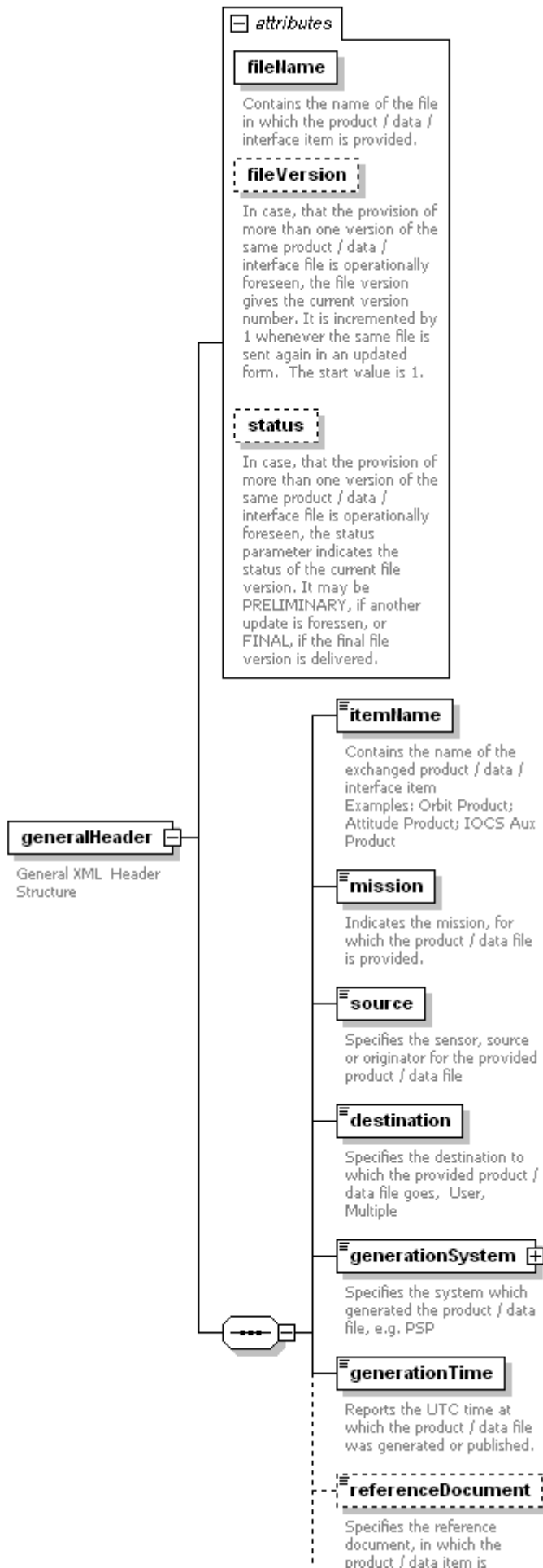
diagram	 elevation angle for Antenna Pattern correction (derived from attitude). Thus optional element in NRT processing.
type	xs:double
properties	isRef 0 con-simp- tent le
annotation	documentati-elevation angle for Antenna Pattern correction (derived from attitude). Thus optional element in NRT pro- on censing.

element **geoReference/geolocationGrid/gridPoint/height**

diagram	 average height (only for a coarse DEM given)
type	xs:double
properties	isRef 0 con-simp- tent le
annotation	documentati-average height (only for a coarse DEM giv- on en)

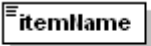
element **generalHeader**

diagram



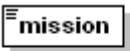
properties	con-com- tent plex					
children	<u>itemName</u> <u>mission</u> <u>source</u> <u>destination</u> <u>generationSystem</u> <u>generationTime</u> <u>referenceDocument</u> <u>revision</u> <u>revision-Comment</u> <u>remark</u>					
attributes	Name fileName	Type <u>string128</u>	Use required	Default	Fixed	Annotation documentati-Contains the on name of the file in which the product / data / interface item is provided. documentati-In case, that on the provision of more than one version of the same product / data / interface file is opera- tionally fore- seen, the file version gives the current version num- ber. It is incre- mented by 1 whenever the same file is sent again in an updated form. The start value is 1. documentati-In case, that on the provision of more than one version of the same product / data / interface file is opera- tionally fore- seen, the status param- eter indicates the status of the current file version. It may be PRELIMINARY , if another update is foressen, or FINAL, if the final file version is delivered.
	fileVersion	<u>string20</u>	optional			
	status	<u>string20</u>	optional			
annotation	documentati-General XML Header Structure on					

element generalHeader/itemName

diagram	 Contains the name of the exchanged product / data / interface item Examples: Orbit Product; Attitude Product; IOCS Aux Product
---------	---

type	<u>string80</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 80
annotation	documentati-Contains the name of the exchanged product / data / interface on item Examples: Orbit Product; Attitude Product; IOCS Aux Product

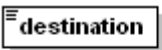
element **generalHeader/mission**

diagram	 Indicates the mission, for which the product / data file is provided.
type	<u>string20</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 20
annotation	documentati-Indicates the mission, for which the product / data file is provid- on ed.

element **generalHeader/source**

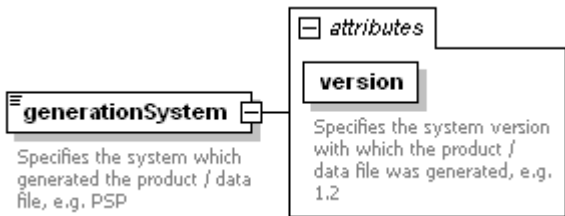
diagram	 Specifies the sensor, source or originator for the provided product / data file
type	<u>string20</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 20
annotation	documentati-Specifies the sensor, source or originator for the provided product / data on file

element **generalHeader/destination**

diagram	 Specifies the destination to which the provided product / data file goes, User, Multiple
type	<u>string20</u>
properties	isRef 0 con-simp- tent le
facets	maxLength 20

annotation	documentati- Specifies the destination to which the provided product / data file goes, User, Multi- on ple
------------	---

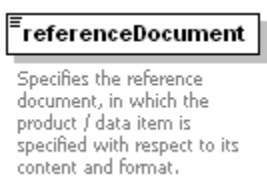
element **generalHeader/generationSystem**

diagram						
type	extension of string80					
properties	isRef 0 con-com- tent plex					
facets	maxLength 80					
attributes	Name version	Type string20	Use required	Default	Fixed	Annotation documentati- Specifies on the sys- tem ver- sion with which the product / data file was gen- erated, e.g. 1.2
annotation	documentati- Specifies the system which generated the product / data file, e.g. on PSP					

element **generalHeader/generationTime**

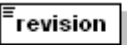
diagram						
type	xs:dateTime					
properties	isRef 0 con-simp- tent le					
annotation	documentati- Reports the UTC time at which the product / data file was generated or pub- on lished.					

element **generalHeader/referenceDocument**

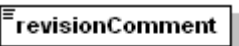
diagram						
type	string255					

properties	isRef 0 con-sim- tent le
facets	maxLength 255
annotation	documentati-Specifies the reference document, in which the product / data item is specified with respect to its content on and format.

element **generalHeader/revision**

diagram	 A handle to distinguish between different project phases (e.g. integration, testing, commissioning phase, operations) in order to separate test data from operational data
type	<u>string20</u>
properties	isRef 0 con-sim- tent le
facets	maxLength 20
annotation	documentati-A handle to distinguish between different project phases (e.g. integration, testing, commissioning phase, on operations) in order to separate test data from operational data

element **generalHeader/revisionComment**

diagram	 Remark field for a narrative description of the revision field entry above.
type	<u>string1024</u>
properties	isRef 0 con-sim- tent le
facets	maxLength 1024
annotation	documentati-Remark field for a narrative description of the revision field entry on above.

element **generalHeader/remark**

diagram	 Remark field for a further narrative description of the product / data file.
type	<u>string1024</u>
properties	isRef 0 con-sim- tent le
facets	maxLength 1024

annotation	documentati-Remark field for a further narrative description of the product / data on file.
------------	---

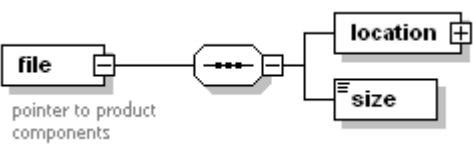
element **antennaReceiveConfiguration**

diagram	 SRA DRA
type	restriction of xs:NMTOKENS
properties	con-simp- tent le
facets	enumerati-SRA on enumerati-DRA on enumerati-UNDEFINE on D
annotation	documentati-SRA on DRA

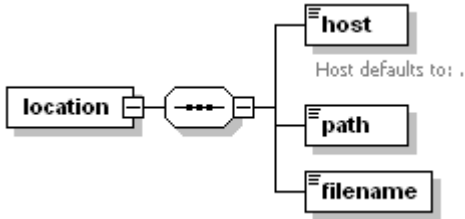
element **chirpSlope**

diagram	 [Up/Down/UpDown] chirp slope
type	restriction of xs:NMTOKEN
properties	con-simp- tent le
facets	enumerati-UP on enumerati-DOWN on enumerati-UPDOWN on N
annotation	documentati-[Up/Down/UpDown] chirp slope on

element **file**

diagram	 pointer to product components
properties	con-com- tent plex
children	location size
annotation	documentati-pointer to product compo- on nents

element **file/location**

diagram	
properties	isRef 0 con-com- tent plex
children	<u>host path filename</u>

element file/location/host

diagram	
type	xs:string
properties	isRef 0 con-simp- tent le
annotation	documentati-Host defaults to: on .

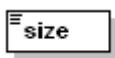
element file/location/path

diagram	
type	xs:string
properties	isRef 0 con-simp- tent le

element file/location/filename

diagram	
type	xs:string
properties	isRef 0 con-simp- tent le

element file/size

diagram	
type	xs:long
properties	isRef 0 con-simp- tent le

element **imagingMode**

diagram	 SM, SC, HS, SL
type	restriction of xs:NMTOKENS
properties	con-simp- tent le
facets	enumerati-SM on enumerati-SL on enumerati-SC on enumerati-HS on enumerati-UNDEFINE on D
annotation	documentati-SM, SC, HS, on SL

element **lookDirection**

diagram	 left right
type	restriction of xs:NMTOKEN
properties	con-simp- tent le
facets	enumerati-LEFT on enumerati-RIGHT on enumerati-UNDEFINE on D
annotation	documentati-left on right

element **polarisationMode**

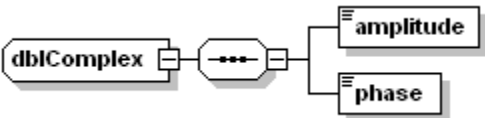
diagram	 single dual twin quad
type	restriction of xs:NMTOKENS
properties	con-simp- tent le
facets	enumerati-SINGL on E enumerati-DUAL on enumerati-TWIN on enumerati-QUAD on

annotation	documentati-single dual twin on quad
------------	---

element **polLayer**

diagram	 HH, HV, ...
type	restriction of xs:string
properties	con-simp- tent le
facets	enumerati-HH on enumerati-HV on enumerati-VH on enumerati-VV on enumerati-UNDEFINE on D
annotation	documentati-HH, HV, on ...

complexType **dbIComplex**

diagram	
children	<u>amplitude</u> <u>phase</u>

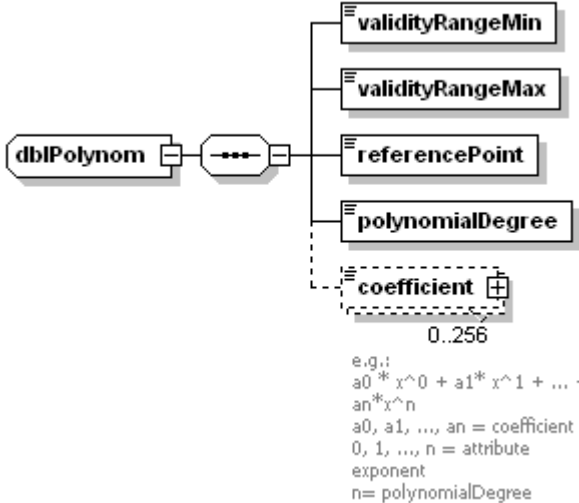
element **dbIComplex/amplitude**

diagram	
type	xs:double
properties	isRef 0 con-simp- tent le

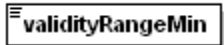
element **dbIComplex/phase**

diagram	
type	xs:double
properties	isRef 0 con-simp- tent le

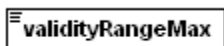
complexType **dbIPolynom**

diagram	 e.g.: $a_0 * x^0 + a_1 * x^1 + \dots + a_n * x^n$ $a_0, a_1, \dots, a_n$ = coefficient $0, 1, \dots, n$ = attribute exponent n = polynomialDegree
children	<u>validityRangeMin</u> <u>validityRangeMax</u> <u>referencePoint</u> <u>polynomialDegree</u> <u>coefficient</u>
used by	elements <u>geoReference/signalPropagationEffects/azimuthShift</u> <u>geoReference/signalPropagationEffects/rangeDelay</u>

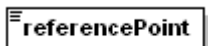
element dbIPolynomial/validityRangeMin

diagram	
type	xs:double
properties	isRef 0 con-sim- tent le

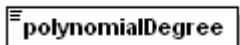
element dbIPolynomial/validityRangeMax

diagram	
type	xs:double
properties	isRef 0 con-sim- tent le

element dbIPolynomial/referencePoint

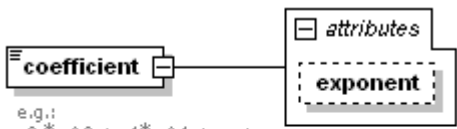
diagram	
type	xs:double
properties	isRef 0 con-sim- tent le

element dbIPolynomial/polynomialDegree

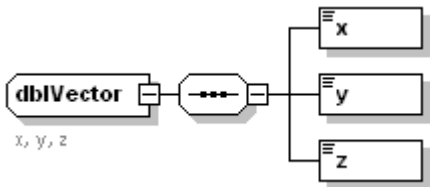
diagram	
---------	---

type	xs:unsignedInt
properties	isRef 0 con-simp- tent le

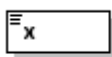
element **dbIPolynomial/coefficient**

diagram	 e.g.: $a_0 * x^0 + a_1 * x^1 + \dots + a_n * x^n$ $a_0, a_1, \dots, a_n$ = coefficient $0, 1, \dots, n$ = attribute exponent n = polynomialDegree					
type	extension of xs:double					
properties	isRef 0 con-com- tent plex					
attributes	Name exponent	Type xs:unsignedInt	Use	Default	Fixed	Annotation
annotation	documentati-e.g.: on $a_0 * x^0 + a_1 * x^1 + \dots + a_n * x^n$ $a_0, a_1, \dots, a_n$ = coefficient $0, 1, \dots, n$ = attribute exponent n = polynomialDegree					

complexType **dbIVector**

diagram	 x, y, z					
children	x y z					
used by	ele- geoRefe- ment rence/referenceFrames/sphere/datumShift					
annotation	documentati- x, y, z on					

element **dbIVector/x**

diagram						
type	xs:double					
properties	isRef 0 con-simp- tent le					

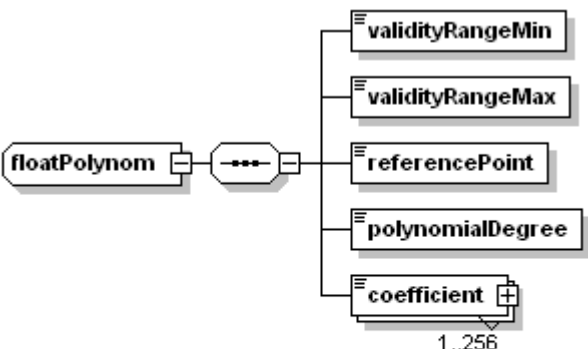
element **dbIVector/y**

diagram	
type	xs:double
properties	isRef 0 con-simp- tent le

element **dblVector/z**

diagram	
type	xs:double
properties	isRef 0 con-simp- tent le

complexType **floatPolynom**

diagram	 $a_0 * x^0 + a_1 * x^1 + \dots + a_n * x^n$ $a_0, a_1, \dots, a_n = \text{coefficient}$ $0, 1, \dots, n = \text{attribute exponent}$ $n = \text{polynomialDegree}$
children	<u>validityRangeMin</u> <u>validityRangeMax</u> <u>referencePoint</u> <u>polynomialDegree</u> <u>coefficient</u>

element **floatPolynom/validityRangeMin**

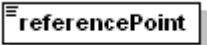
diagram	
type	xs:float
properties	isRef 0 con-simp- tent le

element **floatPolynom/validityRangeMax**

diagram	
type	xs:float

properties	isRef 0 con-sim- tent le
------------	--------------------------------

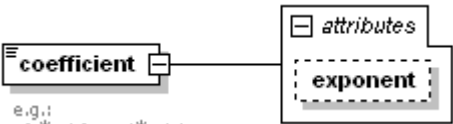
element floatPolynom/referencePoint

diagram	
type	xs:float
properties	isRef 0 con-sim- tent le

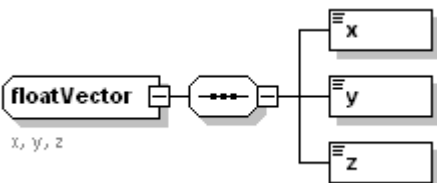
element floatPolynom/polynomialDegree

diagram	
type	xs:unsignedInt
properties	isRef 0 con-sim- tent le

element floatPolynom/coefficient

diagram	 e.g.: $a_0 * x^0 + a_1 * x^1 + \dots + a_n * x^n$ $a_0, a_1, \dots, a_n$ = coefficient $0, 1, \dots, n$ = attribute exponent n = polynomialDegree					
type	extension of xs:float					
properties	isRef 0 con-com- tent plex					
attributes	Name exponent	Type xs:unsignedInt	Use	Default	Fixed	Annotation
annotation	documentati-e.g.: $a_0 * x^0 + a_1 * x^1 + \dots + a_n * x^n$ $a_0, a_1, \dots, a_n$ = coefficient $0, 1, \dots, n$ = attribute exponent n = polynomialDegree					

complexType floatVector

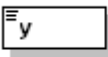
diagram						
---------	---	--	--	--	--	--

children	x y z
annotation	documentati-x, y, z on

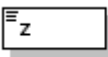
element floatVector/x

diagram	
type	xs:float
properties	isRef 0 con-simp- tent le

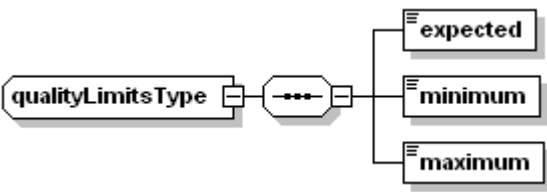
element floatVector/y

diagram	
type	xs:float
properties	isRef 0 con-simp- tent le

element floatVector/z

diagram	
type	xs:float
properties	isRef 0 con-simp- tent le

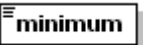
complexType qualityLimitsType

diagram	
children	<u>expected</u> <u>minimum</u> <u>maximum</u>

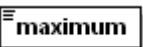
element qualityLimitsType/expected

diagram	
type	xs:float
properties	isRef 0 con-simp- tent le

element **qualityLimitsType/minimum**

diagram	 minimum
type	xs:float
properties	isRef 0 con-simp- tent le

element **qualityLimitsType/maximum**

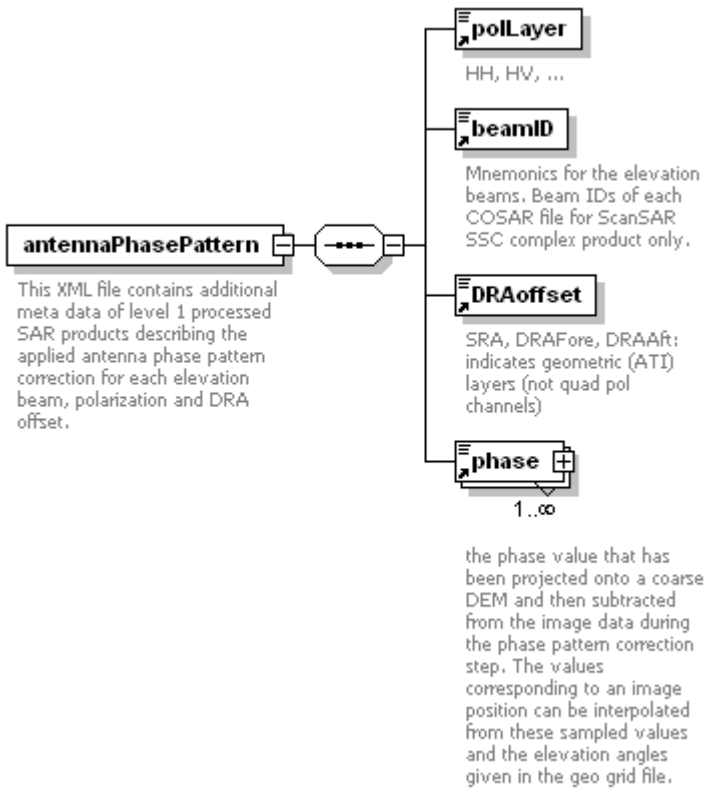
diagram	 maximum
type	xs:float
properties	isRef 0 con-simp- tent le

8.3 Antenna Phase Pattern Annotation Component

This is an external annotation component which is optionally provided depending on the necessity to compensate an elevation, beam and polarisation dependant antenna phase pattern of the instrument. It is provided for SSC products only.

Schema **antennaPhasePattern.xsd**

element **antennaPhasePattern**

diagram	
properties	con-com- tent plex
children	<u>polLayer</u> <u>beamID</u> <u>DRAoffset</u> <u>phase</u>
annotation	documenta-This XML file contains additional meta data of level 1 processed SAR products describing the applied an- tion tenna phase pattern correction for each elevation beam, polarization and DRA offset.

element **beamID**

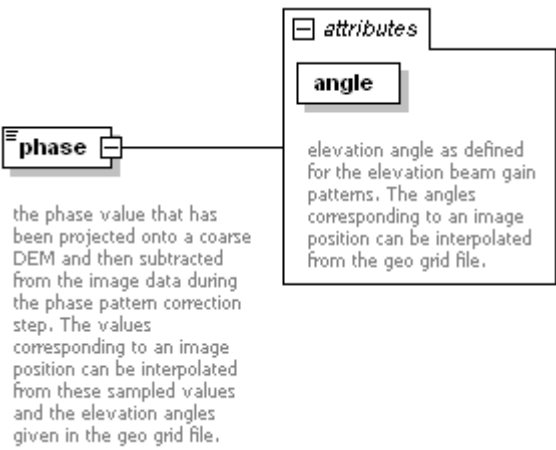
diagram	
type	restriction of xs:string
properties	con-sim-

	tent ple
used by	ele- <u>antennaPhasePat-</u> ment <u>tern</u>
facets	enumera- tion
annotation	documenta-Mnemonics for the elevation beams. Beam IDs of each COSAR file for ScanSAR SSC complex product tion only.

element **DRAoffset**

diagram	 SRA, DRAFore, DRAAft: indicates geometric (ATI) layers (not quad pol channels)
type	restriction of xs:string
properties	con-sim- tent ple
used by	ele- <u>antennaPhasePat-</u> ment <u>tern</u>
facets	enumera-SRA tion enumera-DRAFore tion enumera-DRAAft tion
annotation	documenta-SRA, DRAFore, DRAAft: indicates geometric (ATI) layers (not quad pol chan- tion nels)

element **phase**

diagram	 the phase value that has been projected onto a coarse DEM and then subtracted from the image data during the phase pattern correction step. The values corresponding to an image position can be interpolated from these sampled values and the elevation angles given in the geo grid file. attributes angle elevation angle as defined for the elevation beam gain patterns. The angles corresponding to an image position can be interpolated from the geo grid file.					
type	extension of xs:float					
properties	con-com- tent plex					
used by	ele- <u>antennaPhasePat-</u> ment <u>tern</u>					
attributes	Name	Type	Use	Default	Fixed	Annotation

	angle	xs:float	required	documenta- tion elevation angle as defined for the elevation beam gain patterns. The angles corre- sponding to an image position can be interpolat- ed from the geo grid file.
annotation	documenta- tion the phase value that has been projected onto a coarse DEM and then subtracted from the image data during the phase pattern correction step. The values corresponding to an image position can be interpolated from these sampled values and the elevation angles given in the geo grid file.			

element **polLayer**

diagram	 HH, HV, ...
type	restriction of xs:string
properties	con-sim- tent ple
used by	ele- ment <u>antennaPhasePat- tern</u>
facets	enumera-VV tion enumera-HH tion enumera-HV tion enumera-VH tion enumera-UNDEFINE tion D
annotation	documenta-HH, HV, tion ...

9 How to Use the Annotated Information

How to obtain calibrated image data?

The calFactor contains the calibration constant (as provided in the IOCS Aux Product) as well as the individual scaling factors for each image layer (adjusted for optimal use of the 16bit dynamic range). It can be found in the section

```
<calibration>
...
<calibrationConstant layerIndex="1">
  <polLayer>VV</polLayer>
  <beamID>strip_003</beamID>
  <DRAoffset>SRA</DRAoffset>
  <calFactor>1.80629044778196933E-04</calFactor>
</calibrationConstant>
</calibration>
```

To obtain calibrated data in radar brightness (beta nought) from the image (amplitude) data, you have to multiply (!) this combined calFactor with the power of the digital numbers (integer pixel values)

$$\beta_0 = \text{calFactor} * \text{DN}^2$$

for detected products. Complex data calibrated intensity respectively is then derived from the real and imaginary components

$$\beta_0 = \text{calFactor} * (I^2 + Q^2)$$

This calibration is only applicable for those L1b products which are flagged as "CALIBRATED" in

```
<productVariantInfo>
  <productType>SSC____SM_S</productType>
  ...
  <radiometricCorrection>CALIBRATED</radiometricCorrection>
</productVariantInfo>
```

The factor is usually in the range of 10^{-6} to 10^{-4} , depending on incidence angle (beam) and polarisation channel. However, a detected ScanSAR product has one single calFactor for all beams while SSCs may be scaled individually. The statistical image data mean amplitude of typical products is 50...200.

Note that, if your product is "NOTCALIBRATED", you may either have an experimental product at hand or an anomaly prevented the availability of auxiliary (housekeeping) data on instrument temperature (at the time of generation of your product). Such an anomaly is indicated in

```
<productQuality>
...
<auxDataQuality>
```

```
...
<missingAuxDataFlag>true</missingAuxDataFlag>
</auxDataQuality>
```

Then the digital numbers (amplitude) are lower than calibrated ones by a factor of approx. (1.1 +/- 0.05), depending on the real temperature.

How to evaluate the annotated polynomials?

If not explicitly otherwise stated, all annotated polynomials refer to slant range time. These are updated in azimuth time if necessary. The product component "mapping grid" provides you with the instrument times for a given pixel position (see below).

All the polynomials are described in the same way. This description contains 4 main parameters which are:

- Validity Range
- Reference point
- Polynomial degree
- Coefficients

Here is an example of a polynomial for the baseband Doppler:

```
<basebandDoppler>
  <validityRangeMin>3.62780829992259343E-03</validityRangeMin>
  <validityRangeMax>3.70847362284670249E-03</validityRangeMax>
  <referencePoint>3.66814096138464796E-03</referencePoint>
  <polynomialDegree>2</polynomialDegree>
  <coefficient exponent="0">7.99610899222934677E+01</coefficient>
  <coefficient exponent="1">8.54081711240112782E+02</coefficient>
  <coefficient exponent="2">-1.20015648802765274E+09</coefficient>
</basebandDoppler>
```

The polynomials are functions of range time and are valid between **validityRangeMin** and **validityRangeMax**.

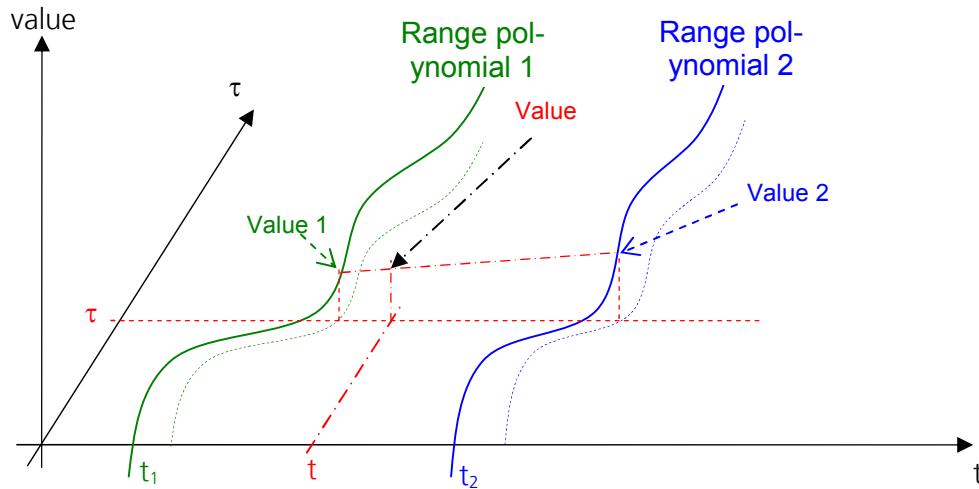
The mathematical formulation is:

$$R = \sum_{i=0}^{\text{deg}} \text{coeff}_i (\tau - \tau_{\text{ref}})^i, \tau \in [\tau_{\text{min}}; \tau_{\text{max}}]$$

where:

- coeff_i is **coefficient exponent="i"**
- τ_{ref} is **referencePoint**
- τ_{min} is **validityRangeMin**
- τ_{max} is **validityRangeMax**
- R is the result, for the example above, it would be a baseband Doppler frequency

When several polynomials are given with each one having a different azimuth time (e.g. Doppler, Doppler rate, velocity parameter, etc.), linear interpolation between the two values obtained from the evaluation at τ of the both nearest polynomials in azimuth is needed to obtain the value at the wanted times.



How to evaluate the grid components?

1. Mapping grid evaluation:

Given a position in the image which can be in UTM/UPS (easting/northing in meters) for GEC/EEC or in pixels for MGD (pixel/line - easier than latitude/longitude to find the grids coordinates), the Mapping Grid (MG) provides azimuth and range instrument times for this point.

For a MGD, Mapping grid indexes (floating point precision) are obtained using the ratio between mapping grid row (resp. column) spacing and image row (resp. column) spacing:

$$\begin{aligned} \text{idx_row}_{\text{MGD}} &= \text{line} * \text{image Row Spacing} / \text{MG Row Spacing} + \text{MG ref row} \\ \text{idx_col}_{\text{MGD}} &= \text{pixel} * \text{image Col Spacing} / \text{MG Col Spacing} + \text{MG ref col} \end{aligned}$$

For EEC/GEC, Mapping grid indexes are obtained using MG row (resp. column) spacing:

$$\begin{aligned} \text{idx_row}_{\text{GEC/EEC}} &= (\text{image UpperLeft northing} - \text{northing}) / \text{MG Row Spacing} + \text{MG ref row} \\ \text{idx_col}_{\text{GEC/EEC}} &= (\text{easting} - \text{image UpperLeft easting}) / \text{MG Col Spacing} + \text{MG ref col} \end{aligned}$$

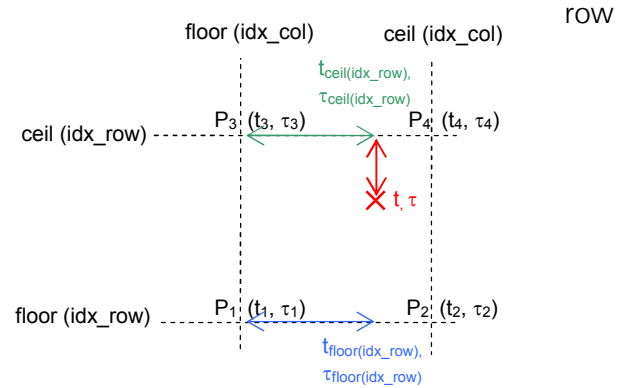
NB: Since MG is in binary format, it is easier to read the whole grid and to store it in a matrix before looking for any indexes.

To obtain the instrument times (t and τ), it is needed to read the four grid points which are surrounding the wanted point and then to interpolate (linear interpolation is sufficient) them:

Point 1: P_1 (floor(idx_row), floor(idx_col))	$\rightarrow t_1 \ \& \ \tau_1$
Point 2: P_2 (floor(idx_row), ceil(idx_col))	$\rightarrow t_2 \ \& \ \tau_2$
Point 3: P_3 (ceil(idx_row), floor(idx_col))	$\rightarrow t_3 \ \& \ \tau_3$
Point 4: P_4 (ceil(idx_row), ceil(idx_col))	$\rightarrow t_4 \ \& \ \tau_4$

First interpolation can take place for a constant
 (floor(idx_row) and ceil(idx_row)):

$$\begin{aligned} t_{\text{floor}(\text{idx_row})} &= (t_2 - t_1) * \\ &\quad (\text{idx_col} - \text{floor}(\text{idx_col})) + t_1 \\ \tau_{\text{floor}(\text{idx_row})} &= (\tau_2 - \tau_1) * \\ &\quad (\text{idx_col} - \text{floor}(\text{idx_col})) + \tau_1 \\ t_{\text{ceil}(\text{idx_row})} &= (t_4 - t_3) * \\ &\quad (\text{idx_col} - \text{floor}(\text{idx_col})) + t_3 \\ \tau_{\text{ceil}(\text{idx_row})} &= (\tau_4 - \tau_3) * \\ &\quad (\text{idx_col} - \text{floor}(\text{idx_col})) + \tau_3 \end{aligned}$$



Then interpolation is done between these two interpolated values to obtain the wanted times:

$$\begin{aligned} t &= (t_{\text{ceil}(\text{idx_row})} - t_{\text{floor}(\text{idx_row})}) * (\text{idx_row} - \text{floor}(\text{idx_row})) + t_{\text{floor}(\text{idx_row})} \\ \tau &= (\tau_{\text{ceil}(\text{idx_row})} - \tau_{\text{floor}(\text{idx_row})}) * (\text{idx_row} - \text{floor}(\text{idx_row})) + \tau_{\text{floor}(\text{idx_row})} \end{aligned}$$

Instrument times obtained are relative to MG reference times *tReferenceTimeUTC* and *tauReferenceTime* provided in the main annotation file.

NB: The MG is smaller than the actual image (contained in) i.e. some points have to be extrapolated from the two last grid values.

2. Geo grid evaluation:

For a given azimuth and range instrument time, the Geo Grid (GG) delivers the position (latitude/longitude), height incidence and elevation angle of this point. Since it refers to instrument times, it does not matter which kind of product it is.

To obtain Geo Grid indexes it is only needed to divide the different times (referenced to GG reference times *tReferenceTimeUTC* and *tauReferenceTime*) by the spacing (azimuth or range).

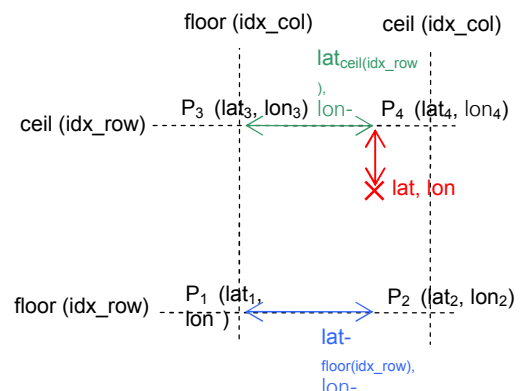
$$\begin{aligned} \text{idx_row} &= t / \text{GG azimuth Spacing} + \text{GG ref row} \\ \text{idx_col} &= \tau / \text{GG range Spacing} + \text{GG ref col} \end{aligned}$$

The interpolation way is exactly the same as for Mapping Grid (linear interpolation is also sufficient):

- Point 1: P₁ (floor(idx_row), floor(idx_col)) → lat₁ & lon₁
- Point 2: P₂ (floor(idx_row), ceil(idx_col)) → lat₂ & lon₂
- Point 3: P₃ (ceil(idx_row), floor(idx_col)) → lat₃ & lon₃
- Point 4: P₄ (ceil(idx_row), ceil(idx_col)) → lat₄ & lon₄

First interpolation can take place for a constant row
 (floor(idx_row) and ceil(idx_row)):

$$\begin{aligned} \text{lat}_{\text{floor}(\text{idx_row})} &= (\text{lat}_2 - \text{lat}_1) * \\ &\quad (\text{idx_col} - \text{floor}(\text{idx_col})) + \text{lat}_1 \\ \text{lon}_{\text{floor}(\text{idx_row})} &= (\text{lon}_2 - \text{lon}_1) * \\ &\quad (\text{idx_col} - \text{floor}(\text{idx_col})) + \text{lon}_1 \\ \text{lat}_{\text{ceil}(\text{idx_row})} &= (\text{lat}_4 - \text{lat}_3) * \\ &\quad (\text{idx_col} - \text{floor}(\text{idx_col})) + \text{lat}_3 \\ \text{lon}_{\text{ceil}(\text{idx_row})} &= (\text{lon}_4 - \text{lon}_3) * \\ &\quad (\text{idx_col} - \text{floor}(\text{idx_col})) + \text{lon}_3 \end{aligned}$$



Then interpolation is done between these two interpolated values to obtain the wanted times:

$$\begin{aligned} \text{lat} &= (\text{lat}_{\text{ceil}(\text{idx_row})} - \text{lat}_{\text{floor}(\text{idx_row})}) * (\text{idx_row} - \text{floor}(\text{idx_row})) + \text{lat}_{\text{floor}(\text{idx_row})} \\ \text{lon} &= (\text{lon}_{\text{ceil}(\text{idx_row})} - \text{lon}_{\text{floor}(\text{idx_row})}) * (\text{idx_row} - \text{floor}(\text{idx_row})) + \text{lon}_{\text{floor}(\text{idx_row})} \end{aligned}$$

NB:

1. GG points are geolocalized using a DEM so when the terrain is not smooth, the interpolated height can be quite different from the real one and thus the position can be misestimated by several meters depending on the terrain variations.
2. The geolocation which derives coordinates for a given instrument times uses besides the orbit, DEM and timing information also the signal propagation corrections (range and azimuth) derived for that specific scene and annotated in the GG. Specifically the tropospheric range delay causes slant range shifts of several meters.
3. Mapping Grid times can be used as input for Geo Grid (GG) which delivers back the position (latitude/longitude) and the height for a consistency check.

How to determine the Doppler centroid in the focussed data of Spotlight acquisitions?

&

How to correctly translate raw data times to zero-Doppler times?

Here we briefly describe how the essential Doppler centroid parameters can be extracted from the XML-formatted products and how the time system is converted from the annotated echo receive time system to the zero Doppler time system of the focused product.

Step 1: The zero Doppler start time t_{start} of the focused scene is extracted from

```
<level1Product ...><productInfo><sceneInfo><start>
  <timeUTC>2007-07-06T13:41:01.860822Z</timeUTC>
```

Step 2: The raw data time tags of the estimated Doppler polynomials are extracted from

```
<level1Product ...><processing><doppler><dopplerEstimate>
  <timeUTC>2007-07-06T13:41:01.284119Z</timeUTC>,
```

and the polynomial coefficients from the following parameter

```
<level1Product ...><processing><doppler><dopplerEstimate>
  <combinedDoppler>
    <validityRangeMin>4.69567739437280491E-03</validityRangeMin>
    <validityRangeMax>4.76343238282169595E-03</validityRangeMax>
    <referencePoint>4.72955488859725000E-03</referencePoint>
    <polynomialDegree>1</polynomialDegree>
    <coefficient exponent="0">1.54256856028094353E+03</coefficient>
    <coefficient exponent="1">6.89245227436726509E+03</coefficient>
  </combinedDoppler>
```

Remark: the Doppler centroid as a function of range time t is calculated from the parameters

$$f_{DC}(t) = \langle \text{coefficient exponent}="0"> + \langle \text{coefficient exponent}="1"> * (t - \langle \text{referencePoint} \rangle)$$

In this example product **47** Doppler polynomials were annotated. This number can be extracted from the parameter

```
<level1Product ...><processing><doppler>
  <numberOfDopplerRecords>47</numberOfDopplerRecords>
```

Step 3: The FM-Rate which is required to convert echo receive times to Doppler-zero times is extracted from the two annotated Doppler rates for start and end of the scene. Both Doppler rates are given as polynomials over range:

```
<level1Product ...><processing><geometry>
  <dopplerRate>
    <timeUTC>2007-07-06T13:41:01.967413Z</timeUTC>
    <dopplerRatePolynomial>
      <validityRangeMin>4.69567739437280491E-03</validityRangeMin>
      <validityRangeMax>4.76343238282169595E-03</validityRangeMax>
      <referencePoint>4.72955488859725000E-03</referencePoint>
      <polynomialDegree>3</polynomialDegree>
      <coefficient exponent="0">-4.92544351670694778E+03</coefficient>
      <coefficient exponent="1">1.06548420383506734E+06</coefficient>
      <coefficient exponent="2">-2.78686983145142853E+08</coefficient>
      <coefficient exponent="3">1.11414280644123263E-03</coefficient>
    </dopplerRatePolynomial>
  </dopplerRate>
```

For the purpose of time correction it is sufficient to use the average of the two zero order coefficients for the whole scene.

Step 4: The echo receive time tags of the Doppler polynomials are converted to Zero Doppler times of the focused data as described in the equation

$$t_{SSC} = t_{RAW} + \frac{f_{DC}(t_{RAW})}{FM} \quad \square \square$$