



# **TerraSAR-X Ground Segment**

## **Level 1b Product Format Specification**

### **CAF – Cluster Applied Remote Sensing**

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## Document Distribution

This document is an annex document to the Basic Product Specification document [AD 1] and distributed along with it.

## Document Change Log

Issue	Date	Page	Change Description	Note (i.e. reason of change)
1.0 Draft	09.05.2005	all	Initial Draft Version	
1.1	05.10.2005	all	<p>Editorial changes</p> <p>Product delivery package structure description added.</p> <p>Composite quicklook redefined as mandatory for all product variants.</p> <p>Clarifications in COSAR file format description.</p> <p>Image coordinate annotation, geo-grid and mapping grid figures added.</p> <p>GeoTIFF details added.</p> <p>Chapters reordered (3 and 6 exchanged).</p> <p>DEM coverage map details added.</p> <p><i>Changes in the product annotation:</i></p> <p>Raw data / signal analysis parameter annotation classified as optional.</p> <p>Further minor changes in XML annotation and parameter documentation.</p> <p>Image data statistics either complex or detected.</p> <p>Attitude quaternions indices changed to reflect changes in attitude product spec.</p> <p>Calibration factor annotation restructured.</p> <p>Product order info adapted to TMSP order file content</p>	End of draft status & first official document release
1.2	27.03.2006	Table. 3-1 all	<p>comment added for product component geometric layer indicator</p> <p>product component beam indicator is now taken from the order file. For SM, SL and complex SC products: identical with elevation beamID of the image layer. In detected ScanSAR products: scan_xyz with xyz as number of the SM beamID of nearest beam.</p>	<p>Post-G/S-TAR issue. Changes in IOCS Aux Product and MOS-IOCS I/F incorporated.</p> <p>Open GrdSeg-NCR-0007 (MOS)</p>

		<p>p. 18</p> <p>due to limitations of the instrument and commanding, the range sampling frequency may change in-between ScanSAR swathes. Hence for experimental complex ScanSAR products, the annotated relative range position (RSRI) of bursts in the CO-SAR file now refers to a virtual sample position on the common raster derived from the ADC sampling rate. An oversampling factor of actual sampling and RSRI sampling (1,2 or 3) is annotated along.</p> <p>all</p> <p>The map plot format changed from GIF to PNG and the browse image may also be in TIFF format. Extension of mapping grid changed to ".bin" to underline that it is not a SUN raster file (.ras).</p> <p>Ch. 6</p> <p><b><i>Changes in the XML product annotation:</i></b></p> <p>editorials in comments</p> <p>attitude section: manoeuvre „NA“ added</p> <p>ScanSAR beam overlap documentation extended</p> <p>georeferencing annotation: included optional polynomial azimuthShift in signalPropagationEffects</p> <p>beamPointingVector unbound and identified with beamID attribute</p> <p>productComponents: type of size changed to long</p> <p>elevationBeamConfiguration is now taken from the order file. For SM, SL: identical with elevation beamID. In ScanSAR: SCAN_xyz with xyz as number of the SM beamID of nearest beam.</p> <p>elevation and azimuth antenna sampling and coverage changed</p> <p>GPSAntennaPosition multiplicity set to 4</p> <p>combinedDoppler (fusion of baseband and geometric estimates) added to dopplerEstimate and geometricDoppler content modified to support antenna pattern/pointing verification by IOCS</p> <p>image quality statistics: complex and detected product differentiation reverted</p>	Open GrdSeg-NCR-0007
			GrdSeg-SCR-0017



			<p>(not meaningful for phase values). Same for quality limits.</p> <p>range compression chirp description now reflects new annotation and selection strategy in the new IOCS Aux product (as of Feb. 2006)</p> <p>all Attitude Product related elements are set to optional to allow (off-nominal) NRT processing without any attitude data.</p> <p>attitude accuracy: added LREF and RREF for left and right looking reference attitude products (used for nominal NRT processing).</p> <p>product quality limits for raw data and Doppler centroid limits adopted from revised IOCS Aux Product DT Quality Limits Table</p> <p>added optional beamID identifier to geometry parameters to allow a more detailed B parameter description for ScanSAR</p> <p>due to varying RSF between ScanSAR beams, the farRangeBeamBorderTime is also required for SSCs.</p> <p>optionality of pixel and timing info in scene coordinates corrected.</p> <p>quicklook image data scaling polarisation layer multiplicity set to 0...1</p> <p>elevationPatternCorrectedFlag typo corrected</p> <p>quicklookDataStartWith added to complexImageInfo to ensure a more uniform QL orientation.</p> <p>Comments for map plot and browse components changed.</p>	
1.3	10.12.2007	Ch. 4.2  Ch. 4.1  Ch. 5.2.1  Annex B	SPECAN scaling rate included in COSAR burst annotation  Packbits compression in GeoTIFF description added  Quicklook image sizes adapted  <b>New section “How to...”</b> introduced with basic recipes on how to use the annotated information.	Post-commissioning phase issue for operational readiness



		<p><b>Changes in XML annotation schema:</b></p> <p>editorials</p> <p>comments added for azimuth processing parameter annotation.</p> <p>optional user order data included and updated</p> <p>optional order parameter procGainAttenuation included</p> <p>optional processing / geometry parameter zeroDopplerVelocity added</p> <p>optional sceneInfo parameter sceneRange-Extent introduced</p> <p>optional processing parameter correctedInstrumentDelay added to handle chirp type &amp; bandwidth dependent delays</p> <p>optional section on signal data analysis (for internal calibration and test purposes in the commissioning phase) removed in user product</p>	
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## Table of Contents

<b>1</b>	<b>Introduction .....</b>	<b>9</b>
1.1	Scope .....	9
1.2	Applicable Documents .....	9
1.3	Reference Documents .....	9
1.4	Document Structure .....	10
1.5	General Aspects .....	10
<b>2</b>	<b>Level 1b Product Format Rationale .....</b>	<b>11</b>
<b>3</b>	<b>Product Delivery Package .....</b>	<b>12</b>
3.1	Package Structure and File Names .....	12
3.2	Administrative Parameter File Set .....	15
<b>4</b>	<b>SAR Image Raster Files .....</b>	<b>16</b>
4.1	Detected and Geocoded Products .....	16
4.2	Complex Products .....	17
<b>5</b>	<b>Further Product Components .....</b>	<b>26</b>
5.1	Auxiliary Raster Files .....	26
5.1.1	Projected Products .....	26
5.1.2	EEC Geocoded Products .....	27
5.2	Image Preview Files .....	27
5.2.1	Quicklook Images .....	27
5.2.2	Map Plot .....	27
<b>6</b>	<b>Level 1b Product Annotation .....</b>	<b>28</b>
6.1	Main Annotation Component .....	29
6.1.1	Product Components .....	31
6.1.2	Product Info .....	36
6.1.3	Product Specific .....	72
6.1.4	Setup .....	107
6.1.5	Processing .....	119
6.1.6	Instrument .....	148
6.1.7	Calibration .....	156
6.1.8	Noise .....	171
6.1.9	Platform .....	176
6.1.10	Product Quality .....	197
6.1.11	General Header and Data Type Definitions .....	218
6.2	Georeferencing Annotation Component .....	232
<b>ANNEX A)</b>	<b>Acronyms and Abbreviations .....</b>	<b>251</b>
<b>ANNEX B)</b>	<b>How to Use the Annotated Information .....</b>	<b>252</b>

## 1 Introduction

### 1.1 Scope

This document defines the format of the level 1b product components as introduced in [AD 1]. In that sense it is an annex document to [AD 1] which details the image file and preview data representation and gives a comprehensive list of the product annotation parameters.

### 1.2 Applicable Documents

This document is based on the requirements and specifications given in the following documents.

[AD 1]	TX-GS-DD-3302	Basic Product Specification 1.5
[AD 2]	TX-GS-DD-3303	Experimental Product Description 1.4

### 1.3 Reference Documents

Reference	Document Number	Document Title
[RD 1]	TX-GS-DD-4111	IOCS Auxiliary Product Specification 1.12
[RD 2]	TX-GS-SP-2601	Orbit And Attitude Product Specification 2.8
[RD 3]	TX-GS-DD-3306	Product and Data Conventions
[RD 4]	TX-GS-ICD-3202	GS to User Interface Control Document
[RD 5]		GeoTIFF Format Specification GeoTIFF Revision 1.0, Specification Version 1.8.1 N. Ritter and M. Ruth; 1995
[RD 6]		TIFF Revision 6.0 Specification Final – June 3 1992

## 1.4 Document Structure

This document is structured as follows:

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

Chapter 2 gives an overview of the TerraSAR-X level 1b product format.

Chapter 3 describes the structure of the delivered level 1b products.

Chapter 4 describes the binary data format of the image components (GeoTIFF and COSAR).

Chapter 5 lists further product components (e.g. quicklooks, auxiliary raster files).

Chapter 6 details the parameter annotation components.

Annex A explains the abbreviations used.

## 1.5 General Aspects

The term "Level 1b Product" as used in this document comprises the TerraSAR-X basic products and the experimental products as given in [AD 1] and [AD 2]. They are generated by the operational TerraSAR Multi Mode SAR Processor (TMSP).

The basic products are the operational products offered by the TerraSAR-X PGS to commercial and scientific customers. These products can be ordered through and will be delivered by the PGS user services at DLR. The experimental product ordering and delivery may be restricted.

## 2 Level 1b Product Format Rationale

The huge variety of level 1b product types for TerraSAR-X (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 6 the parameters are given in a XML formatted annotation similar to the one implemented for Radarsat-2 and to the one proposed for TerraSAR-L. The TerraSAR-X product annotation is however much more comprehensive than the one of Radarsat-2 due to the additional spotlight 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 IOCS auxiliary product, the orbit product and the attitude product used for processing. Details on those products can be found in [RD 1] and [RD 2].

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 Radarsat-2. It allows to annotate map projection parameters as TIFF tags in the image layers. Details are given in chapter 4. 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 "COrplex SAR" (COSAR) format is defined for the complex TerraSAR-X 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 4.

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.

## 3 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.*

### 3.1 Package Structure and File Names

Upon delivery, the level 1b products are packed in a delivery package which may also contain other products. It is supplemented by additional administrative information and either archived into a tar file or put onto a medium. These packages and the delivery mechanisms will be specified in [RD 3] and [RD 4]. Figure 3-1 gives an example for the directory structure inside such a delivery shell. The yellow folders contain the individual level 1b products.

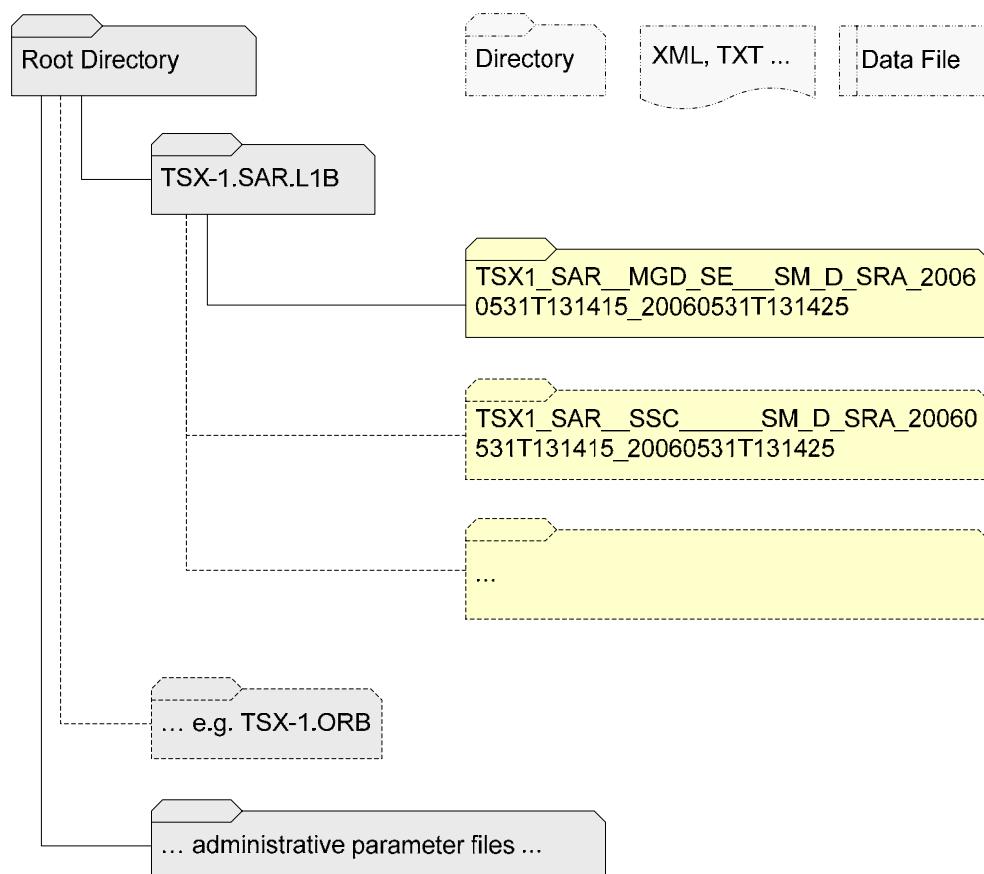


Figure 3-1: Example for the high-level directory structure of delivered products.

The folders hosting the level 1b products are conveniently named using the product naming convention of [RD 3]. The directory structure and components of the level 1b product itself are indicated in Figure 3-2. Table **3-1** gives an overview of the relevant file name constituents.

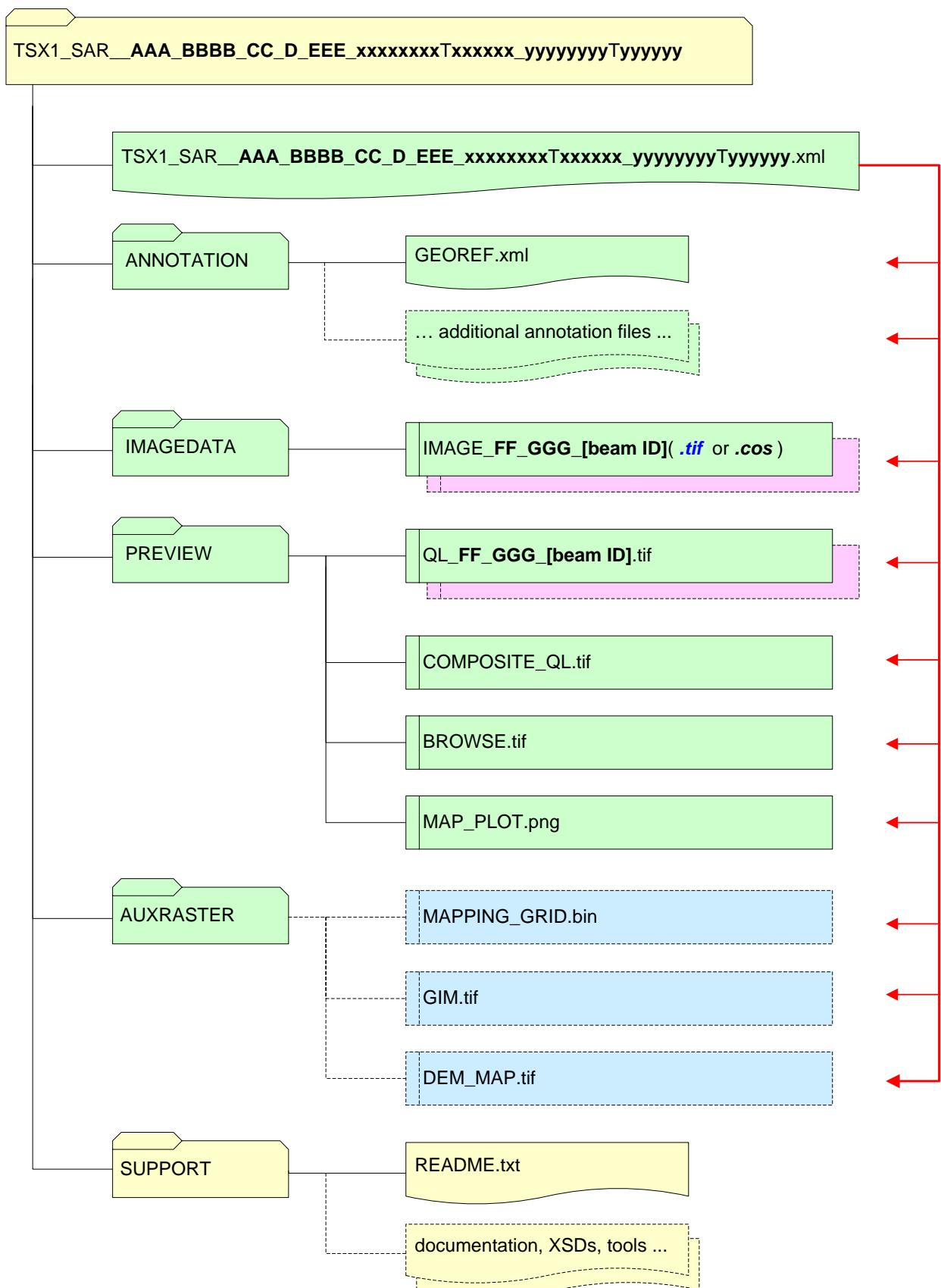


Figure 3-2: Directory structure and files of the TerraSAR-X Level 1b Product.

In Figure 3-2, the yellow color indicates components of the product delivery shell and the SUPPORT directory which includes some documentation on the delivered product (e.g. this document and 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.

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 underscores ("\_"). 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	Value Range	Remark
L1b product names:			
-	mission	TSX1	fixed
-	sensor	SAR_	fixed
<b>AAA</b>	product variant	SSC, MGD, GEC, EEC	product class
<b>BBBB</b>	resolution variant	SE__, RE__	product sub-class: spatially or radiometrically enhanced. No entry (____) for SSCs.
<b>CC</b>	imaging mode	SM, SC, SL, HS	example: HS for High-Resolution SpotLight
<b>D</b>	polarisation mode	S, D, T, Q	example: T for TWIN polarization mode
<b>EEE</b>	antenna receive configuration	SRA, DRA	SRA for single-receive antenna DRA for dual-receive antenna
<b>xxxxxxxxTxxxxxx</b>	UTC start time	-	format: YYYYMMDDThhmmss
<b>yyyyyyyyTyyyyyy</b>	UTC stop time	-	
Variable parts of the product component file names:			
<b>FF</b>	polarization channel image layer	HH, HV, VH, VV	TxRx polarization
<b>GGG</b>	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).
<b>[beam ID]</b>	elevation beam (configuration) ID	e.g. strip_007, scan_009, ...	as taken from the order file for detected products (e.g. scan_009, strip_009, strip-Far_009). Identifying the different image layers for each subswath of (experimental) complex ScanSAR products (e.g. strip_009, strip_010, strip_011 and strip_012).

Table 3-1: 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.

### 3.2 Administrative Parameter File Set

This part of the delivered item describes the product delivery package and contains additional facility related information (e.g. detailed copyright information). It comprises the product and processing facility identifiers as well as the data set descriptors in the format of the product library data base “item information file” (IIF). It is to be specified in the GS-to-User-ICD [RD 4] and not part of this level 1b product format specification.

## 4 SAR Image Raster Files

### 4.1 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 [RD 5] 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 TMSP are listed in Table 4-1 using the conventions of [RD 5]. The TIFF Revision 6.0 tags used are given in Table 4-2 (see [RD 6]).

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
<b>Reference System</b>	<b>code / value</b>
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 4-1: GeoTIFF tags and keys.

<b>TIFF Tags and Keys</b>	<b>Value Code / Example</b>
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 4-2: TIFF tags and keys.

## 4.2 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 (4 beams are used for TerraSAR-X) is stored in  $n$  beam files. Hence there are 1 to 4 files for each of polarization channels in the TerraSAR-X case. 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 like TerraSAR-X 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 4-1 outlines the storage of the bursts in one matrix. Figure 4-2 and Figure 4-3 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 4-4. Figure 4-5 shows the actual storage order of the entire file. Figure 4-6 and Figure 4-7 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 4-8. Figure 4-9 sketches the interrelation of COSAR positioning information and product annotation for a complex ScansAR product.

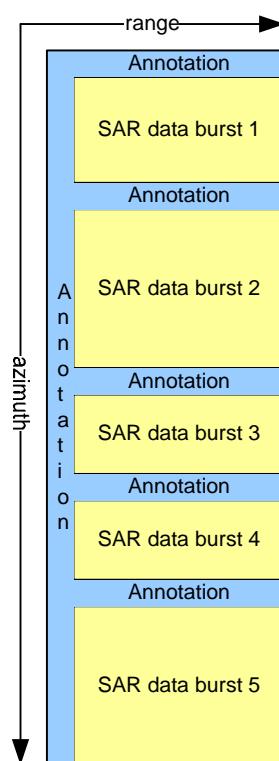


Figure 4-1: Visualization of the image and annotation data of a COSAR file as a rectangular matrix.

### 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-1. In case of a deskewed storage, ASRI is constant for all columns of a burst.

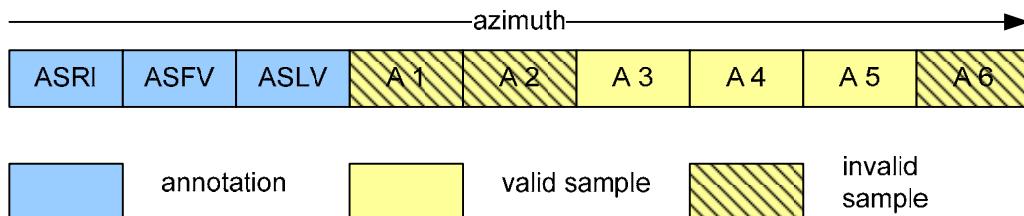


Figure 4-2: Annotation and optional zero-padding of an azimuth column

#### 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 Scan-SAR 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.

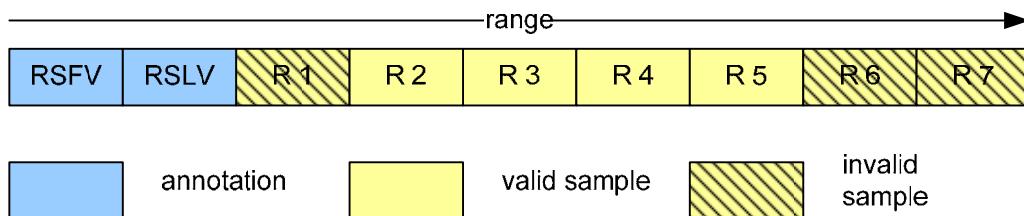


Figure 4-3: Annotation and optional zero-padding of a range line

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 4-4). 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 > 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 4-4. If unset, the filler value is used here as for the rest of the line.

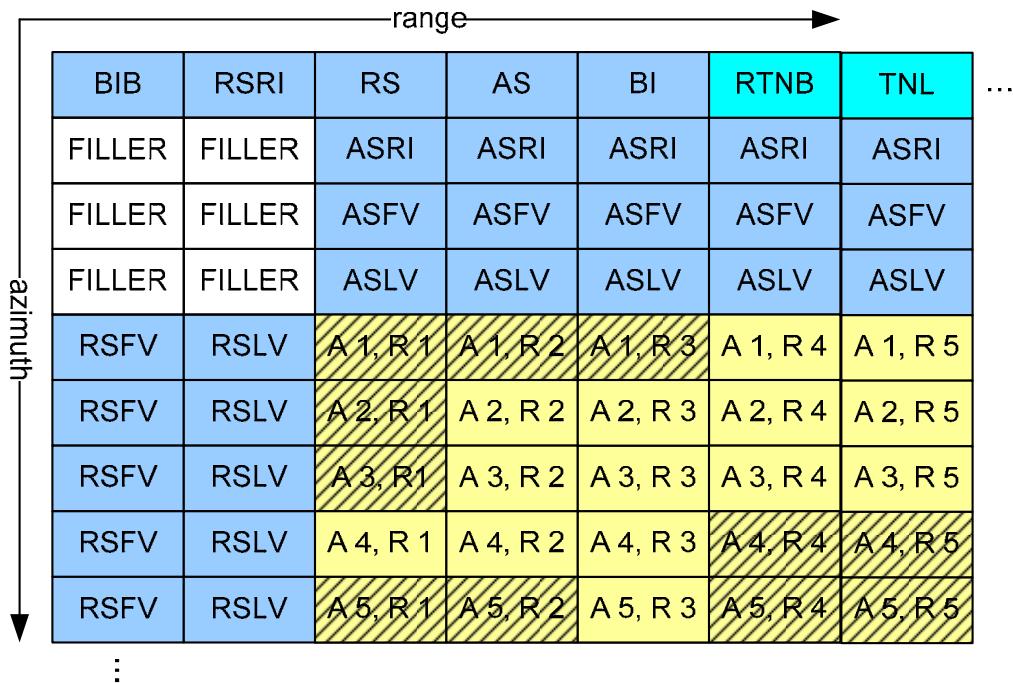


Figure 4-4: Burst annotation

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 4-5.

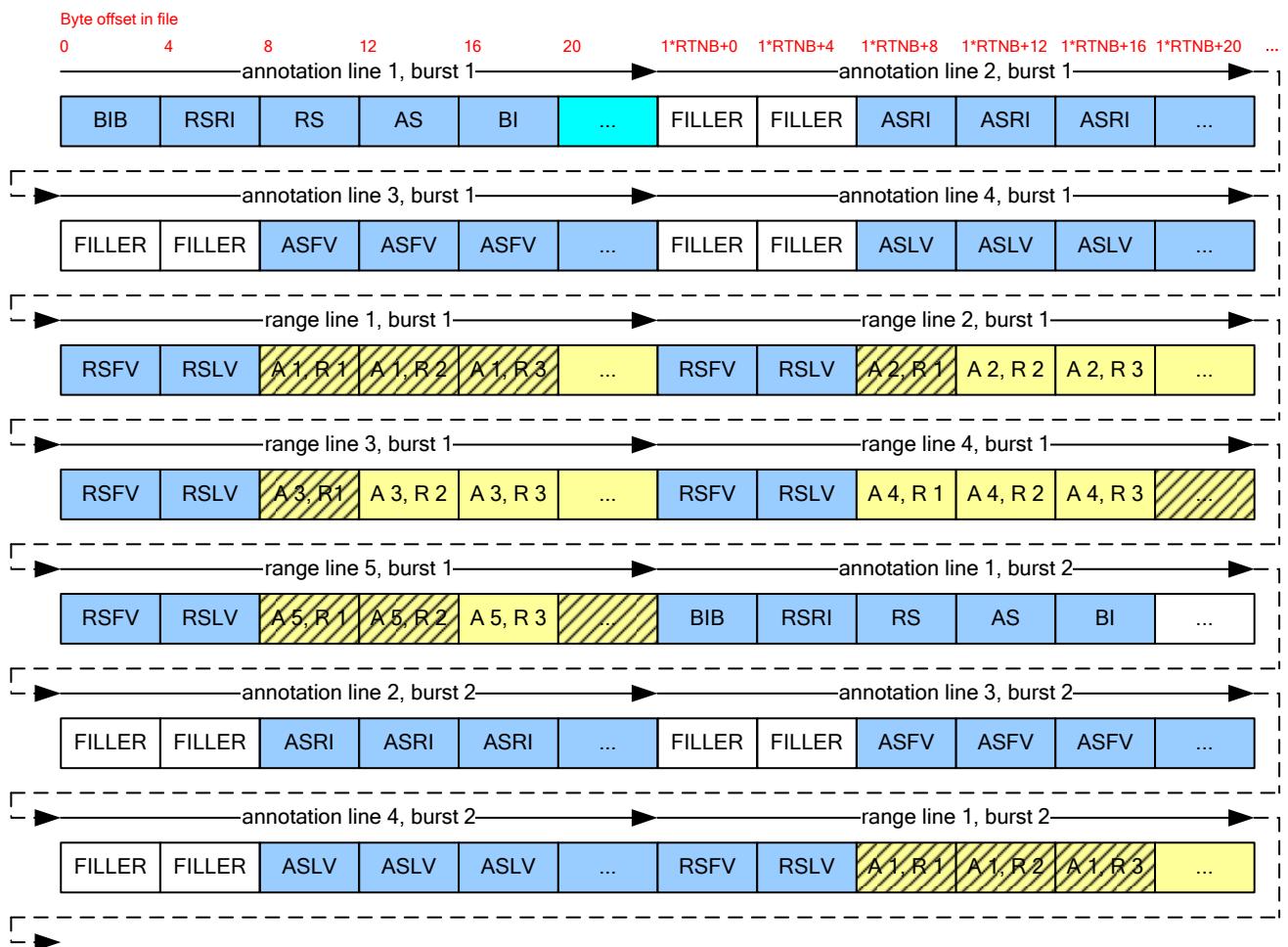


Figure 4-5: Beam file storage order

### 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 4-6).

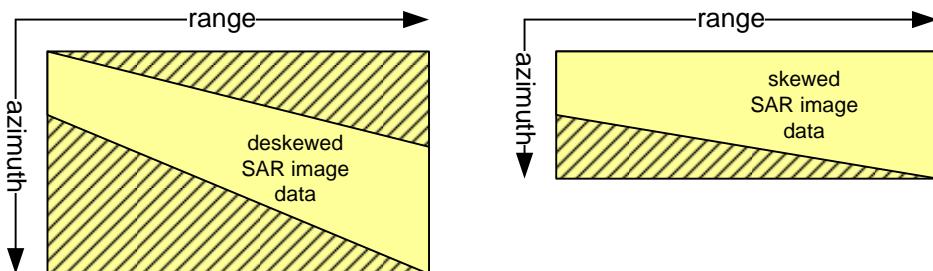


Figure 4-6: Deskewed versus skewed storage organization in the case of a squinted SAR imaging geometry

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 of TerraSAR-X is stored in a deskewed geometry (see Figure 4-7).

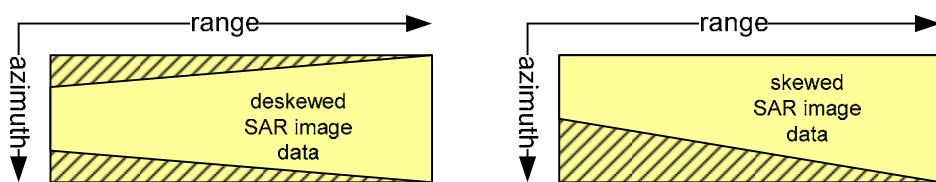


Figure 4-7: Deskewed versus skewed storage organization for total zero-Doppler steered SAR instruments like TerraSAR-X

## COSAR Image Coordinates and Geolocation

Figure 4-8 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.

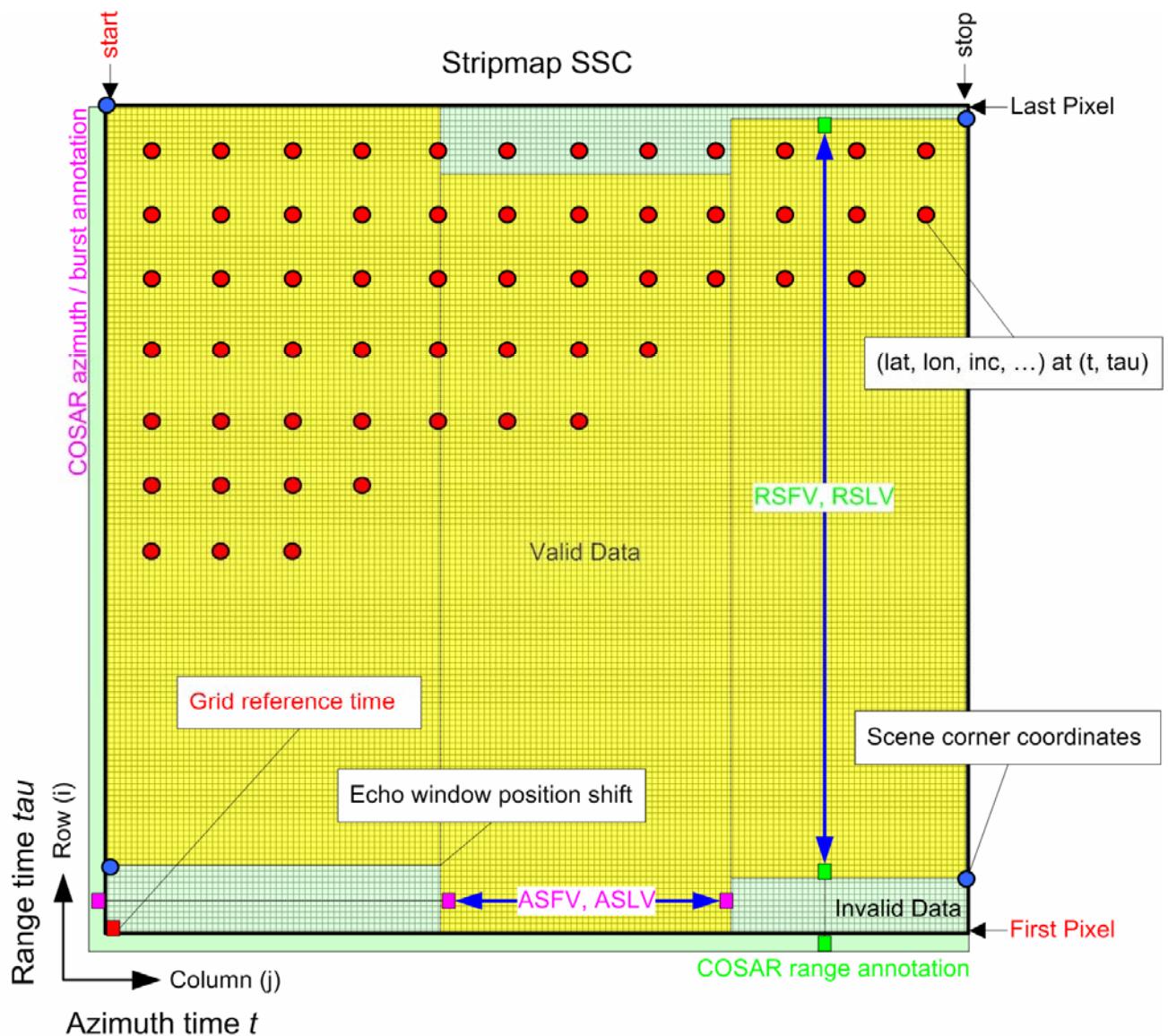


Figure 4-8: Geo-grid, scene coordinates and COSAR image raster for SSCs.

Figure 4-9 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.

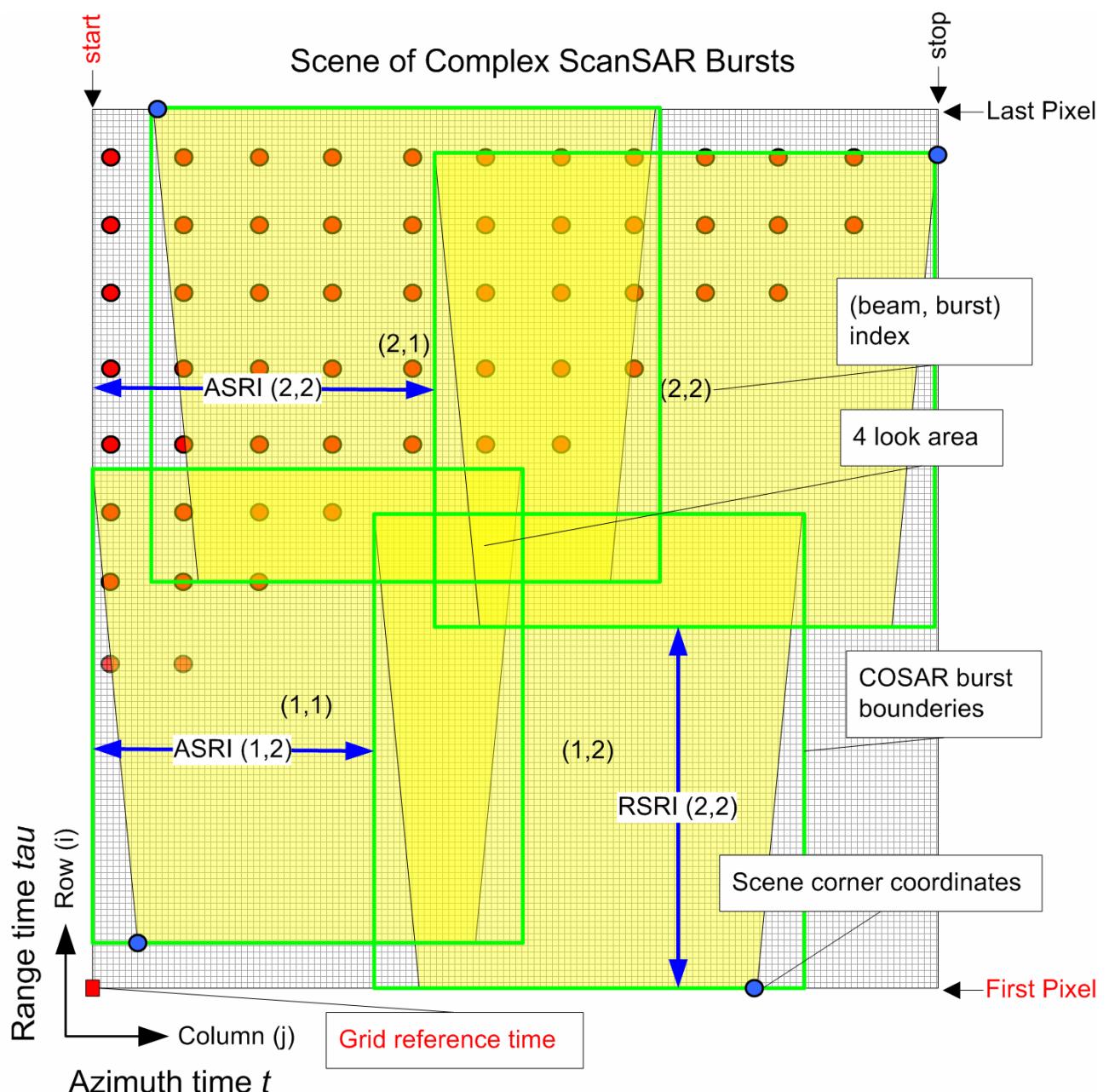


Figure 4-9: Hypothetical ScanSAR SSC burst positions from COSAR annotation on a (virtual) common raster.

## 5 Further Product Components

### 5.1 Auxiliary Raster Files

#### 5.1.1 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 given in 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 5-1 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.

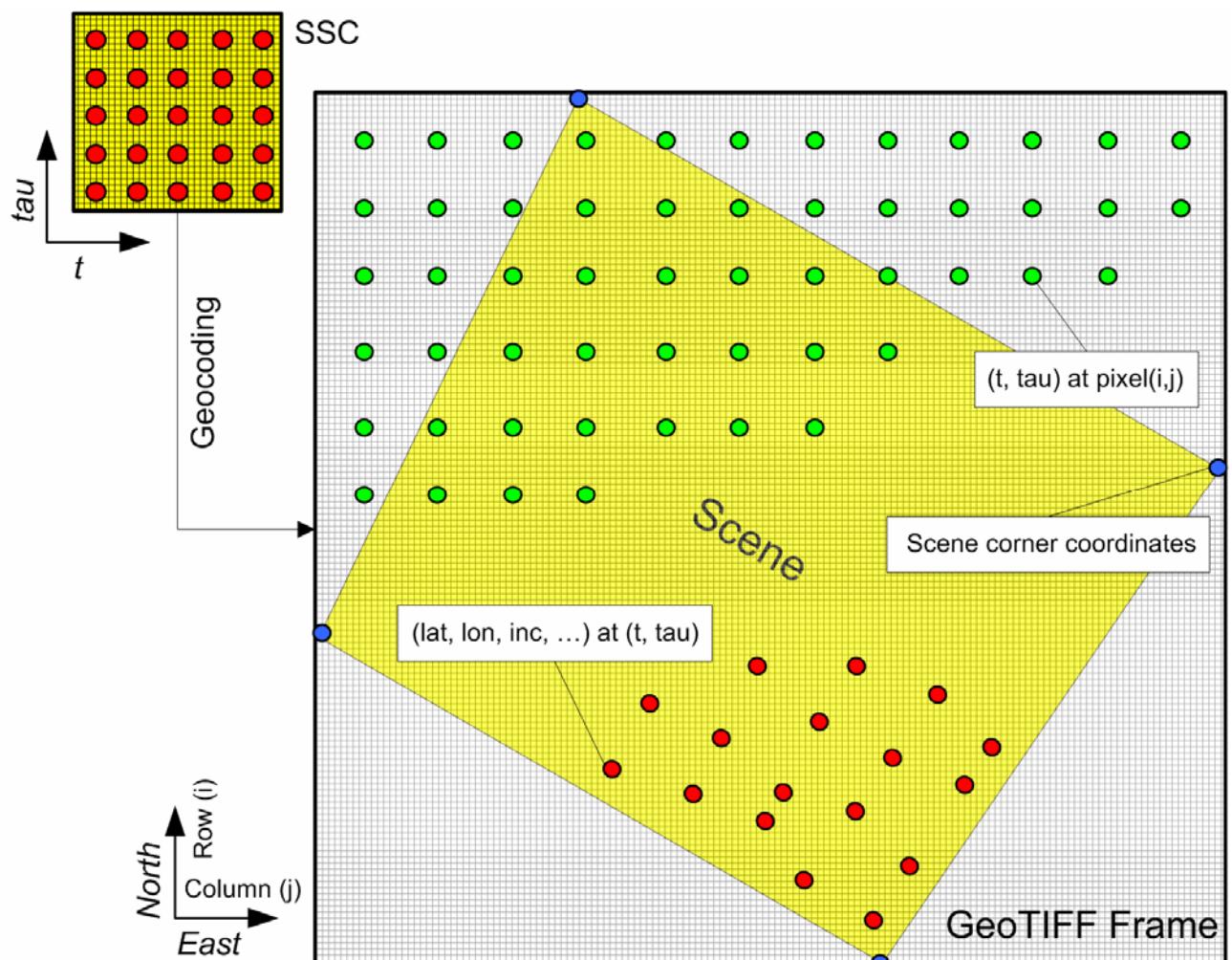


Figure 5-1: Mapping grid, geo-grid, scene and image frame raster.

### 5.1.2 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 [AD 1]) 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.

## 5.2 Image Preview Files

### 5.2.1 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 JPEG or TIFF format) with approx. 1000 pixels size derived from the composite quicklook is additionally contained for cataloguing purposes.

### 5.2.2 Map Plot

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

## 6 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 geocoded 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>TSX-1</mission>
    ...
  </missionInfo>
  <acquisitionInfo>
    ...
  </acquisitionInfo>
  ...
</productInfo>

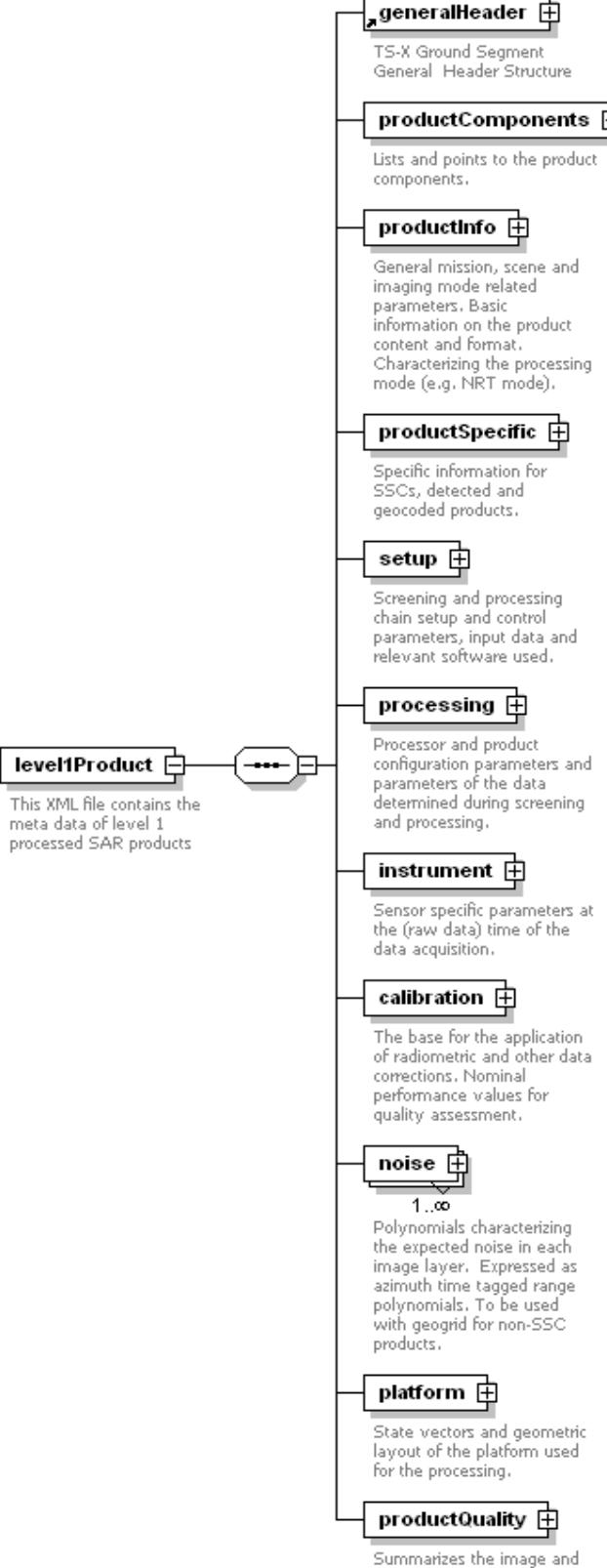
<platform>
  <orbit>
    ...
    <stateVec num="95" qualInd="1" maneuver="NO">
      ...
      </stateVec>
      <stateVec ...>
        ...
        </stateVec>
      ...
    </orbit>
    ...
  </platform>
```

## 6.1 Main Annotation Component

level1Product	
<b>generalHeader</b>	
TS-X Ground Segment general header of XML files	
<b>productComponents</b>	
annotation, imageData, auxRaster-Files, quicklooks, composite-Quicklook, browseImage, mapPlot	pointers to the listed product components.
<b>productInfo</b>	
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
<b>productSpecific</b>	
complexImageInfo, projectedImage-Info, geocodedImageInfo	specific information for SSCs, detected and geocoded products (e.g. image frames and coordinates).
<b>setup</b>	
orderInfo, inputData, processing-Steps	screening and processing chain setup and control parameters, input data and relevant software used.
<b>processing</b>	
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
<b>instrument</b>	
radarParameters, settings	sensor specific parameters at the time of the data acquisition
<b>calibration</b>	
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
<b>noise</b>	
polynomials characterizing the expected noise in each image layer	
<b>platform</b>	
referenceData	geometric layout of the platform
orbit	mainly relevant segment of the orbit file
attitude	mainly relevant segment of the attitude file
<b>productQuality</b>	
rawDataQuality, auxDataQuality, processingParameterQuality, imageDataQuality, limits	summarize the image and data quality. Indicates limits and raises flags if violated.

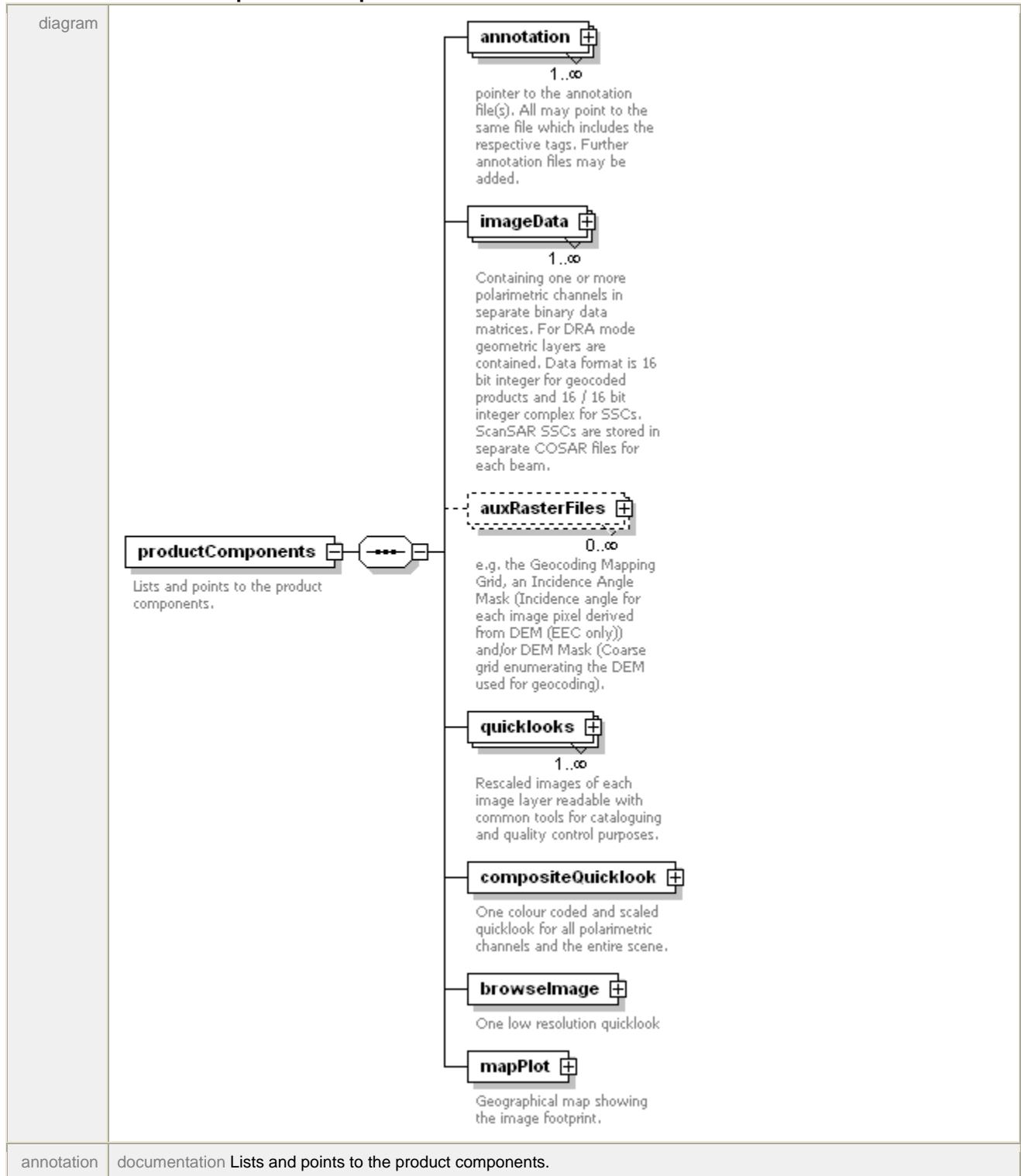
Table 6-1: Overview of main segments and hierarchical structure of the main product annotation file

**element level1Product**

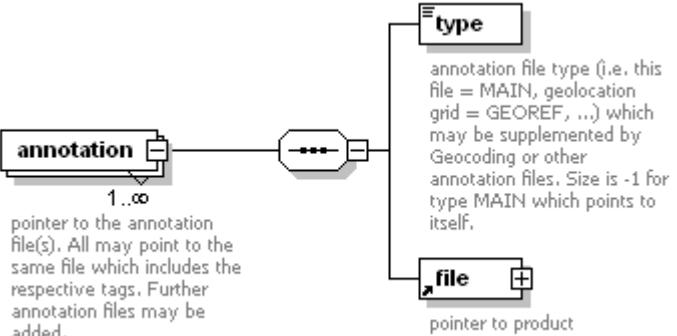
diagram	 <pre> graph TD     generalHeader[generalHeader] --- productComponents     productComponents --- productInfo[productInfo]     productComponents --- productSpecific[productSpecific]     productComponents --- setup[setup]     productComponents --- processing[processing]     productComponents --- instrument[instrument]     productComponents --- calibration[calibration]     productComponents --- noise[noise]     productComponents --- platform[platform]     productComponents --- productQuality[productQuality]     level1Product[level1Product] --- note["This XML file contains the meta data of level 1 processed SAR products"]     </pre> <p>This XML file contains the meta data of level 1 processed SAR products</p>
annotation	documentation This XML file contains the meta data of level 1 processed SAR products

### **6.1.1 Product Components**

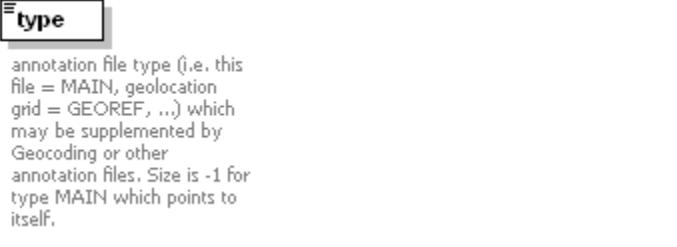
element **level1Product/productComponents**



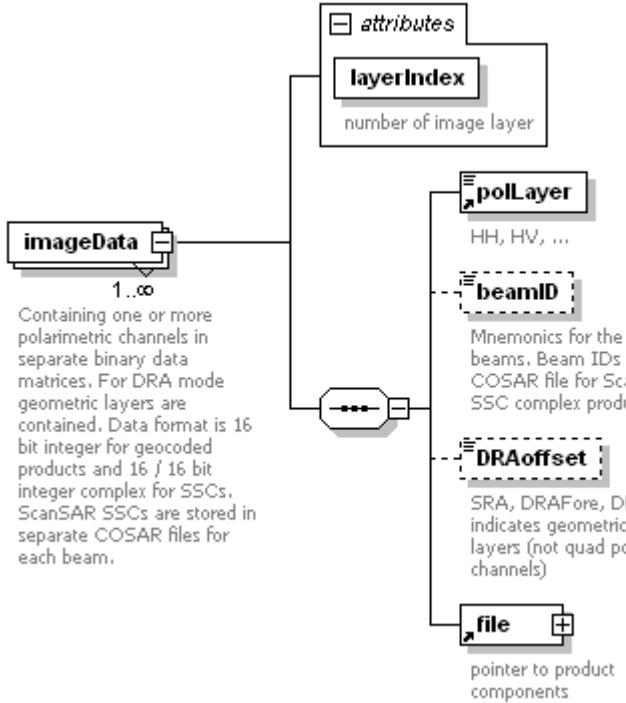
### element **level1Product/productComponents/annotation**

diagram	 <pre> classDiagram     class annotation {         &lt;&lt;annotation&gt;&gt;         &lt;&lt;1..&gt;&gt;     }     class type {         &lt;&lt;type&gt;&gt;     }     class file {         &lt;&lt;file&gt;&gt;         +&lt;&lt;+&gt;&gt;     }     annotation --&gt; type     annotation --&gt; file     type &lt;&lt;annotation file type (i.e. this file = MAIN, geolocation grid = GEOREF, ...) which may be supplemented by Geocoding or other annotation files. Size is -1 for type MAIN which points to itself.&gt;&gt;     file &lt;&lt;pointer to product components&gt;&gt;   </pre>
annotation	documentation pointer to the annotation file(s). All may point to the same file which includes the respective tags. Further annotation files may be added.

### element **level1Product/productComponents/annotation/type**

diagram	 <pre> classDiagram     class type {         &lt;&lt;type&gt;&gt;     }     type &lt;&lt;annotation file type (i.e. this file = MAIN, geolocation grid = GEOREF, ...) which may be supplemented by Geocoding or other annotation files. Size is -1 for type MAIN which points to itself.&gt;&gt;   </pre>
type	restriction of <b>string255</b>
facets	maxLength 255 enumeration MAIN enumeration GEOREF enumeration GEOCODE enumeration OTHER enumeration UNDEFINED
annotation	documentation annotation file type (i.e. this file = MAIN, geolocation grid = GEOREF, ...) which may be supplemented by Geocoding or other annotation files. Size is -1 for type MAIN which points to itself.

### element **level1Product/productComponents/imageData**

diagram	 <p><b>imageData</b>   1..oo  Containing one or more polarimetric channels in separate binary data matrices. For DRA mode geometric 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.</p>																
attributes	<table border="1"> <tr> <td>Name</td><td>layerIndex</td><td>Type</td><td><b>xs:unsignedInt</b></td><td>Use</td><td>Default</td><td>Fixed</td><td>Annotation</td> </tr> <tr> <td></td><td></td><td></td><td></td><td>required</td><td></td><td></td><td>documentation number of image layer</td> </tr> </table>	Name	layerIndex	Type	<b>xs:unsignedInt</b>	Use	Default	Fixed	Annotation					required			documentation number of image layer
Name	layerIndex	Type	<b>xs:unsignedInt</b>	Use	Default	Fixed	Annotation										
				required			documentation number of image layer										
annotation	<p>documentation Containing one or more polarimetric channels in separate binary data matrices. For DRA mode geometric 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.</p>																

#### element level1Product/productComponents/imageData/beamID

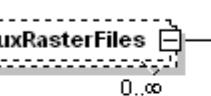
diagram	 <p><b>beamID</b> Mnemonics for the elevation beams. Beam IDs of each COSAR file for ScanSAR SSC complex product only.</p>
type	<b>string20</b>
facets	maxLength 20
annotation	documentation Mnemonics for the elevation beams. Beam IDs of each COSAR file for ScanSAR SSC complex product only.

#### element level1Product/productComponents/imageData/DRAoffset

diagram	 <p><b>DRAoffset</b> SRA, DRAFore, DRAAft; indicates geometric (ATI) layers (not quad pol channels)</p>
type	restriction of <b>xs:NMTOKENS</b>
facets	enumeration SRA enumeration DRAFore enumeration DRAAft

annotation documentation SRA, DRAFore, DRAAft: indicates geometric (ATI) layers (not quad pol channels)

element **level1Product/productComponents/auxRasterFiles**

element	feature product component auxiliary files	
diagram	 <p>0..oo 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).</p>	<p><b>type</b> e.g., GIM Incidence Angle Mask (EEC products), mapping grid or DEM coverage Mask</p> <p><b>file</b>  pointer to product components</p>
annotation		documentation 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).

element **level1Product/productComponents/auxRasterFiles/type**

Element <code>type</code> located in <code>productImplementationType</code>	
diagram	 <b>type</b> e.g. GIM Incidence Angle Mask (EEC products), mapping grid or DEM coverage Mask
type	<b><u>string255</u></b>
facets	maxLength <b>255</b>
annotation	documentation e.g. GIM Incidence Angle Mask (EEC products), mapping grid or DEM coverage Mask

element **level1Product/productComponents/quicklooks**

diagram

```

classDiagram
    class quicklooks {
        <<Rescaled images of each image layer readable with common tools for cataloguing and quality control purposes.>>
        <<1..>>
        layerIndex
        polLayer
        beamID
        DRAoffset
        file
    }
    layerIndex {
        <<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>>
    }

```

attributes	Name	Type	Use	Default	Fixed	Annotation
	quicklooks					
	layerIndex					
	polLayer					
	beamID					
	DRAoffset					
	file					

	layerIndex	<b>xs:unsignedInt</b> required
annotation	documentation	Rescaled images of each image layer readable with common tools for cataloguing and quality control purposes.

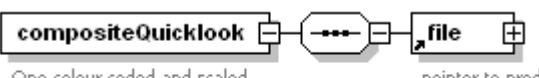
#### element **level1Product/productComponents/quicklooks/beamID**

diagram	 <p>beam IDs of each COSAR file for ScanSAR SSC Complex Product only</p>
type	<b>string20</b>
facets	maxLength 20
annotation	documentation beam IDs of each COSAR file for ScanSAR SSC Complex Product only

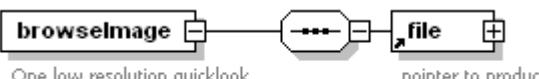
#### element **level1Product/productComponents/quicklooks/DRAoffset**

diagram	 <p>SRA, DRAFore, DRAAft indicates geometric (ATI) layers (not quad pol)</p>
type	restriction of <b>xs:NMTOKENS</b>
facets	enumeration SRA enumeration DRAFore enumeration DRAAft
annotation	documentation SRA, DRAFore, DRAAft indicates geometric (ATI) layers (not quad pol)

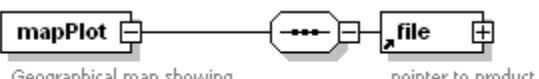
#### element **level1Product/productComponents/compositeQuicklook**

diagram	 <p>One colour coded and scaled quicklook for all polarimetric channels and the entire scene.          pointer to product components</p>
annotation	documentation One colour coded and scaled quicklook for all polarimetric channels and the entire scene.

#### element **level1Product/productComponents/browselImage**

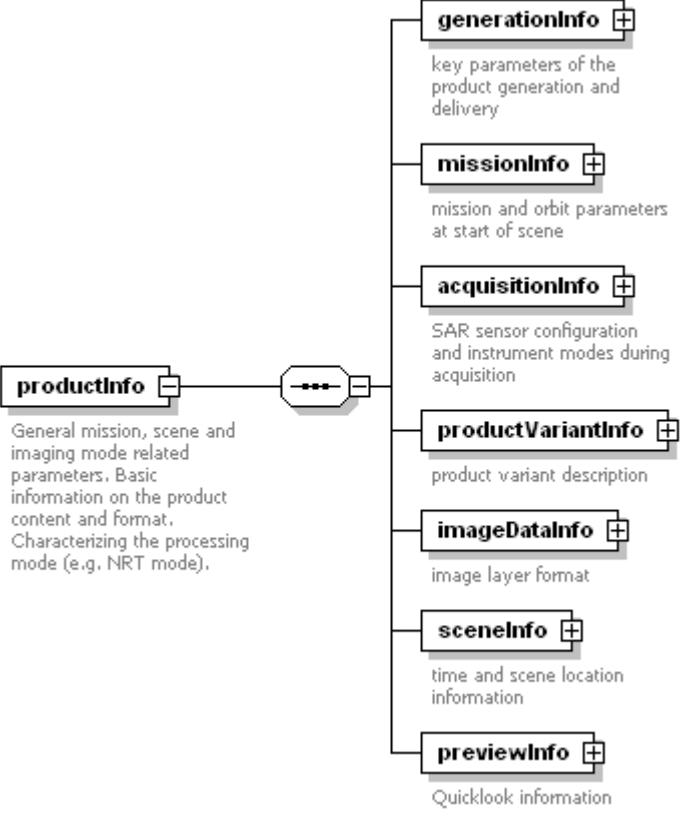
diagram	 <p>One low resolution quicklook          pointer to product components</p>
annotation	documentation One low resolution quicklook

#### element **level1Product/productComponents/mapPlot**

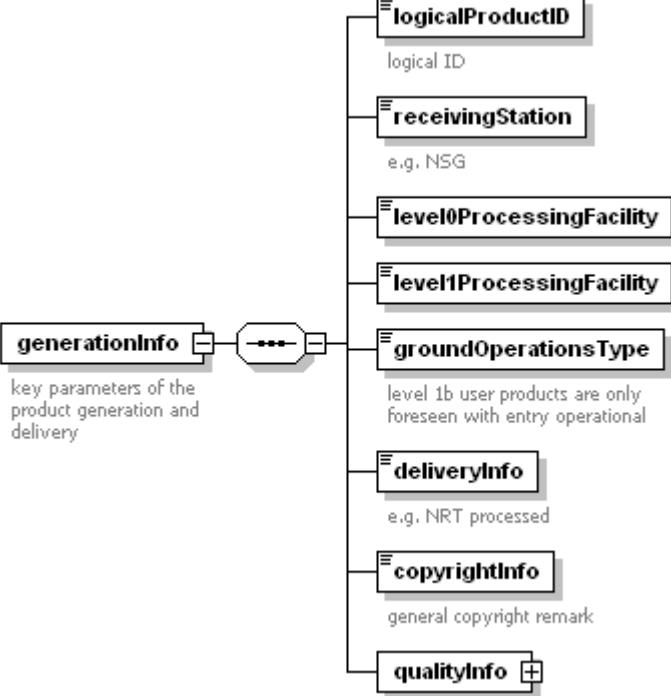
diagram	 <p>Geographical map showing the image footprint.          pointer to product components</p>
annotation	documentation Geographical map showing the image footprint.

## 6.1.2 Product Info

### element **level1Product/productInfo**

diagram	 <pre> graph LR     productInfo[productInfo] --- generationInfo[generationInfo]     productInfo --- missionInfo[missionInfo]     productInfo --- acquisitionInfo[acquisitionInfo]     productInfo --- productVariantInfo[productVariantInfo]     productInfo --- imageDataInfo[imageDataInfo]     productInfo --- sceneInfo[sceneInfo]     productInfo --- previewInfo[previewInfo]   </pre> <p><b>productInfo</b>      General mission, scene and imaging mode related parameters. Basic information on the product content and format. Characterizing the processing mode (e.g. NRT mode).</p> <p><b>generationInfo</b>      key parameters of the product generation and delivery</p> <p><b>missionInfo</b>      mission and orbit parameters at start of scene</p> <p><b>acquisitionInfo</b>      SAR sensor configuration and instrument modes during acquisition</p> <p><b>productVariantInfo</b>      product variant description</p> <p><b>imageDataInfo</b>      image layer format</p> <p><b>sceneInfo</b>      time and scene location information</p> <p><b>previewInfo</b>      Quicklook information</p>
annotation	documentation General mission, scene and imaging mode related parameters. Basic information on the product content and format. Characterizing the processing mode (e.g. NRT mode).

### element **level1Product/productInfo/generationInfo**

diagram	 <pre> classDiagram     class generationInfo     class logicalProductID     class receivingStation     class level0ProcessingFacility     class level1ProcessingFacility     class groundOperationsType     class deliveryInfo     class copyrightInfo     class qualityInfo      generationInfo &lt; --&gt; logicalProductID     generationInfo &lt; --&gt; receivingStation     generationInfo &lt; --&gt; level0ProcessingFacility     generationInfo &lt; --&gt; level1ProcessingFacility     generationInfo &lt; --&gt; groundOperationsType     generationInfo &lt; --&gt; deliveryInfo     generationInfo &lt; --&gt; copyrightInfo     generationInfo &lt; --&gt; qualityInfo   </pre> <p>key parameters of the product generation and delivery</p>
annotation	documentation key parameters of the product generation and delivery

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

diagram	 <p>logical ID</p>
type	<b>string1024</b>
facets	maxLength 1024
annotation	documentation logical ID

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

diagram	 <p>e.g. NSG</p>
type	<b>string20</b>
facets	maxLength 20
annotation	documentation e.g. NSG

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

diagram	
type	<b>string20</b>
facets	maxLength 20

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

diagram	 <b>level1ProcessingFacility</b>
type	<b><u>string20</u></b>
facets	maxLength 20

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

diagram	 <b>groundOperationsType</b>  level 1b user products are only foreseen with entry operational
type	restriction of <b>xs:NMTOKENS</b>
facets	enumeration operational enumeration preoperational enumeration instrument enumeration test enumeration UNDEFINED
annotation	documentation level 1b user products are only foreseen with entry operational

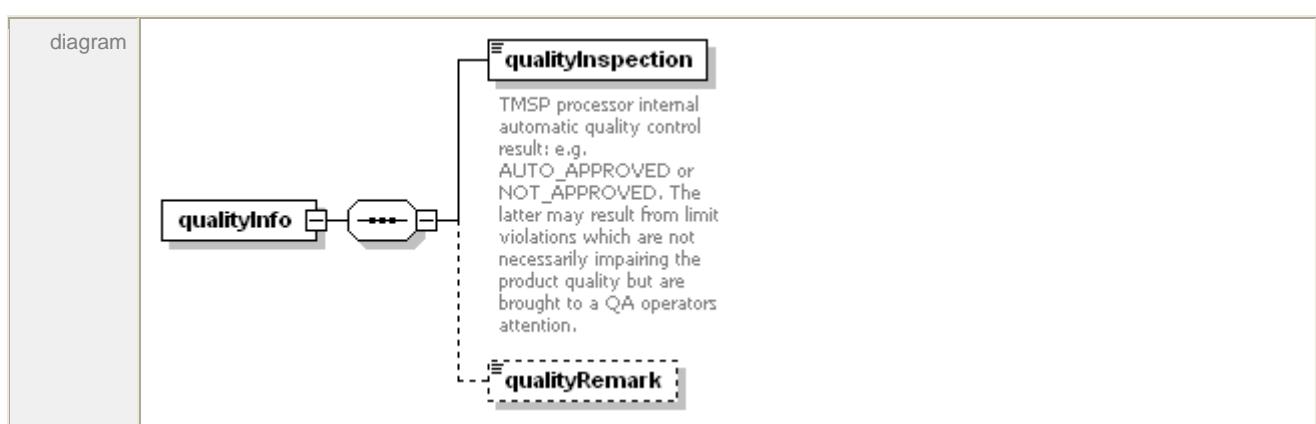
**element level1Product/productInfo/generationInfo/deliveryInfo**

diagram	 <b>deliveryInfo</b>  e.g. NRT processed
type	<b><u>string1024</u></b>
facets	maxLength 1024
annotation	documentation e.g. NRT processed

**element level1Product/productInfo/generationInfo/copyrightInfo**

diagram	 <b>copyrightInfo</b>  general copyright remark
type	<b><u>string1024</u></b>
facets	maxLength 1024
annotation	documentation general copyright remark

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



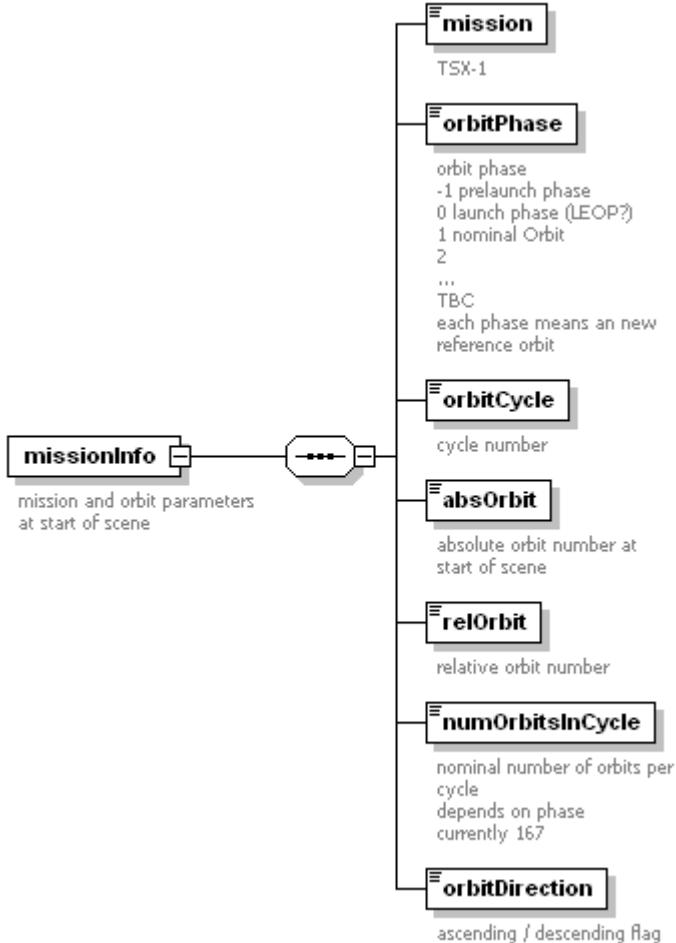
**element level1Product/productInfo/generationInfo/qualityInfo/qualityInspection**

diagram	 <p>TMSP 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.</p>
type	restriction of <a href="#">string255</a>
facets	maxLength 255 enumeration AUTO_APPROVED enumeration OPERATOR_APPROVED enumeration NOT_APPROVED enumeration UNDEFINED
annotation	documentation TMSP 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.

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

diagram	
type	<a href="#">string1024</a>
facets	maxLength 1024

**element level1Product/productInfo/missionInfo**

diagram	 <pre> classDiagram     class missionInfo {         &lt;&lt;mission and orbit parameters at start of scene&gt;&gt;     }     class mission {         &lt;&lt;TSX-1&gt;&gt;     }     missionInfo "2" --&gt; mission     missionInfo "2" --&gt; "3.."     "3..&gt;" orbitPhase     "3..&gt;" orbitCycle     "3..&gt;" absOrbit     "3..&gt;" relOrbit     "3..&gt;" numOrbitsInCycle     "3..&gt;" orbitDirection     </pre> <p><b>mission</b> TSX-1</p> <p><b>orbitPhase</b></p> <p>orbit phase      -1 prelaunch phase      0 launch phase (LEOP?)      1 nominal Orbit      2      ...      TBC      each phase means an new reference orbit</p> <p><b>orbitCycle</b></p> <p>cycle number</p> <p><b>absOrbit</b></p> <p>absolute orbit number at start of scene</p> <p><b>relOrbit</b></p> <p>relative orbit number</p> <p><b>numOrbitsInCycle</b></p> <p>nominal number of orbits per cycle      depends on phase      currently 167</p> <p><b>orbitDirection</b></p> <p>ascending / descending flag</p>
annotation	documentation mission and orbit parameters at start of scene

#### element level1Product/productInfo/missionInfo/mission

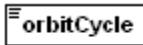
diagram	 <pre> classDiagram     class mission {         &lt;&lt;TSX-1&gt;&gt;     }     </pre>
type	<b>string20</b>
facets	maxLength 20
annotation	documentation TSX-1

#### element level1Product/productInfo/missionInfo/orbitPhase

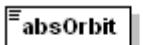
diagram	 <pre> classDiagram     class orbitPhase {         &lt;&lt;orbit phase         -1 prelaunch phase         0 launch phase (LEOP?)         1 nominal Orbit         2         ...         TBC         each phase means an new reference orbit&gt;&gt;     }     </pre>
type	<b>xs:int</b>

annotation	documentation orbit phase -1 prelaunch phase 0 launch phase (LEOP?) 1 nominal Orbit 2 ... TBC each phase means an new reference orbit
------------	--

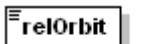
#### element **level1Product/productInfo/missionInfo/orbitCycle**

diagram	 <b>orbitCycle</b> cycle number
type	<b>xs:int</b>
annotation	documentation cycle number

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

diagram	 <b>absOrbit</b> absolute orbit number at start of scene
type	restriction of <b>xs:int</b>
facets	minInclusive -1
annotation	documentation absolute orbit number at start of scene

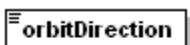
#### element **level1Product/productInfo/missionInfo/relOrbit**

diagram	 <b>relOrbit</b> relative orbit number
type	<b>xs:int</b>
annotation	documentation relative orbit number

#### element **level1Product/productInfo/missionInfo/numOrbitsInCycle**

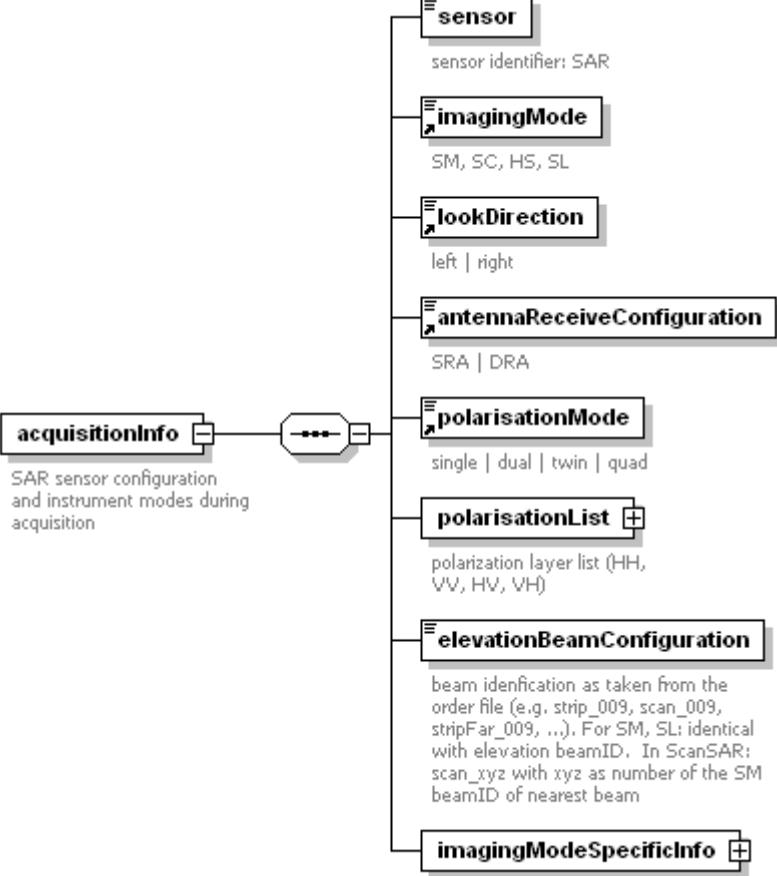
diagram	 <b>numOrbitsInCycle</b> nominal number of orbits per cycle depends on phase currently 167
type	<b>xs:int</b>
annotation	documentation nominal number of orbits per cycle depends      on      phase currently 167

#### element **level1Product/productInfo/missionInfo/orbitDirection**

diagram	 <b>orbitDirection</b> ascending / descending flag
type	restriction of <b>xs:NMTOKENS</b>

facets	enumeration ASCENDING enumeration DESCENDING enumeration UNDEFINED
annotation	documentation ascending / descending flag

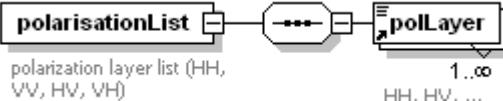
#### element **level1Product/productInfo/acquisitionInfo**

diagram	 <pre> graph LR     subgraph acquisitionInfo [acquisitionInfo]         sensor[sensor] --- SM[imagingMode]         sensor --- LD[lookDirection]         sensor --- ARC[antennaReceiveConfiguration]         SM --- SM_modes["SM, SC, HS, SL"]         LD --- LD_modes["left   right"]         ARC --- ARC_modes["SRA   DRA"]         polarisationMode[polarisationMode] --- PM_modes["single   dual   twin   quad"]         polarisationList[polarisationList] --- PL_modes["polarization layer list (HH, VV, HV, VH)"]         elevationBeamConfiguration[elevationBeamConfiguration] --- EBC_modes["beam identification as taken from the order file (e.g. strip_009, scan_009, stripFar_009, ...). For SM, SL: identical with elevation beamID. In ScanSAR: scan_xyz with xyz as number of the SM beamID of nearest beam"]         imagingModeSpecificInfo[imagingModeSpecificInfo] --- IMSI_modes["Beam infos for the different modes"]     end </pre> <p>SAR sensor configuration and instrument modes during acquisition</p>
annotation	documentation SAR sensor configuration and instrument modes during acquisition

#### element **level1Product/productInfo/acquisitionInfo/sensor**

diagram	 <p>sensor identifier: SAR</p>
type	<u>string20</u>
facets	maxLength 20
annotation	documentation sensor identifier: SAR

#### element **level1Product/productInfo/acquisitionInfo/polarisationList**

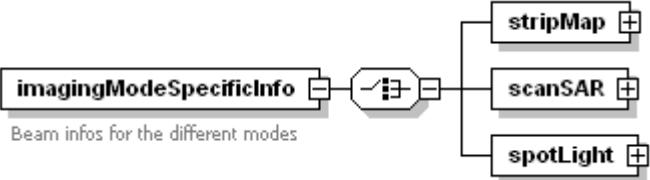
diagram	 <pre> graph LR     subgraph polarisationList [polarisationList]         polLayer[polLayer]     end     polLayer --- PL_modes["polarization layer list (HH, VV, HV, VH)"]     polLayer --- PL_count["1..∞"]     polLayer --- PL_values["HH, HV, ..."] </pre> <p>polarization layer list (HH, VV, HV, VH)</p>
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annotation	documentation polarization layer list (HH, VV, HV, VH)
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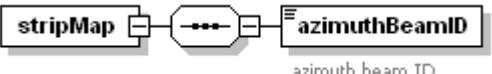
**element level1Product/productInfo/acquisitionInfo/elevationBeamConfiguration**

diagram	 <p>beam identification as taken from the order file (e.g. strip_009, scan_009, stripFar_009, ...). For SM, SL: identical with elevation beamID. In ScanSAR: scan_xyz with xyz as number of the SM beamID of nearest beam</p>
type	<u>string20</u>
facets	maxLength 20
annotation	documentation beam identification as taken from the order file (e.g. strip_009, scan_009, stripFar_009, ...). For SM, SL: identical with elevation beamID. In ScanSAR: scan_xyz with xyz as number of the SM beamID of nearest beam

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

diagram	 <p>Beam infos for the different modes</p>
annotation	documentation Beam infos for the different modes

**element level1Product/productInfo/acquisitionInfo/imagingModeSpecificInfo/stripMap**

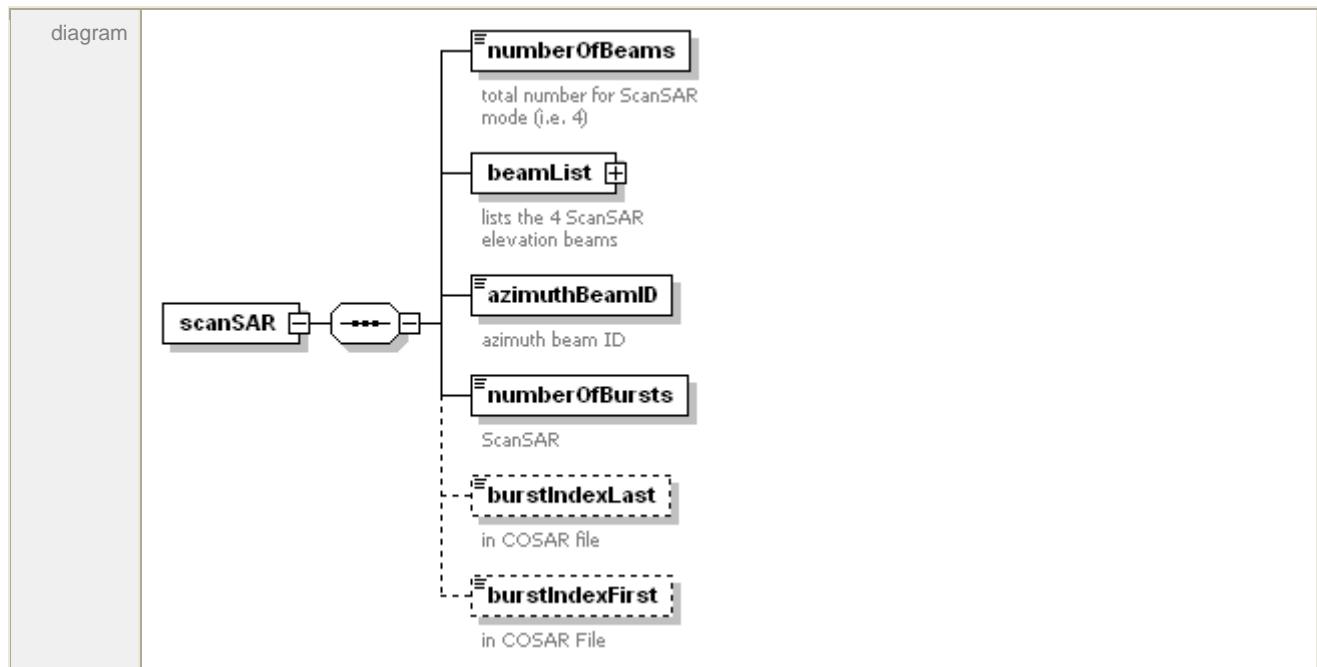
diagram	 <p>azimuth beam ID</p>
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**element level1Product/productInfo/acquisitionInfo/imagingModeSpecificInfo/stripMap/azimuthBeamID**

diagram	 <p>azimuth beam ID</p>
type	<u>string20</u>
facets	maxLength 20
annotation	documentation azimuth beam ID

**element level1Product/productInfo/acquisitionInfo/imagingModeSpecificInfo/scansAR**

Public

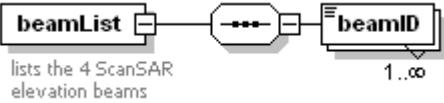


element

**level1Product/productInfo/acquisitionInfo/imagingModeSpecificInfo/scanSAR/numberOfBeams**

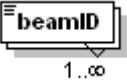
diagram	 <pre> class Diagram     class numberOfBeams {         &lt;&lt;number of Beams&gt;&gt;     }   </pre>
	<p>total number for ScanSAR mode (i.e. 4)</p>
type	<b>xs:int</b>
annotation	documentation total number for ScanSAR mode (i.e. 4)

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

diagram	 <pre> class Diagram     class beamList {         &lt;&lt;beamList&gt;&gt;     }     class beamID {         &lt;&lt;beamID&gt;&gt;     }     beamList --&gt; beamID   </pre>
annotation	documentation lists the 4 ScanSAR elevation beams

element

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

diagram	 <pre> class Diagram     class beamID {         &lt;&lt;beamID&gt;&gt;     }   </pre>
type	<b>string20</b>
facets	maxLength 20

element

**level1Product/productInfo/acquisitionInfo/imagingModeSpecificInfo/scanSAR/azimuthBeamID**

diagram	 <b>azimuthBeamID</b>
	azimuth beam ID
type	<b>string20</b>
facets	maxLength 20
annotation	documentation azimuth beam ID

element

**level1Product/productInfo/acquisitionInfo/imagingModeSpecificInfo/scanSAR/numberOfBursts**

diagram	 <b>numberOfBursts</b>
	ScanSAR
type	<b>xs:int</b>
annotation	documentation ScanSAR

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

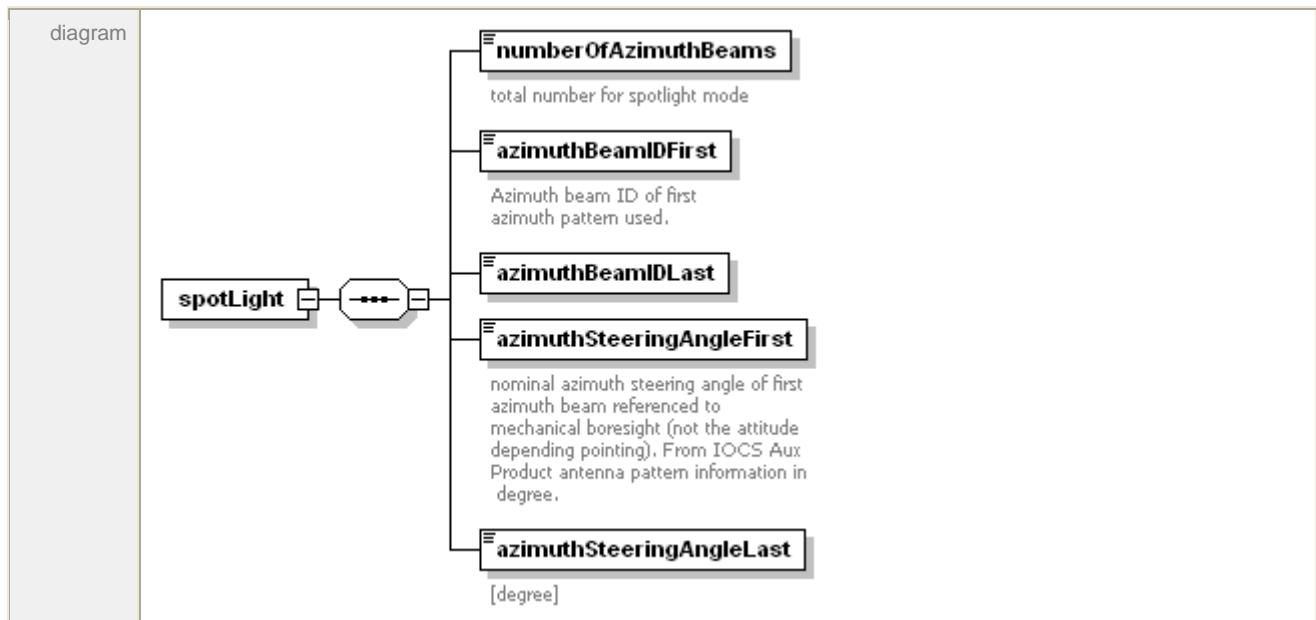
diagram	 <b>burstIndexLast</b>
	in COSAR file
type	<b>xs:int</b>
annotation	documentation in COSAR file

element

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

diagram	 <b>burstIndexFirst</b>
	in COSAR File
type	<b>xs:int</b>
annotation	documentation in COSAR File

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



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

diagram	
	<b>numberOfAzimuthBeams</b> total number for spotlight mode
type	<b>xs:int</b>
annotation	documentation total number for spotlight mode

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

diagram	
	<b>azimuthBeamIDFirst</b> Azimuth beam ID of first azimuth pattern used.
type	<b>string20</b>
facets	maxLength 20
annotation	documentation Azimuth beam ID of first azimuth pattern used.

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

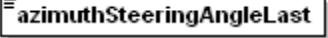
diagram	
	<b>azimuthBeamIDLast</b> Azimuth beam ID of last azimuth pattern used.
type	<b>string20</b>
facets	maxLength 20

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

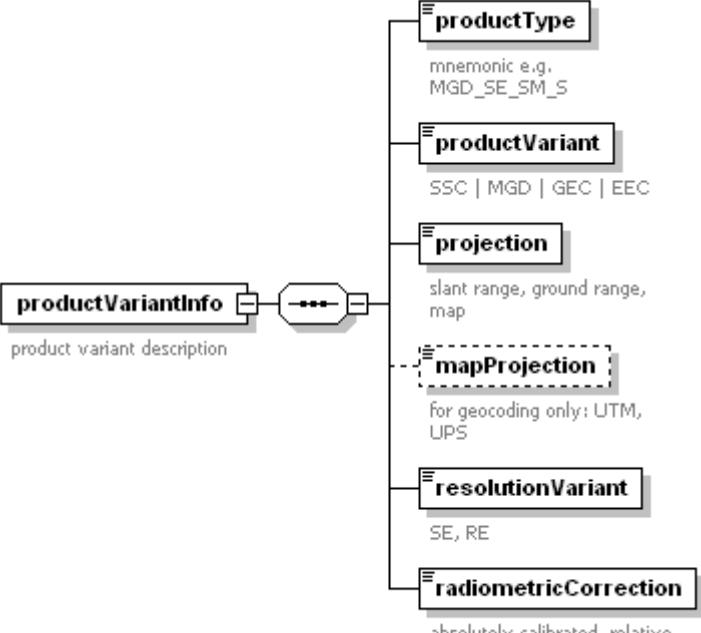
diagram	 <p>nominal azimuth steering angle of first azimuth beam referenced to mechanical boresight (not the attitude depending pointing). From IOCS Aux Product antenna pattern information in degree.</p>
type	<b>xs:float</b>
annotation	documentation nominal azimuth steering angle of first azimuth beam referenced to mechanical boresight (not the attitude depending pointing). From IOCS Aux Product antenna pattern information in degree.

element

**level1Product/productInfo/acquisitionInfo/imagingModeSpecificInfo/spotLight/azimuthSteeringAngleLast**

diagram	 <p>[degree]</p>
type	<b>xs:float</b>
annotation	documentation [degree]

element **level1Product/productInfo/productVariantInfo**

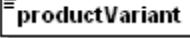
diagram	 <p>product variant description</p>
annotation	documentation product variant description

element **level1Product/productInfo/productVariantInfo/productType**

diagram	 <p>mnemonic e.g., MGD_SE_SM_S</p>
type	<b>string128</b>

facets	maxLength 128
annotation	documentation mnemonic e.g. MGD_SE_SM_S

**element level1Product/productInfo/productVariantInfo/productVariant**

diagram	 <b>productVariant</b> SSC   MGD   GEC   EEC
type	restriction of xs:NMTOKENS
facets	enumeration SSC enumeration MGD enumeration GEC enumeration EEC enumeration UNDEFINED
annotation	documentation SSC   MGD   GEC   EEC

**element level1Product/productInfo/productVariantInfo/projection**

diagram	 <b>projection</b> slant range, ground range, map
type	restriction of xs:NMTOKENS
facets	enumeration SLANRANGE enumeration UNDEFINED enumeration GROUNDRANGE enumeration MAP
annotation	documentation slant range, ground range, map

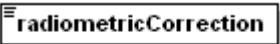
**element level1Product/productInfo/productVariantInfo/mapProjection**

diagram	 <b>mapProjection</b> for geocoding only: UTM, UPS
type	restriction of xs:NMTOKENS
facets	enumeration UTM enumeration UPS enumeration UNDEFINED
annotation	documentation for geocoding only: UTM, UPS

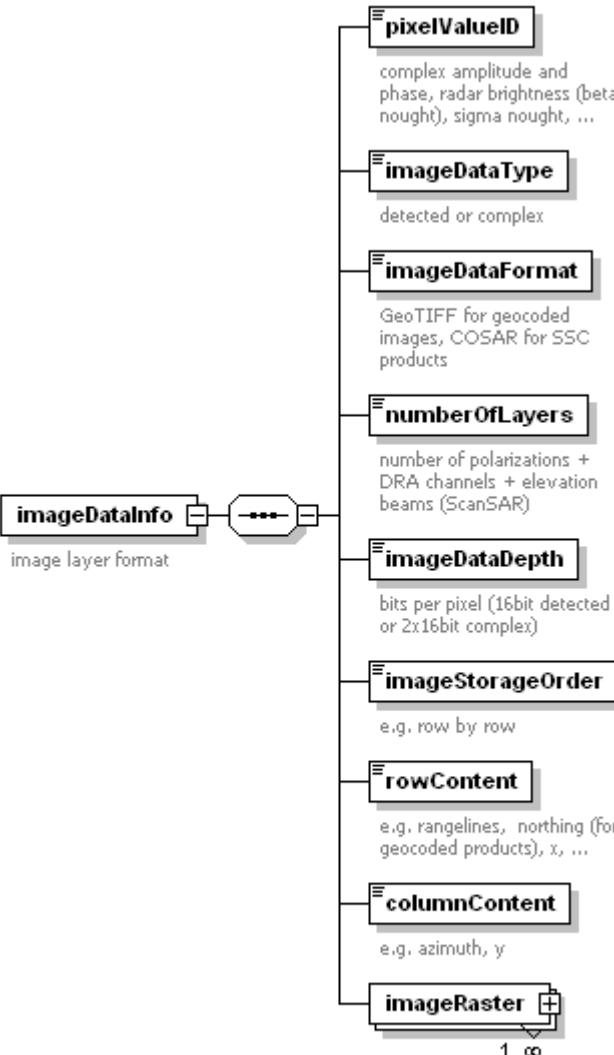
**element level1Product/productInfo/productVariantInfo/resolutionVariant**

diagram	 <b>resolutionVariant</b> SE, RE
type	restriction of xs:NMTOKENS
facets	enumeration SE enumeration RE enumeration UNDEFINED
annotation	documentation SE, RE

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

diagram	 <p>absolutely calibrated, relative calibrated, not calibrated, ...</p>
type	restriction of <u>string128</u>
facets	maxLength 128 enumeration CALIBRATED enumeration NOTCALIBRATED enumeration UNDEFINED enumeration RELCALIBRATED
annotation	documentation absolutely calibrated, relative calibrated, not calibrated, ...

**element level1Product/productInfo/imageDataInfo**

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

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

diagram	 <b>pixelValueID</b> <small>complex amplitude and phase, radar brightness (beta nought), sigma nought, ...</small>
type	<b>string128</b>
facets	maxLength 128
annotation	documentation complex amplitude and phase, radar brightness (beta nought), sigma nought, ...

**element level1Product/productInfo/imageDataInfo/imageDataType**

diagram	 <b>imageDataType</b> <small>detected or complex</small>
type	restriction of <b>xs:NMTOKENS</b>
facets	enumeration COMPLEX enumeration DETECTED
annotation	documentation detected or complex

**element level1Product/productInfo/imageDataInfo/imageDataFormat**

diagram	 <b>imageDataFormat</b> <small>GeoTIFF for geocoded images, COSAR for SSC products</small>
type	restriction of <b>string255</b>
facets	maxLength 255 enumeration GEOTIFF enumeration COSAR enumeration UNDEFINED
annotation	documentation GeoTIFF for geocoded images, COSAR for SSC products

**element level1Product/productInfo/imageDataInfo/numberOfLayers**

diagram	 <b>numberOfLayers</b> <small>number of polarizations + DRA channels + elevation beams (ScanSAR)</small>
type	<b>xs:int</b>
annotation	documentation number of polarizations + DRA channels + elevation beams (ScanSAR)

**element level1Product/productInfo/imageDataInfo/imageDataDepth**

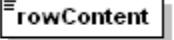
diagram	 <b>imageDataDepth</b> <small>bits per pixel (16bit detected or 2x16bit complex)</small>
type	<b>xs:int</b>

annotation	documentation bits per pixel (16bit detected or 2x16bit complex)
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**element level1Product/productInfo/imageDataInfo/imageStorageOrder**

diagram	 <b>imageStorageOrder</b> <small>e.g. row by row</small>
type	restriction of <b>xs:NMTOKENS</b>
facets	enumeration ROWBYROW enumeration COLBYCOL enumeration UNDEFINED
annotation	documentation e.g. row by row

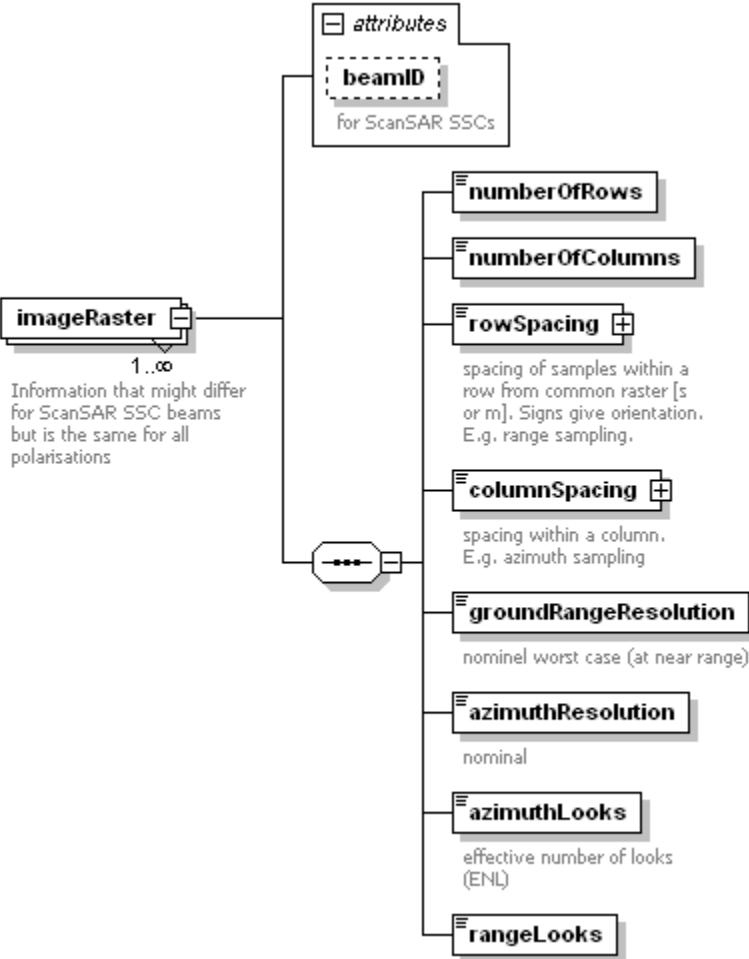
**element level1Product/productInfo/imageDataInfo/rowContent**

diagram	 <b>rowContent</b> <small>e.g. rangelines, northing (for geocoded products), x, ...</small>
type	<b>string20</b>
facets	maxLength 20
annotation	documentation e.g. rangelines, northing (for geocoded products), x, ...

**element level1Product/productInfo/imageDataInfo/columnContent**

diagram	 <b>columnContent</b> <small>e.g. azimuth, y</small>
type	<b>string20</b>
facets	maxLength 20
annotation	documentation e.g. azimuth, y

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

diagram	 <pre> classDiagram     class imageRaster {         &lt;&lt;1..&gt;&gt;         &lt;&lt;Information that might differ for ScanSAR SSC beams but is the same for all polarisations&gt;&gt;     }     class attributes {         beamID     }     attributes &lt; -- imageRaster     class numberOfRows     class numberOfColumns     class rowSpacing     class columnSpacing     class groundRangeResolution     class azimuthResolution     class azimuthLooks     class rangeLooks     </pre>								
attributes	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">Name</td><td style="width: 30%;">beamID</td> <td>Type</td><td style="width: 10%;"><u>string20</u></td> <td>Use</td><td>Default</td><td>Fixed</td> <td>Annotation</td> </tr> </table> <p>documentation for ScanSAR SSCs</p>	Name	beamID	Type	<u>string20</u>	Use	Default	Fixed	Annotation
Name	beamID	Type	<u>string20</u>	Use	Default	Fixed	Annotation		
annotation	documentation Information that might differ for ScanSAR SSC beams but is the same for all polarisations								

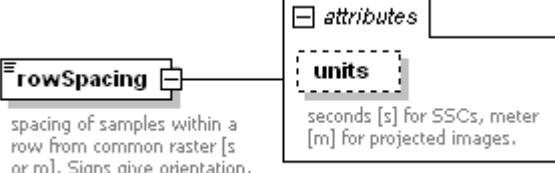
#### element level1Product/productInfo/imageDataInfo/imageRaster/numberOfRows

diagram	
type	<b>xs:int</b>

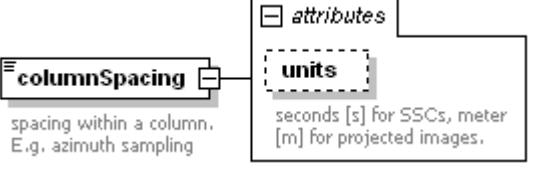
#### element level1Product/productInfo/imageDataInfo/imageRaster/numberOfColumns

diagram	
type	<b>xs:int</b>

#### element level1Product/productInfo/imageDataInfo/imageRaster/rowSpacing

diagram	 <p>spacing of samples within a row from common raster [s or m]. Signs give orientation. E.g. range sampling.</p>												
type	extension of xs:float												
attributes	<table> <tr> <td>Name</td> <td>Type</td> <td>Use</td> <td>Default</td> <td>Fixed</td> <td>Annotation</td> </tr> <tr> <td>units</td> <td><b>derived by: xs:NMTOKENS</b></td> <td></td> <td></td> <td></td> <td>seconds [s] for SSCs, meter [m] for projected images.</td> </tr> </table>	Name	Type	Use	Default	Fixed	Annotation	units	<b>derived by: xs:NMTOKENS</b>				seconds [s] for SSCs, meter [m] for projected images.
Name	Type	Use	Default	Fixed	Annotation								
units	<b>derived by: xs:NMTOKENS</b>				seconds [s] for SSCs, meter [m] for projected images.								
annotation	documentation spacing of samples within a row from common raster [s or m]. Signs give orientation. E.g. range sampling.												

#### element level1Product/productInfo/imageDataInfo/imageRaster/columnSpacing

diagram	 <p>spacing within a column. E.g. azimuth sampling</p>												
type	extension of xs:float												
attributes	<table> <tr> <td>Name</td> <td>Type</td> <td>Use</td> <td>Default</td> <td>Fixed</td> <td>Annotation</td> </tr> <tr> <td>units</td> <td><b>derived by: xs:NMTOKENS</b></td> <td></td> <td></td> <td></td> <td>seconds [s] for SSCs, meter [m] for projected images.</td> </tr> </table>	Name	Type	Use	Default	Fixed	Annotation	units	<b>derived by: xs:NMTOKENS</b>				seconds [s] for SSCs, meter [m] for projected images.
Name	Type	Use	Default	Fixed	Annotation								
units	<b>derived by: xs:NMTOKENS</b>				seconds [s] for SSCs, meter [m] for projected images.								
annotation	documentation spacing within a column. E.g. azimuth sampling												

#### element level1Product/productInfo/imageDataInfo/imageRaster/groundRangeResolution

diagram	 <p>nominal worst case (at near range)</p>
type	xs:double
annotation	documentation nominal worst case (at near range)

#### element level1Product/productInfo/imageDataInfo/imageRaster/azimuthResolution

diagram	 <p>nominal</p>
type	xs:double
annotation	documentation nominal

#### element level1Product/productInfo/imageDataInfo/imageRaster/azimuthLooks

diagram	 <p>effective number of looks (ENL)</p>
type	xs:float

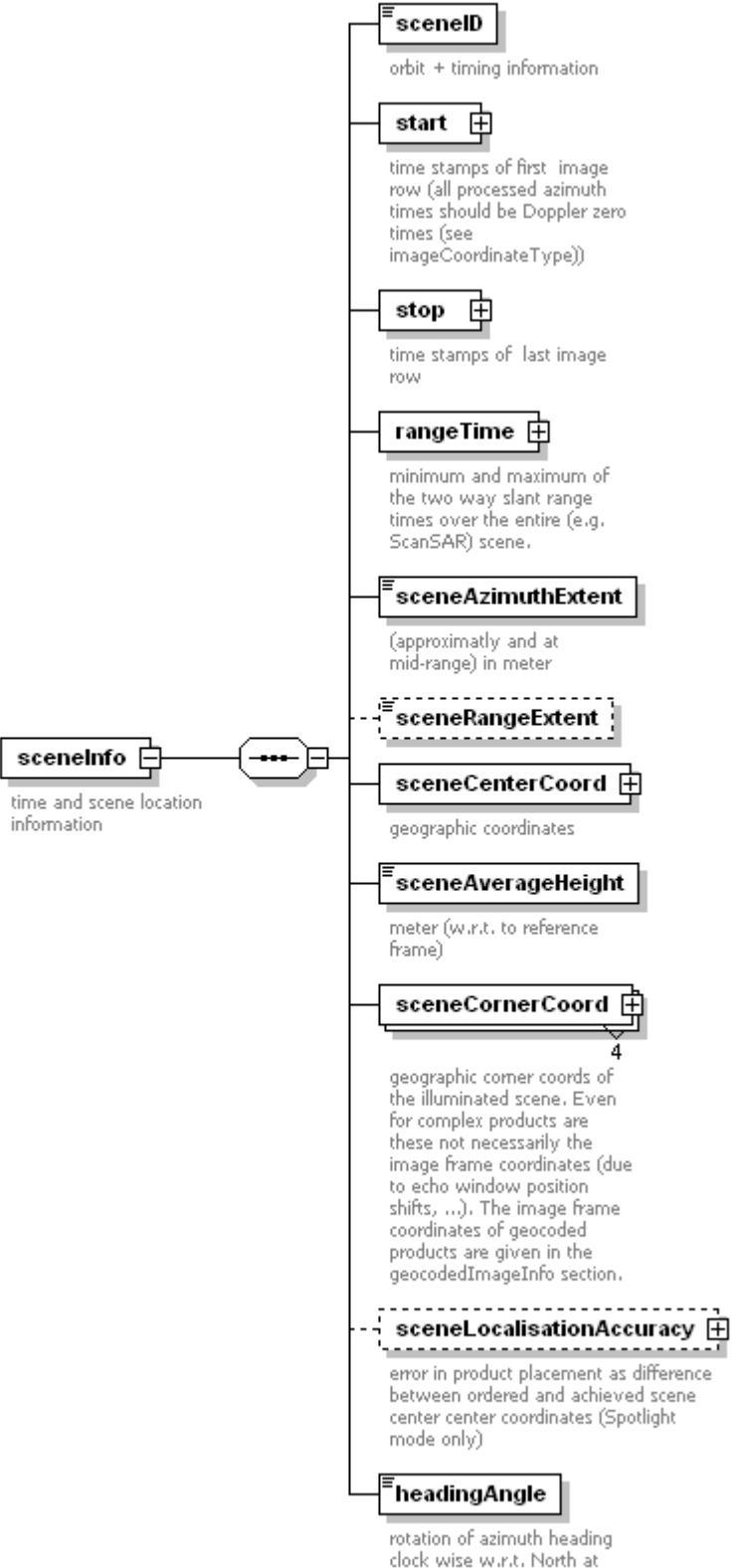


annotation	documentation effective number of looks (ENL)
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**element level1Product/productInfo/imageDataInfo/imageRaster/rangeLooks**

diagram	rangeLooks
type	<b>xs:float</b>

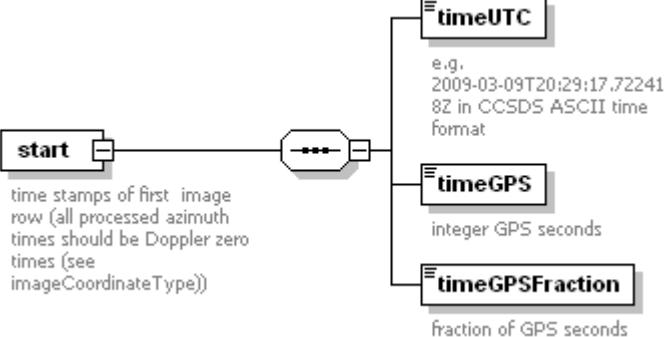
**element level1Product/productInfo/sceneInfo**

diagram	 <pre> classDiagram     class sceneID {         orbit + timing information     }     class start {         time stamps of first image row (all processed azimuth times should be Doppler zero times (see imageCoordinateType))     }     class stop {         time stamps of last image row     }     class rangeTime {         minimum and maximum of the two way slant range times over the entire (e.g. ScanSAR) scene.     }     class sceneAzimuthExtent {         (approximately and at mid-range) in meter     }     class sceneRangeExtent     class sceneCenterCoord {         geographic coordinates     }     class sceneAverageHeight {         meter (w.r.t. to reference frame)     }     class 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.     }     class sceneLocalisationAccuracy     class headingAngle {         rotation of azimuth heading clock wise w.r.t. North at mid-scene in degree     }      sceneInfo &lt; -- sceneID     sceneInfo &lt; -- start     sceneInfo &lt; -- stop     sceneInfo &lt; -- rangeTime     sceneInfo &lt; -- sceneAzimuthExtent     sceneInfo --&gt; sceneRangeExtent     sceneInfo &lt; -- sceneCenterCoord     sceneInfo &lt; -- sceneAverageHeight     sceneInfo &lt; -- sceneCornerCoord     sceneInfo &lt; -- sceneLocalisationAccuracy     sceneInfo &lt; -- headingAngle   </pre>
annotation	documentation time and scene location information

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

diagram	 orbit + timing information
type	<b>string1024</b>
facets	maxLength 1024
annotation	documentation orbit + timing information

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

diagram	 time stamps of first image row (all processed azimuth times should be Doppler zero times (see imageCoordinateType))
annotation	documentation time stamps of first image row (all processed azimuth times should be Doppler zero times (see imageCoordinateType))

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

diagram	 e.g., 2009-03-09T20:29:17.72241 8Z in CCSDS ASCII time format
type	<b>xs:dateTime</b>
annotation	documentation e.g. 2009-03-09T20:29:17.722418Z in CCSDS ASCII time format

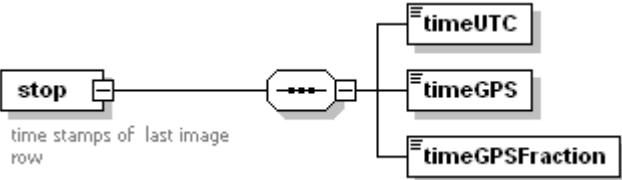
#### element **level1Product/productInfo/sceneInfo/start/timeGPS**

diagram	 integer GPS seconds
type	<b>xs:long</b>
annotation	documentation integer GPS seconds

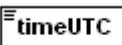
#### element **level1Product/productInfo/sceneInfo/start/timeGPSFraction**

diagram	 fraction of GPS seconds
type	<b>xs:float</b>
annotation	documentation fraction of GPS seconds

#### element **level1Product/productInfo/sceneInfo/stop**

diagram	 <p>time stamps of last image row</p>
annotation	documentation time stamps of last image row

**element level1Product/productInfo/sceneInfo/stop/timeUTC**

diagram	
type	<b>xs:dateTime</b>

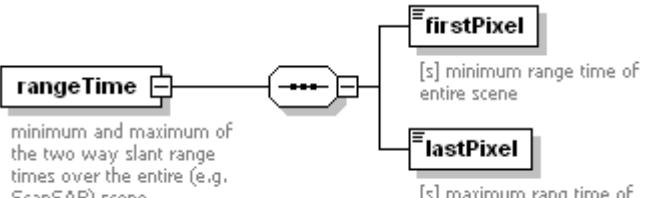
**element level1Product/productInfo/sceneInfo/stop/timeGPS**

diagram	
type	<b>xs:long</b>

**element level1Product/productInfo/sceneInfo/stop/timeGPSFraction**

diagram	
type	<b>xs:float</b>

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

diagram	 <p>[s] minimum range time of entire scene</p> <p>[s] maximum range time of entire scene</p>
annotation	documentation minimum and maximum of the two way slant range times over the entire (e.g. ScanSAR) scene.

**element level1Product/productInfo/sceneInfo/rangeTime/firstPixel**

diagram	 <p>[s] minimum range time of entire scene</p>
type	<b>xs:double</b>
annotation	documentation [s] minimum range time of entire scene

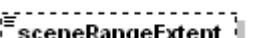
**element level1Product/productInfo/sceneInfo/rangeTime/lastPixel**

diagram	 <b>lastPixel</b>
	[s] maximum rang time of entire scene
type	<b>xs:double</b>
annotation	documentation [s] maximum rang time of entire scene

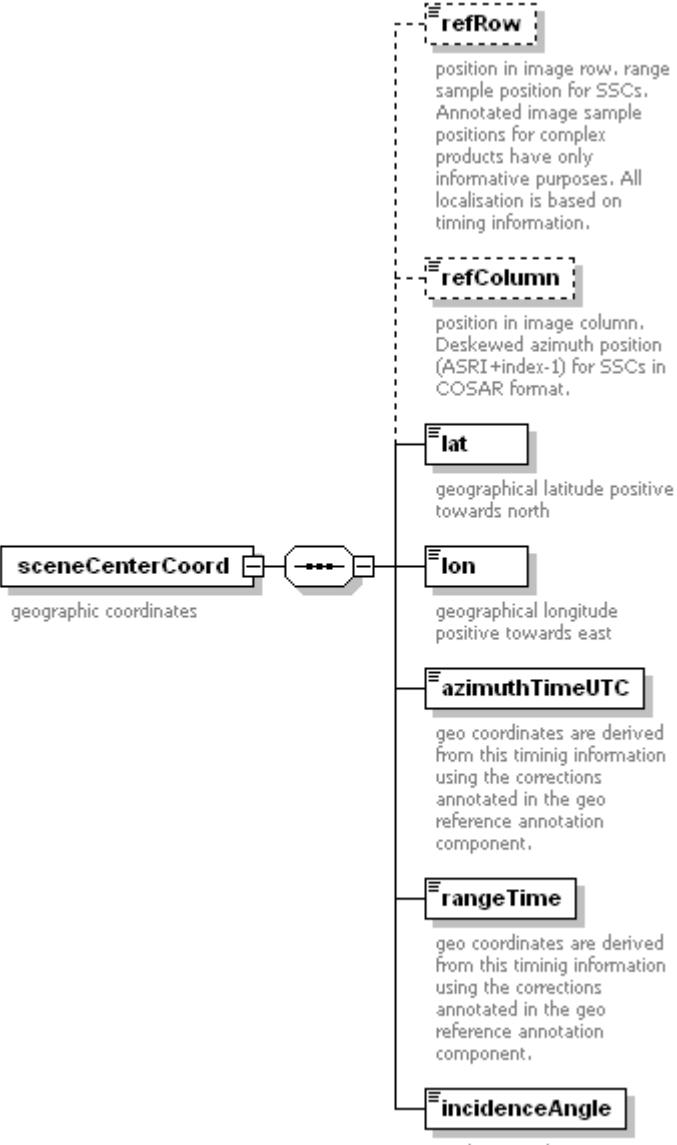
**element level1Product/productInfo/sceneInfo/sceneAzimuthExtent**

diagram	 <b>sceneAzimuthExtent</b>
	(approximatlly and at mid-range) in meter
type	<b>xs:double</b>
annotation	documentation (approximatlly and at mid-range) in meter

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

diagram	 <b>sceneRangeExtent</b>
type	<b>xs:double</b>

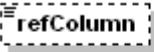
**element level1Product/productInfo/sceneInfo/sceneCenterCoord**

diagram	 <pre> graph LR     SC[sceneCenterCoord] --- dashed  refRow[refRow]     refRow --- dashed  lat[lat]     refRow --- dashed  lon[lon]     refRow --- solid  azimuthTimeUTC[azimuthTimeUTC]     azimuthTimeUTC --- solid  rangeTime[rangeTime]     azimuthTimeUTC --- solid  incidenceAngle[incidenceAngle]     </pre>
annotation	documentation geographic coordinates

#### element **level1Product/productInfo/sceneInfo/sceneCenterCoord/refRow**

diagram	
type	<b>xs:int</b>
annotation	documentation 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.

#### element **level1Product/productInfo/sceneInfo/sceneCenterCoord/refColumn**

diagram	 <b>refColumn</b>
	position in image column. Deskewed azimuth position (ASRI+index-1) for SSCs in COSAR format.
type	<b>xs:int</b>
annotation	documentation position in image column. Deskewed azimuth position (ASRI+index-1) for SSCs in COSAR format.

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

diagram	 <b>lat</b>
	geographical latitude positive towards north
type	<b>latitudeDegType</b>
facets	minInclusive -90 maxInclusive 90
annotation	documentation geographical latitude positive towards north

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

diagram	 <b>lon</b>
	geographical longitude positive towards east
type	<b>longitudeDegType</b>
facets	minInclusive -180 maxInclusive 180
annotation	documentation geographical longitude positive towards east

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

diagram	 <b>azimuthTimeUTC</b>
	geo coordinates are derived from this timing information using the corrections annotated in the geo reference annotation component.
type	<b>xs:dateTime</b>
annotation	documentation geo coordinates are derived from this timing information using the corrections annotated in the geo reference annotation component.

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

diagram	 <b>rangeTime</b>
	geo coordinates are derived from this timing information using the corrections annotated in the geo reference annotation component.

type	<b>xs:double</b>
annotation	documentation geo coordinates are derived from this timing information using the corrections annotated in the geo reference annotation component.

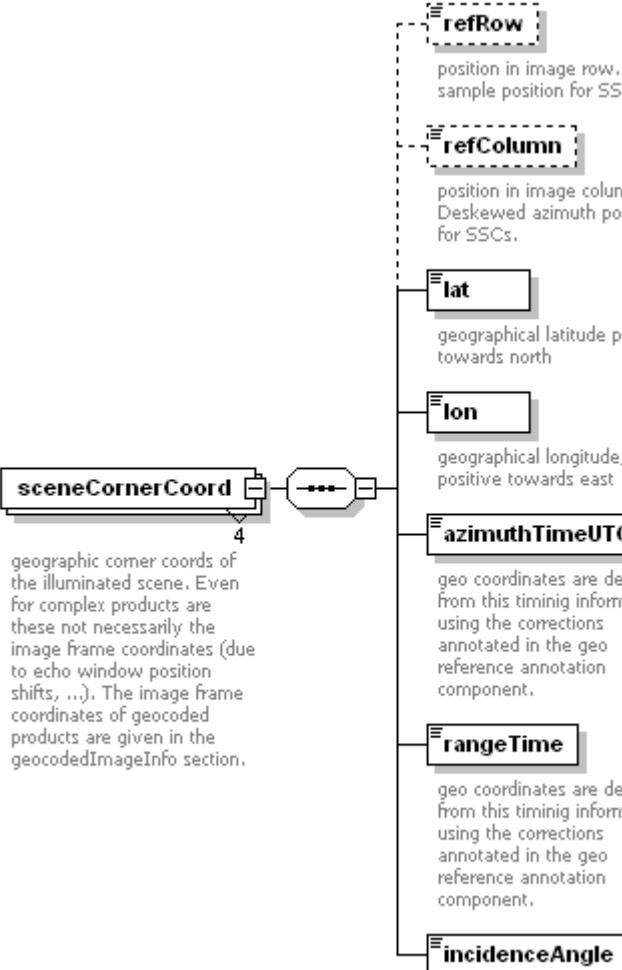
**element level1Product/productInfo/sceneInfo/sceneCenterCoord/incidenceAngle**

diagram	 <b>incidenceAngle</b> incidence angle
type	<b>xs:double</b>
annotation	documentation incidence angle

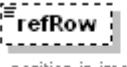
**element level1Product/productInfo/sceneInfo/sceneAverageHeight**

diagram	 <b>sceneAverageHeight</b> meter (w.r.t. to reference frame)
type	<b>xs:double</b>
annotation	documentation meter (w.r.t. to reference frame)

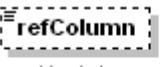
**element level1Product/productInfo/sceneInfo/sceneCornerCoord**

diagram	 <pre> classDiagram     class sceneCornerCoord {         &lt;&lt;4&gt;&gt;     }     class refRow     class refColumn     class lat     class lon     class azimuthTimeUTC     class rangeTime     class incidenceAngle      sceneCornerCoord "4" --&gt; refRow     sceneCornerCoord --&gt; refColumn     sceneCornerCoord --&gt; lat     sceneCornerCoord --&gt; lon     sceneCornerCoord --&gt; azimuthTimeUTC     sceneCornerCoord --&gt; rangeTime     sceneCornerCoord --&gt; incidenceAngle   </pre>
annotation	documentation 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.

#### element level1Product/productInfo/sceneInfo/sceneCornerCoord/refRow

diagram	 <p>position in image row, range sample position for SSCs.</p>
type	<b>xs:int</b>
annotation	documentation position in image row. range sample position for SSCs.

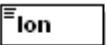
#### element level1Product/productInfo/sceneInfo/sceneCornerCoord/refColumn

diagram	 <p>position in image column, Deskewed azimuth position for SSCs.</p>
type	<b>xs:int</b>
annotation	documentation position in image column. Deskewed azimuth position for SSCs.

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

diagram	 <b>lat</b> geographical latitude positive towards north
type	<b><u>latitudeDegType</u></b>
facets	minInclusive -90 maxInclusive 90
annotation	documentation geographical latitude positive towards north

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

diagram	 <b>lon</b> geographical longitude, positive towards east
type	<b><u>longitudeDegType</u></b>
facets	minInclusive -180 maxInclusive 180
annotation	documentation geographical longitude, positive towards east

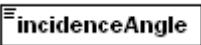
**element level1Product/productInfo/sceneInfo/sceneCornerCoord/azimuthTimeUTC**

diagram	 <b>azimuthTimeUTC</b> geo coordinates are derived from this timing information using the corrections annotated in the geo reference annotation component.
type	<b><u>xs:dateTime</u></b>
annotation	documentation geo coordinates are derived from this timing information using the corrections annotated in the geo reference annotation component.

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

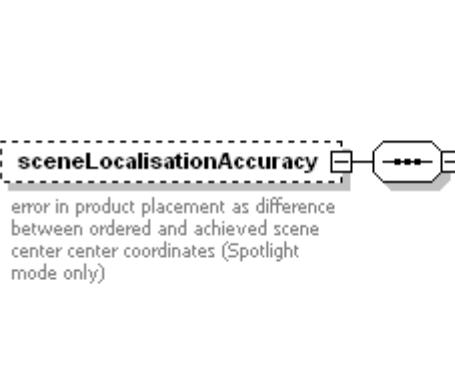
diagram	 <b>rangeTime</b> geo coordinates are derived from this timing information using the corrections annotated in the geo reference annotation component.
type	<b><u>xs:double</u></b>
annotation	documentation geo coordinates are derived from this timing information using the corrections annotated in the geo reference annotation component.

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

diagram	 <b>incidenceAngle</b> incidence angle
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type	<b>xs:double</b>
annotation	documentation incidence angle

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

diagram	 <pre> classDiagram     class sceneLocalisationAccuracy {         &lt;&lt;error in product placement as difference between ordered and achieved scene center center coordinates (Spotlight mode only)&gt;&gt;     }     class referenceProjection {         &lt;&lt;image projection for the error calculation (ground range, WGS84)&gt;&gt;     }     class latError {         &lt;&lt;geographical latitude positive towards north&gt;&gt;     }     class lonError {         &lt;&lt;geographical longitude positive towards east&gt;&gt;     }      sceneLocalisationAccuracy "1" -- "*" referenceProjection :      sceneLocalisationAccuracy "1" -- "*" latError :      sceneLocalisationAccuracy "1" -- "*" lonError :   </pre>
annotation	documentation error in product placement as difference between ordered and achieved scene center center coordinates (Spotlight mode only)

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

diagram	 <pre> classDiagram     class referenceProjection {         &lt;&lt;image projection for the error calculation (ground range, WGS84)&gt;&gt;     }   </pre>
type	<b>string128</b>
facets	maxLength 128
annotation	documentation image projection for the error calculation (ground range, WGS84)

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

diagram	 <pre> classDiagram     class latError {         &lt;&lt;geographical latitude positive towards north&gt;&gt;     }   </pre>
type	<b>latitudeDegType</b>
facets	minInclusive -90 maxInclusive 90
annotation	documentation geographical latitude positive towards north

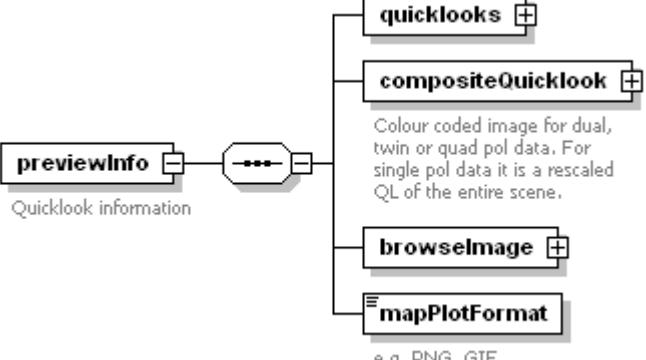
**element level1Product/productInfo/sceneInfo/sceneLocalisationAccuracy/lonError**

diagram	 <pre> classDiagram     class lonError {         &lt;&lt;geographical longitude positive towards east&gt;&gt;     }   </pre>
type	<b>longitudeDegType</b>
facets	minInclusive -180 maxInclusive 180
annotation	documentation geographical longitude positive towards east

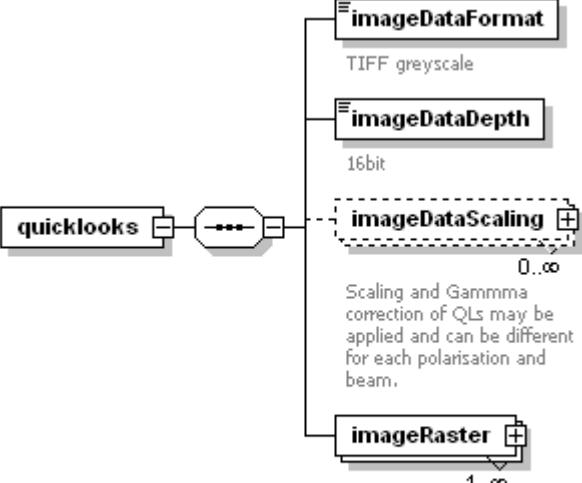
### element level1Product/productInfo/sceneInfo/headingAngle

diagram	 <p>rotation of azimuth heading clock wise w.r.t. North at mid-scene in degree</p>
type	<b>xs:float</b>
annotation	documentation rotation of azimuth heading clock wise w.r.t. North at mid-scene in degree

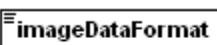
### element level1Product/productInfo/previewInfo

diagram	 <p><b>previewInfo</b> Quicklook information</p> <p><b>quicklooks</b> +</p> <p><b>compositeQuicklook</b> +</p> <p><b>browselimage</b> +</p> <p><b>mapPlotFormat</b> +</p> <p>e.g. PNG, GIF</p>
annotation	documentation Quicklook information

### element level1Product/productInfo/previewInfo/quicklooks

diagram	 <p><b>quicklooks</b> +</p> <p><b>imageDataFormat</b> +</p> <p>TIFF greyscale</p> <p><b>imageDataDepth</b> +</p> <p>16bit</p> <p><b>imageDataScaling</b> +</p> <p>0..∞</p> <p>Scaling and Gamma correction of QLs may be applied and can be different for each polarisation and beam.</p> <p><b>imageRaster</b> +</p> <p>1..∞</p> <p>Size and spacing might differ for quicklooks of ScanSAR SSC beams but is the same for all polarisations.</p>
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### element level1Product/productInfo/previewInfo/quicklooks/imageDataFormat

diagram	 <p>TIFF greyscale</p>
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type	<b>string255</b>
facets	maxLength 255
annotation	documentation TIFF greyscale

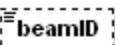
**element level1Product/productInfo/previewInfo/quicklooks/imageDataDepth**

diagram	 16bit
type	<b>xs:int</b>
annotation	documentation 16bit

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

diagram	<p>Scaling and Gamma correction of QLs may be applied and can be different for each polarisation and beam.</p>
annotation	documentation Scaling and Gamma correction of QLs may be applied and can be different for each polarisation and beam.

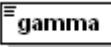
**element level1Product/productInfo/previewInfo/quicklooks/imageDataScaling/beamID**

diagram	 mnemonics for the beams, Beam IDs of each beam file for ScanSAR SSC complex product only
type	<b>string20</b>
facets	maxLength 20
annotation	documentation mnemonics for the beams. Beam IDs of each beam file for ScanSAR SSC complex product only

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

diagram	
	SRA, DRAFore, DRAAft: indicates geometric (ATI) layers (not quad pol channels)
type	restriction of <b>xs:NMTOKENS</b>
facets	enumeration SRA enumeration DRAFore enumeration DRAAft
annotation	documentation SRA, DRAFore, DRAAft: indicates geometric (ATI) layers (not quad pol channels)

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

diagram	
type	<b>xs:double</b>

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

diagram	
type	<b>xs:double</b>

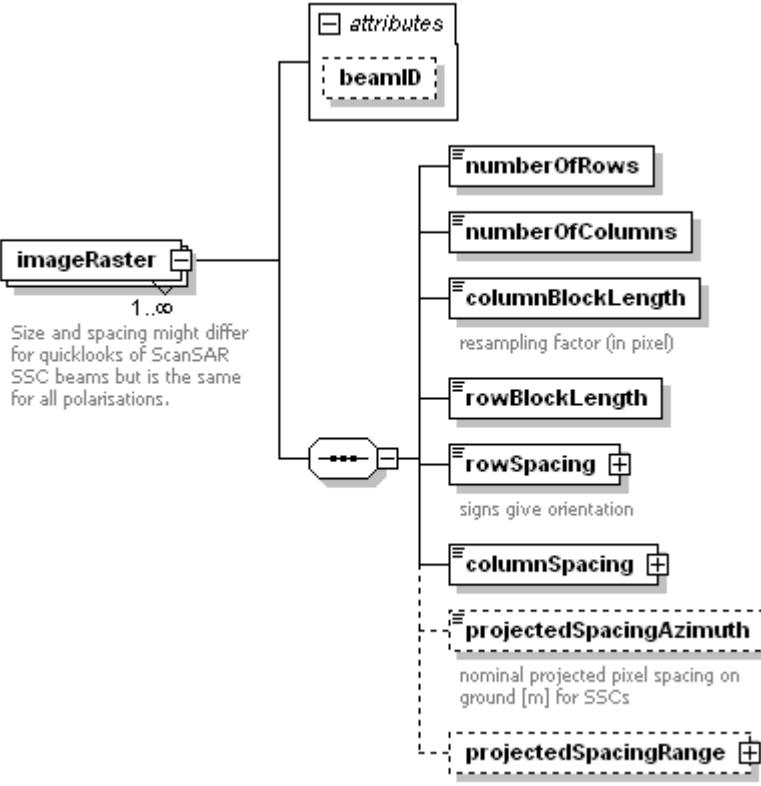
**element level1Product/productInfo/previewInfo/quicklooks/imageDataScaling/clipUpper**

diagram	
type	<b>xs:double</b>

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

diagram	
type	<b>xs:double</b>

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

diagram	 <p><b>imageRaster</b> <small>1..oo</small></p> <p>Size and spacing might differ for quicklooks of ScanSAR SSC beams but is the same for all polarisations.</p>												
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>beamID</td><td><b>string20</b></td><td></td><td></td><td></td><td></td></tr> </tbody> </table>	Name	Type	Use	Default	Fixed	Annotation	beamID	<b>string20</b>				
Name	Type	Use	Default	Fixed	Annotation								
beamID	<b>string20</b>												
annotation	documentation Size and spacing might differ for quicklooks of ScanSAR SSC beams but is the same for all polarisations.												

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

diagram	<b>numberOfRows</b>
type	<b>xs:int</b>

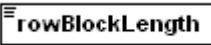
**element level1Product/productInfo/previewInfo/quicklooks/imageRaster/numberOfColumns**

diagram	<b>numberOfColumns</b>
type	<b>xs:int</b>

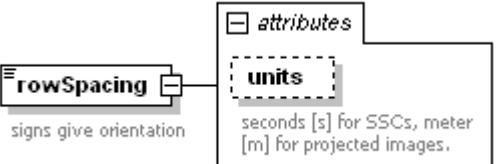
**element level1Product/productInfo/previewInfo/quicklooks/imageRaster/columnBlockLength**

diagram	<b>columnBlockLength</b>
	resampling factor (in pixel)
type	<b>xs:float</b>
annotation	documentation resampling factor (in pixel)

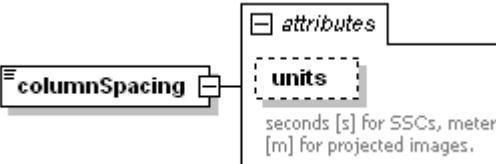
**element level1Product/productInfo/previewInfo/quicklooks/imageRaster/rowBlockLength**

diagram	
type	<b>xs:float</b>

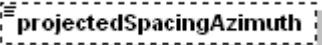
**element level1Product/productInfo/previewInfo/quicklooks/imageRaster/rowSpacing**

diagram	 The diagram shows the rowSpacing element with a dashed border. It has a solid border around its internal structure. Inside, there is a box labeled "attributes" with a dashed border, and another box labeled "units" with a solid border. A line connects the rowSpacing element to the "units" box. A note below says "signs give orientation".					
type	extension of <b>xs:float</b>					
attributes	Name units	Type	Use	Default	Fixed	Annotation documentation seconds [s] for SSCs, meter [m] for projected images.
annotation	documentation signs give orientation					

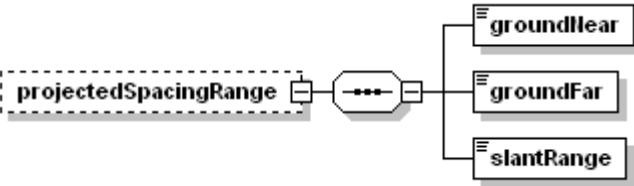
**element level1Product/productInfo/previewInfo/quicklooks/imageRaster/columnSpacing**

diagram	 The diagram shows the columnSpacing element with a dashed border. It has a solid border around its internal structure. Inside, there is a box labeled "attributes" with a dashed border, and another box labeled "units" with a solid border. A line connects the columnSpacing element to the "units" box. A note below says "seconds [s] for SSCs, meter [m] for projected images".					
type	extension of <b>xs:float</b>					
attributes	Name units	Type	Use	Default	Fixed	Annotation documentation seconds [s] for SSCs, meter [m] for projected images.

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

diagram	 The diagram shows the projectedSpacingAzimuth element with a dashed border. It has a solid border around its internal structure. Below it, a note says "nominal projected pixel spacing on ground [m] for SSCs".
type	<b>xs:float</b>
annotation	documentation nominal projected pixel spacing on ground [m] for SSCs

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

diagram	 The diagram shows the projectedSpacingRange element with a dashed border. It branches into three elements: groundNear, groundFar, and slantRange, each with a solid border.
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**element level1Product/productInfo/previewInfo/quicklooks/imageRaster/projectedSpacingRange/groundNear**

diagram	 <b>groundNear</b>
type	<b>xs:float</b>

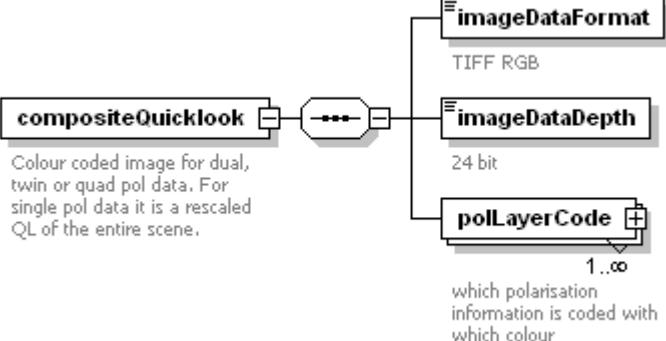
element  
**level1Product/productInfo/previewInfo/quicklooks/imageRaster/projectedSpacingRange/groundFar**

diagram	 <b>groundFar</b>
type	<b>xs:float</b>

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

diagram	 <b>slantRange</b>
type	<b>xs:float</b>

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

diagram	 <pre> graph LR     compositeQuicklook[compositeQuicklook] ---&gt; imageDateFormat[imageDateFormat]     compositeQuicklook ---&gt; imageDepth[imageDataDepth]     compositeQuicklook ---&gt; polLayerCode[polLayerCode]     imageDateFormat ---&gt; TIFF_RGB["TIFF RGB"]     imageDepth ---&gt; bit_24["24 bit"]     polLayerCode ---&gt; count_1toInf["1..∞"]     </pre> <p>Colour coded image for dual, twin or quad pol data. For single pol data it is a rescaled QL of the entire scene.</p>
annotation	documentation Colour coded image for dual, twin or quad pol data. For single pol data it is a rescaled QL of the entire scene.

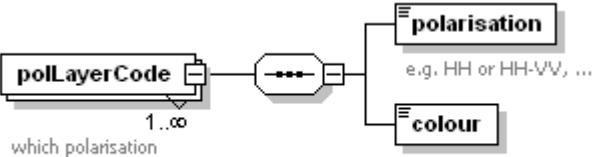
element **level1Product/productInfo/previewInfo/compositeQuicklook/imageDateFormat**

diagram	 <b>imageDateFormat</b>
	TIFF RGB
type	<b>string255</b>
facets	maxLength 255
annotation	documentation TIFF RGB

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

diagram	 <b>imageDataDepth</b>
	24 bit
type	<b>xs:int</b>
annotation	documentation 24 bit

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

diagram	 <p>polLayerCode 1..∞ which polarisation information is coded with which colour</p>
annotation	documentation which polarisation information is coded with which colour

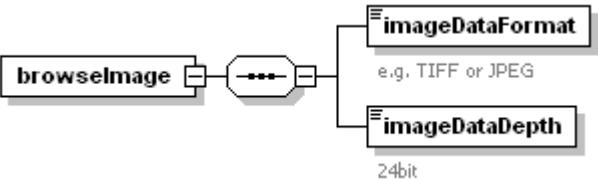
**element level1Product/productInfo/previewInfo/compositeQuicklook/polLayerCode/polarisation**

diagram	 <p>e.g. HH or HH-VV, ...</p>
type	<b>string80</b>
facets	maxLength 80
annotation	documentation e.g. HH or HH-VV, ...

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

diagram	
type	<b>string20</b>
facets	maxLength 20

**element level1Product/productInfo/previewInfo/browselImage**

diagram	 <p>browselImage 1..∞ imageDataFormat e.g. TIFF or JPEG imageDataDepth 24bit</p>
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**element level1Product/productInfo/previewInfo/browselImage/imageDataFormat**

diagram	 <p>e.g. TIFF or JPEG</p>
type	<b>string255</b>
facets	maxLength 255
annotation	documentation e.g. TIFF or JPEG

**element level1Product/productInfo/previewInfo/browselImage/imageDataDepth**

diagram	 <p>24bit</p>
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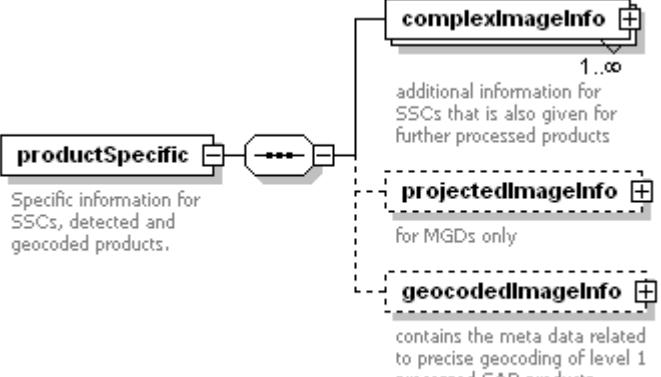
type	<b>xs:int</b>
annotation	documentation 24bit

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

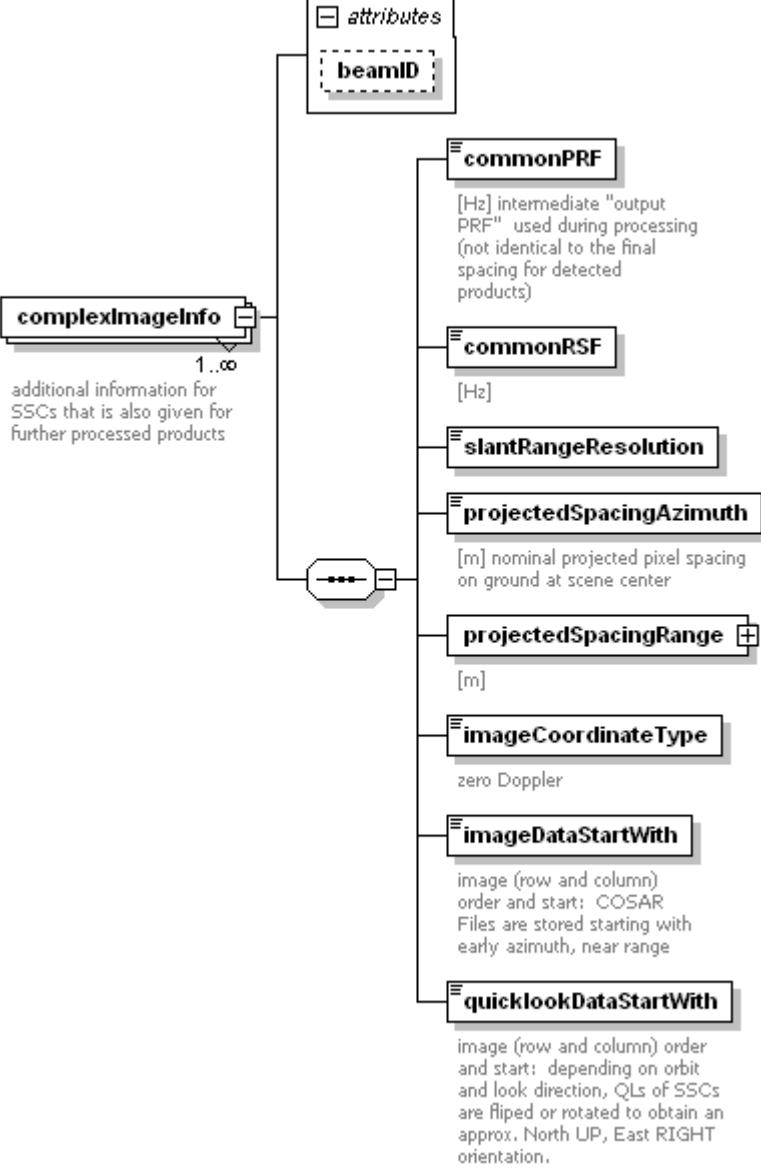
diagram	
type	<b>string255</b>
facets	maxLength 255
annotation	documentation e.g. PNG, GIF

### 6.1.3 Product Specific

**element level1Product/productSpecific**

diagram	
annotation	documentation Specific information for SSCs, detected and geocoded products.

**element level1Product/productSpecific/complexImageInfo**

diagram	 <pre> classDiagram     class complexImageInfo {         &lt;&lt;1..oo&gt;&gt;         &lt;&lt;additional information for SSCs that is also given for further processed products&gt;&gt;     }     class beamID     class commonPRF {         &lt;&lt;[Hz] intermediate "output PRF" used during processing (not identical to the final spacing for detected products)&gt;&gt;     }     class commonRSF {         &lt;&lt;[Hz]&gt;&gt;     }     class slantRangeResolution     class projectedSpacingAzimuth {         &lt;&lt;[m] nominal projected pixel spacing on ground at scene center&gt;&gt;     }     class projectedSpacingRange {         &lt;&lt;[m]&gt;&gt;     }     class imageCoordinateType {         &lt;&lt;zero Doppler&gt;&gt;     }     class imageDataStartWith     class quicklookDataStartWith      complexImageInfo "1..oo" --&gt; commonPRF     beamID --&gt; commonPRF     commonRSF --&gt; commonPRF     slantRangeResolution --&gt; commonPRF     projectedSpacingAzimuth --&gt; commonPRF     projectedSpacingRange --&gt; commonPRF     imageCoordinateType --&gt; commonPRF     imageDataStartWith --&gt; commonPRF     quicklookDataStartWith --&gt; commonPRF </pre>												
attributes	<table border="1" style="width: 100%; border-collapse: collapse;"> <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>beamID</td><td><u>string20</u></td><td></td><td></td><td></td><td></td></tr> </tbody> </table>	Name	Type	Use	Default	Fixed	Annotation	beamID	<u>string20</u>				
Name	Type	Use	Default	Fixed	Annotation								
beamID	<u>string20</u>												
annotation	documentation additional information for SSCs that is also given for further processed products												

#### element level1Product/productSpecific/complexImageInfo/commonPRF

diagram	 <pre> classDiagram     class commonPRF {         &lt;&lt;[Hz] intermediate "output PRF" used during processing (not identical to the final spacing for detected products)&gt;&gt;     }      commonPRF </pre>
type	<b>xs:double</b>
annotation	documentation [Hz] intermediate "output PRF" used during processing (not identical to the final spacing for detected products)

**element level1Product/productSpecific/complexImageInfo/commonRSF**

diagram	 [Hz]
type	<b>xs:double</b>
annotation	documentation [Hz]

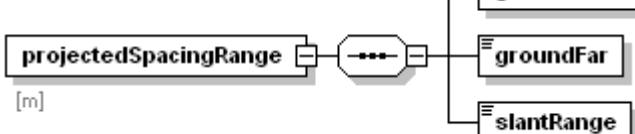
**element level1Product/productSpecific/complexImageInfo/slantRangeResolution**

diagram	
type	<b>xs:double</b>

**element level1Product/productSpecific/complexImageInfo/projectedSpacingAzimuth**

diagram	 [m] nominal projected pixel spacing on ground at scene center
type	<b>xs:float</b>
annotation	documentation [m] nominal projected pixel spacing on ground at scene center

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

diagram	 [m]
annotation	documentation [m]

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

diagram	
type	<b>xs:float</b>

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

diagram	
type	<b>xs:float</b>

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

diagram	
type	<b>xs:float</b>

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

diagram	 <b>imageCoordinateType</b>
	zero Doppler
type	restriction of <b>string128</b>
facets	maxLength 128 enumeration RAW enumeration ZERODOPPLER enumeration UNDEFINED
annotation	documentation zero Doppler

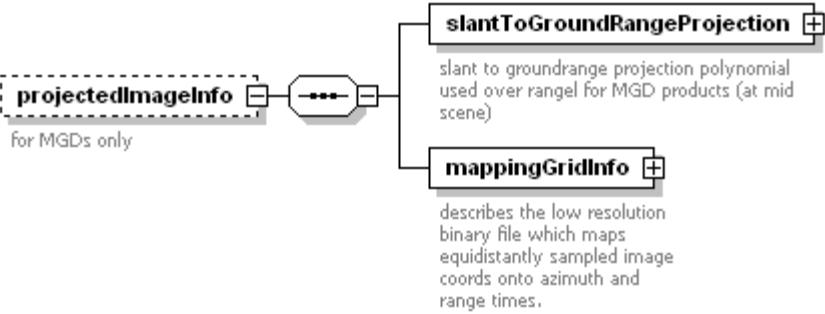
**element level1Product/productSpecific/complexImageInfo/imageDataStartWith**

diagram	 <b>imageDataStartWith</b>
	image (row and column) order and start: COSAR Files are stored starting with early azimuth, near range
type	restriction of <b>xs:NMTOKENS</b>
facets	enumeration EARLYAZNEARRG enumeration EARLYAZFARRG enumeration LATEAZNEARRG enumeration LATEAZFARRG enumeration UNDEFINED

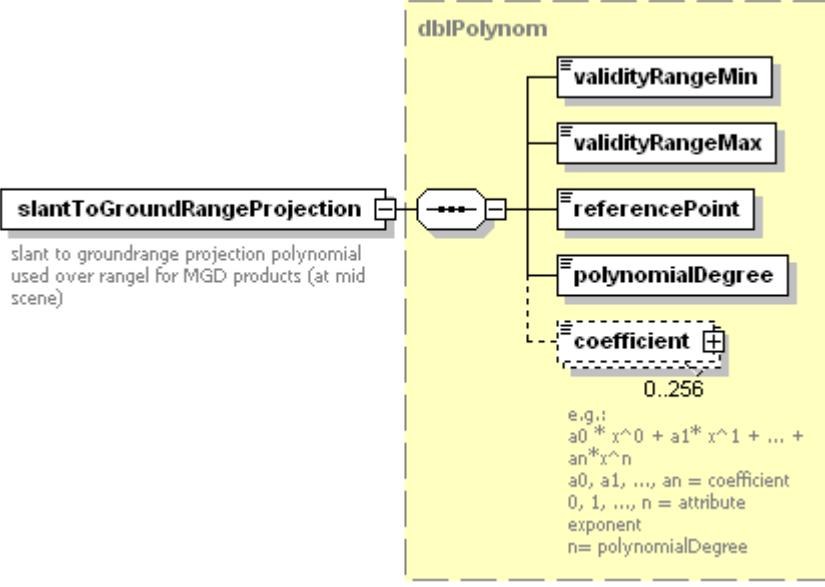
**element level1Product/productSpecific/complexImageInfo/quicklookDataStartWith**

diagram	 <b>quicklookDataStartWith</b>
	image (row and column) order and start: depending on orbit and look direction, QLs of SSCs are fliped or rotated to obtain an approx. North UP, East RIGHT orientation.
type	restriction of <b>xs:NMTOKENS</b>
facets	enumeration EARLYAZNEARRG enumeration EARLYAZFARRG enumeration LATEAZNEARRG enumeration LATEAZFARRG enumeration UNDEFINED
annotation	documentation image (row and column) order and start: depending on orbit and look direction, QLs of SSCs are fliped or rotated to obtain an approx. North UP, East RIGHT orientation.

**element level1Product/productSpecific/projectedImageInfo**

diagram	 <pre> classDiagram     class projectedImageInfo     class slantToGroundRangeProjection     class mappingGridInfo      projectedImageInfo --&gt; slantToGroundRangeProjection     projectedImageInfo --&gt; mappingGridInfo   </pre> <p>for MGDs only</p>
annotation	documentation for MGDs only

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

diagram	 <pre> classDiagram     class slantToGroundRangeProjection     class dblPolynom     class validityRangeMin     class validityRangeMax     class referencePoint     class polynomialDegree     class coefficient      slantToGroundRangeProjection --&gt; dblPolynom     slantToGroundRangeProjection --&gt; validityRangeMin     slantToGroundRangeProjection --&gt; validityRangeMax     slantToGroundRangeProjection --&gt; referencePoint     slantToGroundRangeProjection --&gt; polynomialDegree     slantToGroundRangeProjection --&gt; coefficient   </pre> <p>slant to groundrange projection polynomial used over rangel for MGD products (at mid scene)</p>
type	<b><u>dblPolynom</u></b>
annotation	documentation slant to groundrange projection polynomial used over rangel for MGD products (at mid scene)

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

diagram	<pre> classDiagram     class mappingGridInfo {         &lt;&lt;describes the low resolution binary file which maps equidistantly sampled image coords onto azimuth and range times.&gt;&gt;         pixelValueID         imageDataFormat         imageDataDepth         imageStorageOrder         gridReferenceTime     }     pixelValueID &lt; -- "azimuth and range time (t and tau)"     imageDataFormat &lt; -- "plain binary"     imageDataDepth &lt; -- "bits per pixel = 2*double"     imageStorageOrder &lt; -- "row by row"     gridReferenceTime &lt; -- "origin of time coordinate system"   </pre>
annotation	documentation describes the low resolution binary file which maps equidistantly sampled image coords onto azimuth and range times.

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

diagram	<pre> classDiagram     class pixelValueID {         &lt;&lt;azimuth and range time (t and tau)&gt;&gt;     }   </pre>
type	<u>string128</u>
facets	maxLength 128
annotation	documentation azimuth and range time (t and tau)

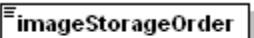
#### element **level1Product/productSpecific/projectedImageInfo/mappingGridInfo/imageDataFormat**

diagram	<pre> classDiagram     class imageDataFormat {         &lt;&lt;plain binary&gt;&gt;     }   </pre>
type	<u>string255</u>
facets	maxLength 255
annotation	documentation plain binary

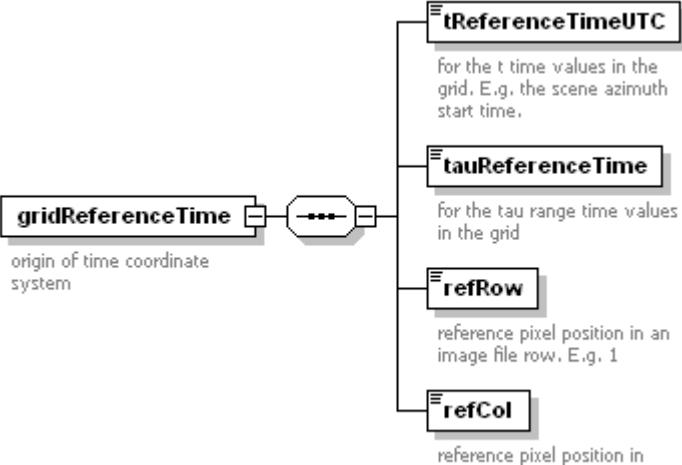
#### element **level1Product/productSpecific/projectedImageInfo/mappingGridInfo/imageDataDepth**

diagram	<pre> classDiagram     class imageDataDepth {         &lt;&lt;bits per pixel = 2*double&gt;&gt;     }   </pre>
type	<u>xs:int</u>
annotation	documentation bits per pixel = 2*double

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

diagram	
	row by row
type	restriction of xs:NMTOKENS
facets	enumeration ROWBYROW enumeration COLBYCOL enumeration UNDEFINED
annotation	documentation row by row

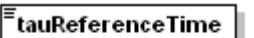
element **level1Product/productSpecific/projectedImageInfo/mappingGridInfo/gridReferenceTime**

diagram	
	origin of time coordinate system
annotation	documentation origin of time coordinate system

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

diagram	
	for the t time values in the grid. E.g. the scene azimuth start time.
type	xs:dateTime
annotation	documentation for the t time values in the grid. E.g. the scene azimuth start time.

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

diagram	
	for the tau range time values in the grid
type	xs:double
annotation	documentation for the tau range time values in the grid

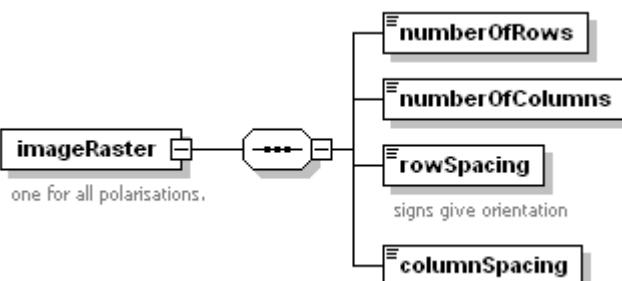
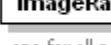
element  
**level1Product/productSpecific/projectedImageInfo/mappingGridInfo/gridReferenceTime/refRow**

diagram	 <b>refRow</b> <small>reference pixel position in an image file row. E.g. 1</small>
type	<b>xs:long</b>
annotation	documentation reference pixel position in an image file row. E.g. 1

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

diagram	 <b>refCol</b> <small>reference pixel position in image column. E.g. 1</small>
type	<b>xs:long</b>
annotation	documentation reference pixel position in image column. E.g. 1

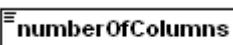
element **level1Product/productSpecific/projectedImageInfo/mappingGridInfo/imageRaster**

diagram	 <b>imageRaster</b>  <small>one for all polarisations.</small>
annotation	documentation one for all polarisations.

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

diagram	 <b>numberOfRows</b>
type	<b>xs:int</b>

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

diagram	 <b>numberOfColumns</b>
type	<b>xs:int</b>

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

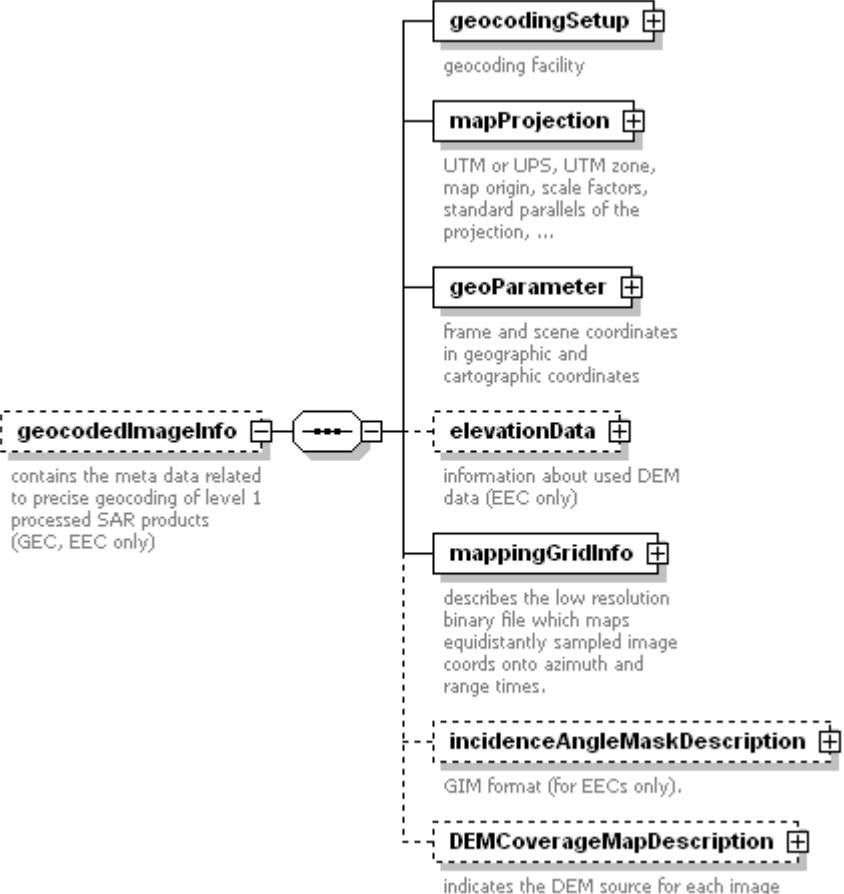
diagram	
	signs give orientation
type	<b>xs:float</b>
annotation	documentation signs give orientation

element

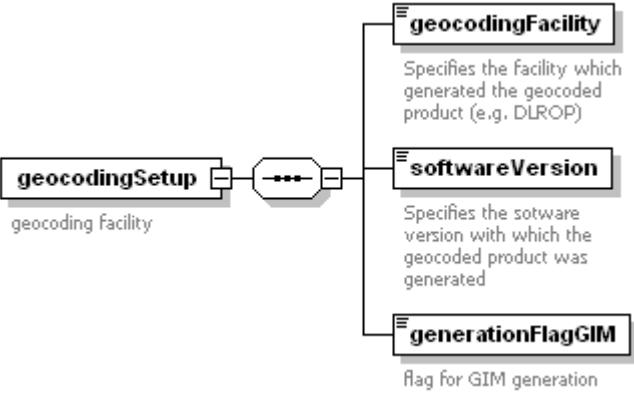
### **level1Product/productSpecific/projectedImageInfo/mappingGridInfo/imageRaster/columnSpacing**

diagram	
type	<b>xs:float</b>

element **level1Product/productSpecific/geocodedImageInfo**

diagram	 <p><b>geocodingSetup</b> [+] geocoding facility</p> <p><b>mapProjection</b> [+] UTM or UPS, UTM zone, map origin, scale factors, standard parallels of the projection, ...</p> <p><b>geoParameter</b> [+] frame and scene coordinates in geographic and cartographic coordinates</p> <p><b>geocodedImageInfo</b> [ ] contains the meta data related to precise geocoding of level 1 processed SAR products (GEC, EEC only)</p> <p><b>elevationData</b> [+] information about used DEM data (EEC only)</p> <p><b>mappingGridInfo</b> [+] describes the low resolution binary file which maps equidistantly sampled image coords onto azimuth and range times.</p> <p><b>incidenceAngleMaskDescription</b> [+] GIM format (for EECs only).</p> <p><b>DEMCoverageMapDescription</b> [+] indicates the DEM source for each image pixel (for EECs only).</p>
annotation	documentation contains the meta data related to precise geocoding of level 1 processed SAR products (GEC, EEC only)

element **level1Product/productSpecific/geocodedImageInfo/geocodingSetup**

diagram	 <pre> classDiagram     class geocodingSetup     class geocodingFacility     class softwareVersion     class generationFlagGIM      geocodingSetup &lt; --&gt; geocodingFacility     geocodingSetup &lt; --&gt; softwareVersion     geocodingSetup &lt; --&gt; generationFlagGIM   </pre> <p>The diagram illustrates the structure of the <code>geocodingSetup</code> element. It is a composite element consisting of three separate components: <code>geocodingFacility</code>, <code>softwareVersion</code>, and <code>generationFlagGIM</code>. Each component is represented by a rectangle with a horizontal bar at the top, indicating they are individual elements within the composite.</p>
annotation	documentation geocoding facility

**element level1Product/productSpecific/geocodedImageInfo/geocodingSetup/geocodingFacility**

diagram	 <p>Specifies the facility which generated the geocoded product (e.g. DLROP)</p>
type	<b>string80</b>
facets	maxLength 80
annotation	documentation Specifies the facility which generated the geocoded product (e.g. DLROP)

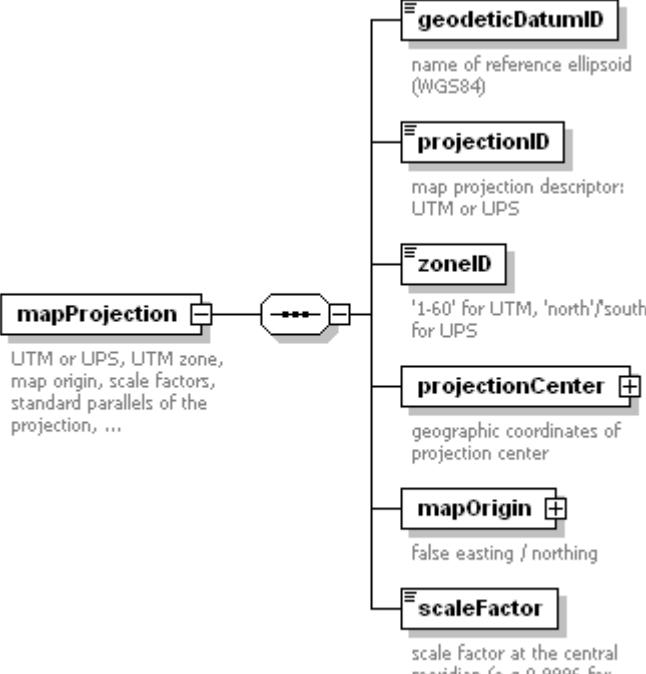
**element level1Product/productSpecific/geocodedImageInfo/geocodingSetup/softwareVersion**

diagram	 <p>Specifies the software version with which the geocoded product was generated</p>
type	<b>string20</b>
facets	maxLength 20
annotation	documentation Specifies the software version with which the geocoded product was generated

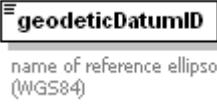
**element level1Product/productSpecific/geocodedImageInfo/geocodingSetup/generationFlagGIM**

diagram	 <p>Flag for GIM generation</p>
type	<b>xs:boolean</b>
annotation	documentation flag for GIM generation

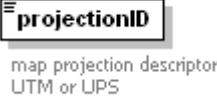
**element level1Product/productSpecific/geocodedImageInfo/mapProjection**

diagram	 <pre> classDiagram     mapProjection "1..&gt;" geodeticDatumID     mapProjection "1..&gt;" projectionID     mapProjection "1..&gt;" zoneID     mapProjection "1..&gt;" projectionCenter     mapProjection "1..&gt;" mapOrigin     mapProjection "1..&gt;" scaleFactor   </pre> <p>mapProjection      UTM or UPS, UTM zone, map origin, scale factors, standard parallels of the projection, ...</p>
annotation	documentation UTM or UPS, UTM zone, map origin, scale factors, standard parallels of the projection, ...

#### element level1Product/productSpecific/geocodedImageInfo/mapProjection/geodeticDatumID

diagram	 <p>geodeticDatumID      name of reference ellipsoid (WGS84)</p>
type	<u>string20</u>
facets	maxLength 20
annotation	documentation name of reference ellipsoid (WGS84)

#### element level1Product/productSpecific/geocodedImageInfo/mapProjection/projectionID

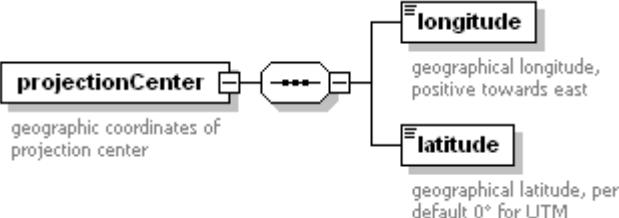
diagram	 <p>projectionID      map projection descriptor: UTM or UPS</p>
type	<u>string20</u>
facets	maxLength 20
annotation	documentation map projection descriptor: UTM or UPS

#### element level1Product/productSpecific/geocodedImageInfo/mapProjection/zoneID

diagram	 <p>zoneID      '1-60' for UTM, 'north'/'south' for UPS</p>
type	<u>string20</u>

facets	maxLength 20
annotation	documentation '1-60' for UTM, 'north'/'south' for UPS

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

diagram	 <pre> graph LR     projectionCenter[projectionCenter] --- longitude[longitude]     projectionCenter --- latitude[latitude]     </pre> <p>geographic coordinates of projection center</p>
annotation	documentation geographic coordinates of projection center

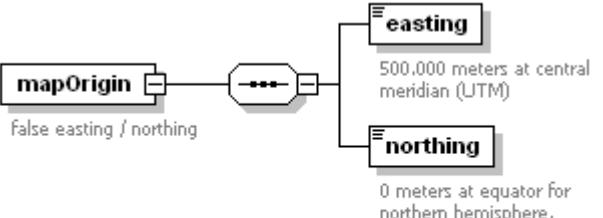
**element level1Product/productSpecific/geocodedImageInfo/mapProjection/projectionCenter/longitude**

diagram	 <p>geographical longitude, positive towards east</p>
type	<u>longitudeDegType</u>
facets	minInclusive -180 maxInclusive 180
annotation	documentation geographical longitude, positive towards east

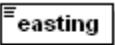
**element level1Product/productSpecific/geocodedImageInfo/mapProjection/projectionCenter/latitude**

diagram	 <p>geographical latitude, per default 0° for UTM</p>
type	<u>latitudeDegType</u>
facets	minInclusive -90 maxInclusive 90
annotation	documentation geographical latitude, per default 0° for UTM

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

diagram	 <pre> graph LR     mapOrigin[mapOrigin] --- easting[easting]     mapOrigin --- northing[northing]     </pre> <p>False easting / northing</p>
annotation	documentation false easting / northing

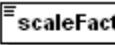
**element level1Product/productSpecific/geocodedImageInfo/mapProjection/mapOrigin/easting**

diagram	 <b>easting</b> <small>500.000 meters at central meridian (UTM)</small>
type	<b>xs:float</b>
annotation	documentation 500.000 meters at central meridian (UTM)

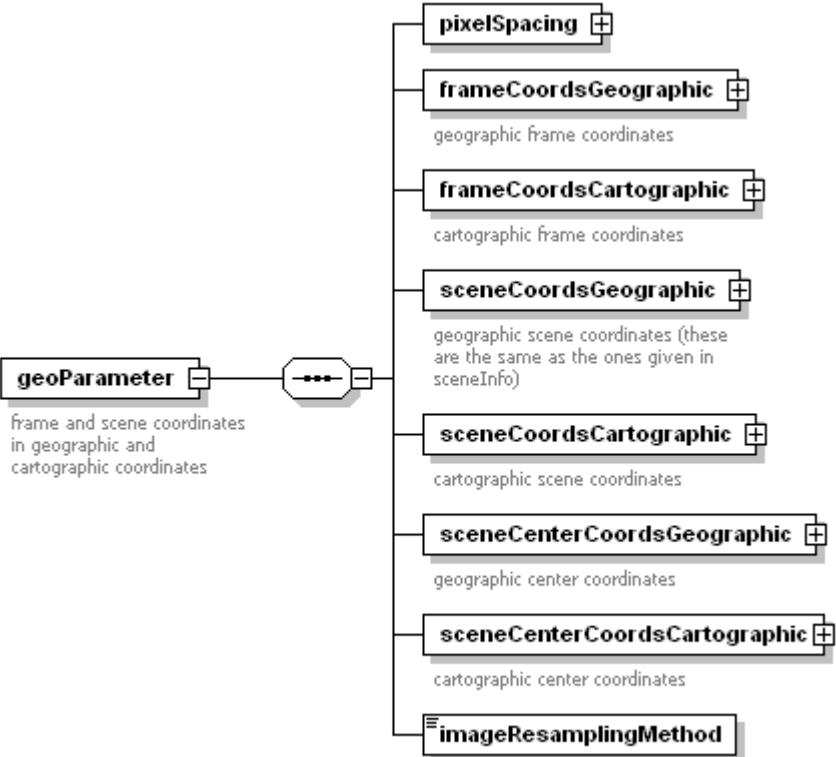
**element level1Product/productSpecific/geocodedImageInfo/mapProjection/mapOrigin/northing**

diagram	 <b>northing</b> <small>0 meters at equator for northern hemisphere,          10.000.000 meters at equator for southern hemisphere</small>
type	<b>xs:float</b>
annotation	documentation 0 meters at equator for northern hemisphere, 10.000.000 meters at equator for southern hemisphere

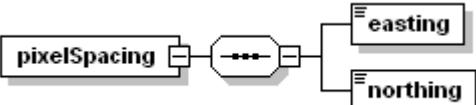
**element level1Product/productSpecific/geocodedImageInfo/mapProjection/scaleFactor**

diagram	 <b>scaleFactor</b> <small>scale Factor at the central meridian (e.g 0,9996 for UTM)</small>
type	<b>xs:float</b>
annotation	documentation scale factor at the central meridian (e.g 0,9996 for UTM)

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

diagram	 <pre> graph TD     geoParameter[geoParameter] --&gt; pixelSpacing[pixelSpacing]     geoParameter --&gt; frameCoordsGeographic[frameCoordsGeographic]     geoParameter --&gt; frameCoordsCartographic[frameCoordsCartographic]     geoParameter --&gt; sceneCoordsGeographic[sceneCoordsGeographic]     geoParameter --&gt; sceneCoordsCartographic[sceneCoordsCartographic]      pixelSpacing     frameCoordsGeographic     frameCoordsCartographic     sceneCoordsGeographic     sceneCoordsCartographic      sceneCoordsGeographic --- note1["frame and scene coordinates in geographic and cartographic coordinates"]     sceneCoordsGeographic --- note2["geographic scene coordinates (these are the same as the ones given in sceneInfo)"]     sceneCoordsCartographic --- note3["cartographic scene coordinates"]     sceneCenterCoordsGeographic[sceneCenterCoordsGeographic]     sceneCenterCoordsCartographic[sceneCenterCoordsCartographic]   </pre>
annotation	documentation frame and scene coordinates in geographic and cartographic coordinates

#### element level1Product/productSpecific/geocodedImageInfo/geoParameter/pixelSpacing

diagram	 <pre> graph TD     pixelSpacing[pixelSpacing] --&gt; easting[easting]     pixelSpacing --&gt; northing[northing]   </pre>
---------	---

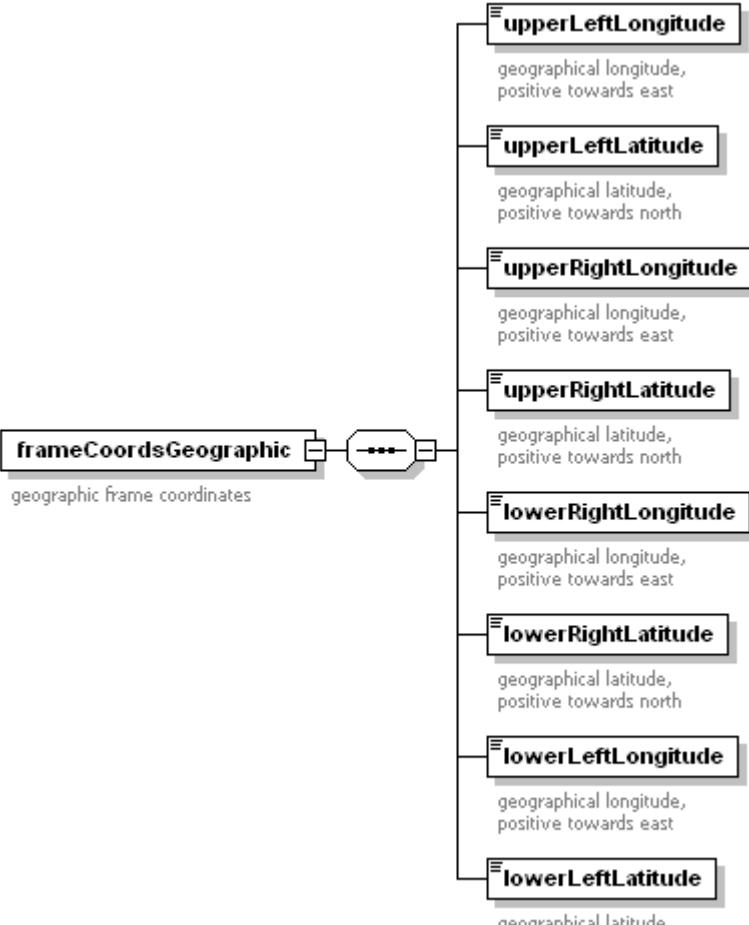
#### element level1Product/productSpecific/geocodedImageInfo/geoParameter/pixelSpacing/easting

diagram	 <pre> graph TD     easting[easting]   </pre>
type	xs:float

#### element level1Product/productSpecific/geocodedImageInfo/geoParameter/pixelSpacing/northing

diagram	 <pre> graph TD     northing[northing]   </pre>
type	xs:float

#### element level1Product/productSpecific/geocodedImageInfo/geoParameter/frameCoordsGeographic

diagram	 <pre> classDiagram     class frameCoordsGeographic {         &lt;&lt;geographic frame coordinates&gt;&gt;     }     class upperLeftLongitude     class upperLeftLatitude     class upperRightLongitude     class upperRightLatitude     class lowerRightLongitude     class lowerRightLatitude     class lowerLeftLongitude     class lowerLeftLatitude      frameCoordsGeographic "3" --&gt; upperLeftLongitude :      frameCoordsGeographic "3" --&gt; upperLeftLatitude :      frameCoordsGeographic "3" --&gt; upperRightLongitude :      frameCoordsGeographic "3" --&gt; upperRightLatitude :      frameCoordsGeographic "3" --&gt; lowerRightLongitude :      frameCoordsGeographic "3" --&gt; lowerRightLatitude :      frameCoordsGeographic "3" --&gt; lowerLeftLongitude :      frameCoordsGeographic "3" --&gt; lowerLeftLatitude :   </pre>
annotation	documentation geographic frame coordinates

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

diagram	 <p><b>upperLeftLongitude</b>      geographical longitude, positive towards east</p>
type	<u>longitudeDegType</u>
facets	minInclusive -180 maxInclusive 180
annotation	documentation geographical longitude, positive towards east

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

diagram	 <p><b>upperLeftLatitude</b>      geographical latitude, positive towards north</p>
---------	--

type	<b><u>latitudeDegType</u></b>
facets	minInclusive -90 maxInclusive 90
annotation	documentation geographical latitude, positive towards north

element

**level1Product/productSpecific/geocodedImageInfo/geoParameter/frameCoordsGeographic/upperRightLongitude**

diagram	 <b>upperRightLongitude</b> <small>geographical longitude, positive towards east</small>
type	<b><u>longitudeDegType</u></b>
facets	minInclusive -180 maxInclusive 180

element

**level1Product/productSpecific/geocodedImageInfo/geoParameter/frameCoordsGeographic/upperRightLatitude**

diagram	 <b>upperRightLatitude</b> <small>geographical latitude, positive towards north</small>
type	<b><u>latitudeDegType</u></b>
facets	minInclusive -90 maxInclusive 90

element

**level1Product/productSpecific/geocodedImageInfo/geoParameter/frameCoordsGeographic/lowerRightLongitude**

diagram	 <b>lowerRightLongitude</b> <small>geographical longitude, positive towards east</small>
type	<b><u>longitudeDegType</u></b>
facets	minInclusive -180 maxInclusive 180

element

**level1Product/productSpecific/geocodedImageInfo/geoParameter/frameCoordsGeographic/lowerRightLatitude**

diagram	 <b>lowerRightLatitude</b> <small>geographical latitude, positive towards north</small>
---------	---

type	<b><u>latitudeDegType</u></b>
facets	minInclusive -90 maxInclusive 90
annotation	documentation geographical latitude, positive towards north

element

**level1Product/productSpecific/geocodedImageInfo/geoParameter/frameCoordsGeographic/lowerLeftLongitude**

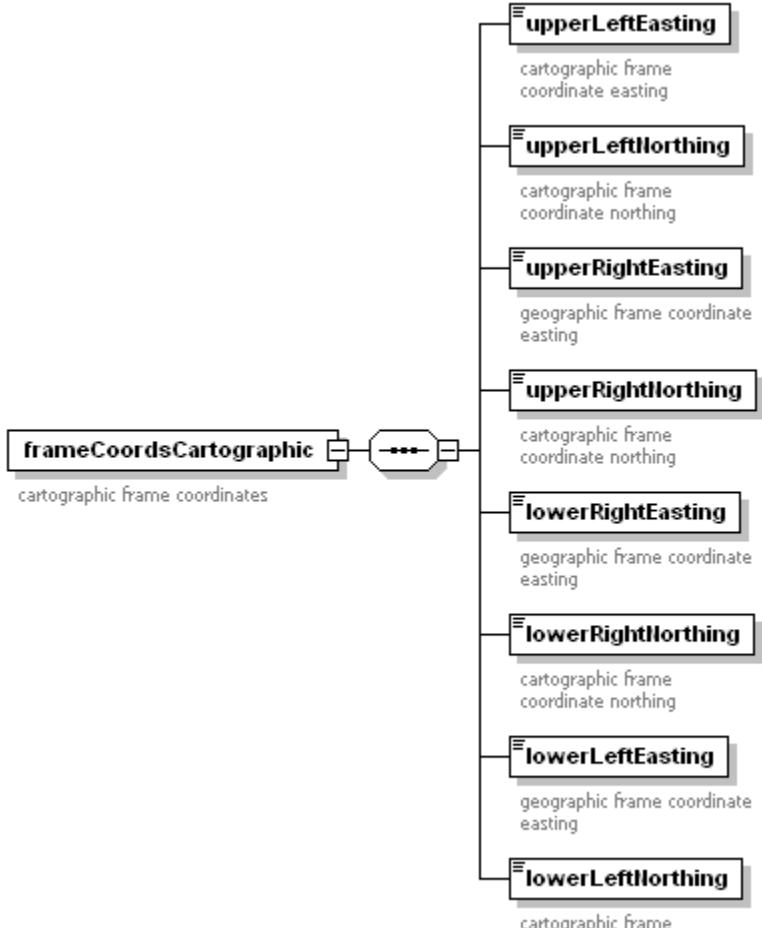
diagram	 <b>lowerLeftLongitude</b>  geographical longitude, positive towards east
type	<b><u>longitudeDegType</u></b>
facets	minInclusive -180 maxInclusive 180
annotation	documentation geographical longitude, positive towards east

element

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

diagram	 <b>lowerLeftLatitude</b>  geographical latitude, positive towards north
type	<b><u>latitudeDegType</u></b>
facets	minInclusive -90 maxInclusive 90
annotation	documentation geographical latitude, positive towards north

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

diagram	 <pre> classDiagram     class frameCoordsCartographic {         &lt;&lt;cartographic frame coordinates&gt;&gt;     }     class upperLeftEasting {         &lt;&lt;cartographic frame coordinate easting&gt;&gt;     }     class upperLeftNorthing {         &lt;&lt;cartographic frame coordinate northing&gt;&gt;     }     class upperRightEasting {         &lt;&lt;geographic frame coordinate easting&gt;&gt;     }     class upperRightNorthing {         &lt;&lt;cartographic frame coordinate northing&gt;&gt;     }     class lowerRightEasting {         &lt;&lt;geographic frame coordinate easting&gt;&gt;     }     class lowerRightNorthing {         &lt;&lt;cartographic frame coordinate northing&gt;&gt;     }     class lowerLeftEasting {         &lt;&lt;geographic frame coordinate easting&gt;&gt;     }     class lowerLeftNorthing {         &lt;&lt;cartographic frame coordinate northing&gt;&gt;     }      frameCoordsCartographic "2" --&gt; upperLeftEasting :      frameCoordsCartographic "2" --&gt; upperLeftNorthing :      frameCoordsCartographic "2" --&gt; upperRightEasting :      frameCoordsCartographic "2" --&gt; upperRightNorthing :      frameCoordsCartographic "2" --&gt; lowerRightEasting :      frameCoordsCartographic "2" --&gt; lowerRightNorthing :      frameCoordsCartographic "2" --&gt; lowerLeftEasting :      frameCoordsCartographic "2" --&gt; lowerLeftNorthing :   </pre>
annotation	documentation cartographic frame coordinates

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

diagram	 <p>cartographic frame coordinate easting</p>
type	<b>xs:double</b>
annotation	documentation cartographic frame coordinate easting

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

diagram	 <p>cartographic frame coordinate northing</p>
type	<b>xs:double</b>
annotation	documentation cartographic frame coordinate northing

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

diagram	 <b>upperRightEasting</b>
	geographic frame coordinate easting
type	<b>xs:double</b>
annotation	documentation geographic frame coordinate easting

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

diagram	 <b>upperRightNorthing</b>
	cartographic frame coordinate northing
type	<b>xs:double</b>
annotation	documentation cartographic frame coordinate northing

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

diagram	 <b>lowerRightEasting</b>
	geographic frame coordinate easting
type	<b>xs:double</b>
annotation	documentation geographic frame coordinate easting

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

diagram	 <b>lowerRightNorthing</b>
	cartographic frame coordinate northing
type	<b>xs:double</b>
annotation	documentation cartographic frame coordinate northing

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

diagram	 <b>lowerLeftEasting</b>
	geographic frame coordinate easting
type	<b>xs:double</b>

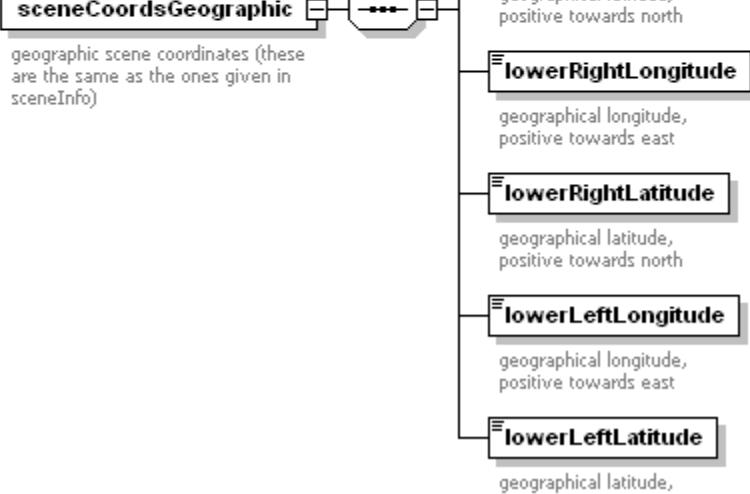
annotation	documentation geographic frame coordinate easting
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element

**level1Product/productSpecific/geocodedImageInfo/geoParameter/frameCoordsCartographic/lowerLeftNorthing**

diagram	 <b>lowerLeftNorthing</b> <small>cartographic frame coordinate northing</small>
type	<b>xs:double</b>
annotation	documentation cartographic frame coordinate northing

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

diagram	 <b>sceneCoordsGeographic</b> <small>geographic scene coordinates (these are the same as the ones given in sceneInfo)</small>
annotation	documentation geographic scene coordinates (these are the same as the ones given in sceneInfo)

element

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

diagram	 <b>upperLeftLongitude</b> <small>geographical longitude, positive towards east</small>
type	<b>longitudeDegType</b>
facets	minInclusive -180 maxInclusive 180
annotation	documentation geographical longitude, positive towards east

element

**level1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCoordsGeographic/upperLeftLatitude**

diagram	 <b>upperLeftLatitude</b> <small>geographical latitude, positive towards north</small>
type	<b>latitudeDegType</b>
facets	minInclusive -90 maxInclusive 90
annotation	documentation geographical latitude, positive towards north

element

**level1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCoordsGeographic/upperRightLongitude**

diagram	 <b>upperRightLongitude</b> <small>geographical longitude, positive towards east</small>
type	<b>longitudeDegType</b>
facets	minInclusive -180 maxInclusive 180
annotation	documentation geographical longitude, positive towards east

element

**level1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCoordsGeographic/upperRightLatitude**

diagram	 <b>upperRightLatitude</b> <small>geographical latitude, positive towards north</small>
type	<b>latitudeDegType</b>
facets	minInclusive -90 maxInclusive 90
annotation	documentation geographical latitude, positive towards north

element

**level1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCoordsGeographic/lowerRightLongitude**

diagram	 <b>lowerRightLongitude</b> <small>geographical longitude, positive towards east</small>
type	<b>longitudeDegType</b>
facets	minInclusive -180 maxInclusive 180
annotation	documentation geographical longitude, positive towards east

element

**level1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCoordsGeographic/lowerRightLatitude**

diagram	 <b>lowerRightLatitude</b> <small>geographical latitude, positive towards north</small>
type	<b>latitudeDegType</b>
facets	minInclusive -90 maxInclusive 90
annotation	documentation geographical latitude, positive towards north

element

**level1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCoordsGeographic/lowerLeftLongitude**

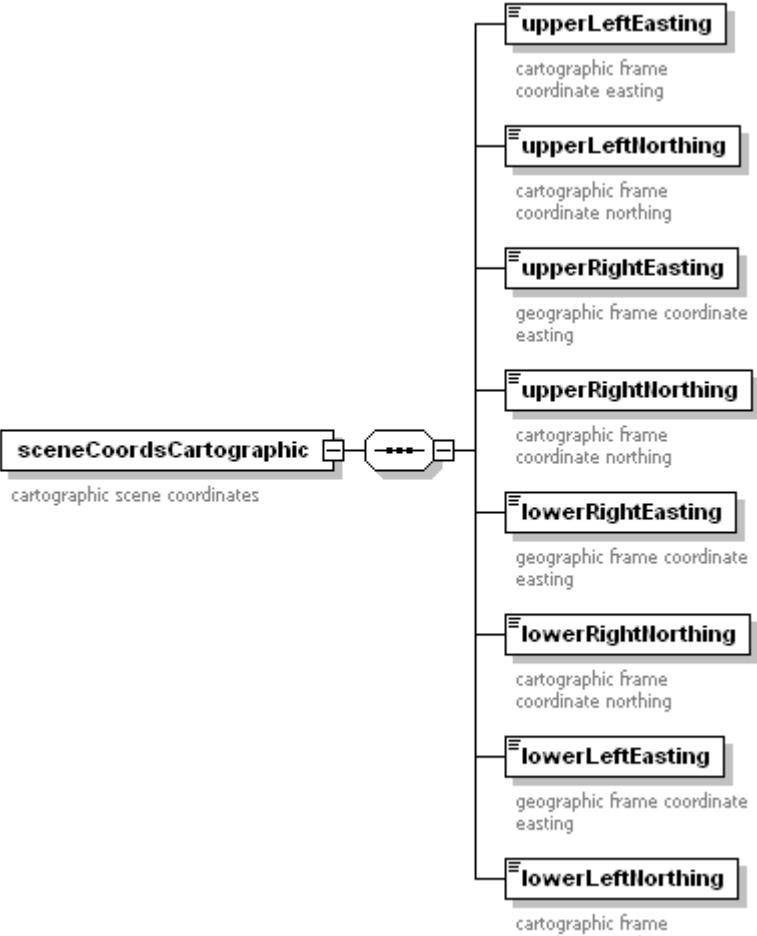
diagram	 <b>lowerLeftLongitude</b> <small>geographical longitude, positive towards east</small>
type	<b>longitudeDegType</b>
facets	minInclusive -180 maxInclusive 180
annotation	documentation geographical longitude, positive towards east

element

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

diagram	 <b>lowerLeftLatitude</b> <small>geographical latitude, positive towards north</small>
type	<b>latitudeDegType</b>
facets	minInclusive -90 maxInclusive 90
annotation	documentation geographical latitude, positive towards north

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

diagram	 <pre> classDiagram     class sceneCoordsCartographic {         &lt;&lt;cartographic scene coordinates&gt;&gt;     }     class upperLeftEasting {         &lt;&lt;cartographic frame coordinate easting&gt;&gt;     }     class upperLeftNorthing {         &lt;&lt;cartographic frame coordinate northing&gt;&gt;     }     class upperRightEasting {         &lt;&lt;geographic frame coordinate easting&gt;&gt;     }     class upperRightNorthing {         &lt;&lt;cartographic frame coordinate northing&gt;&gt;     }     class lowerRightEasting {         &lt;&lt;geographic frame coordinate easting&gt;&gt;     }     class lowerRightNorthing {         &lt;&lt;cartographic frame coordinate northing&gt;&gt;     }     class lowerLeftEasting {         &lt;&lt;geographic frame coordinate easting&gt;&gt;     }     class lowerLeftNorthing {         &lt;&lt;cartographic frame coordinate northing&gt;&gt;     }      sceneCoordsCartographic "3" --&gt; upperLeftEasting :      sceneCoordsCartographic "3" --&gt; upperLeftNorthing :      sceneCoordsCartographic "3" --&gt; upperRightEasting :      sceneCoordsCartographic "3" --&gt; upperRightNorthing :      sceneCoordsCartographic "3" --&gt; lowerRightEasting :      sceneCoordsCartographic "3" --&gt; lowerRightNorthing :      sceneCoordsCartographic "3" --&gt; lowerLeftEasting :      sceneCoordsCartographic "3" --&gt; lowerLeftNorthing :   </pre>
annotation	documentation cartographic scene coordinates

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

diagram	 <pre> class upperLeftEasting {     &lt;&lt;cartographic frame coordinate easting&gt;&gt; }   </pre>
type	<b>xs:double</b>
annotation	documentation cartographic frame coordinate easting

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

diagram	 <pre> class upperLeftNorthing {     &lt;&lt;cartographic frame coordinate northing&gt;&gt; }   </pre>
type	<b>xs:double</b>
annotation	documentation cartographic frame coordinate northing

element

**level1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCoordsCartographic/upperRightEasting**

diagram	 <b>upperRightEasting</b>
	geographic frame coordinate easting
type	<b>xs:double</b>
annotation	documentation geographic frame coordinate easting

element

**level1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCoordsCartographic/upperRightNorthing**

diagram	 <b>upperRightNorthing</b>
	cartographic frame coordinate northing
type	<b>xs:double</b>
annotation	documentation cartographic frame coordinate northing

element

**level1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCoordsCartographic/lowerRightEasting**

diagram	 <b>lowerRightEasting</b>
	geographic frame coordinate easting
type	<b>xs:double</b>
annotation	documentation geographic frame coordinate easting

element

**level1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCoordsCartographic/lowerRightNorthing**

diagram	 <b>lowerRightNorthing</b>
	cartographic frame coordinate northing
type	<b>xs:double</b>
annotation	documentation cartographic frame coordinate northing

element

**level1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCoordsCartographic/lowerLeftEasting**

diagram	 <b>lowerLeftEasting</b>
	geographic frame coordinate easting
type	<b>xs:double</b>

annotation	documentation geographic frame coordinate easting
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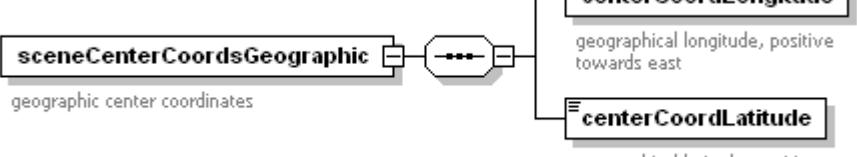
element

**level1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCoordsCartographic/lowerLeftNorthing**

diagram	 cartographic frame coordinate northing
type	<b>xs:double</b>
annotation	documentation cartographic frame coordinate northing

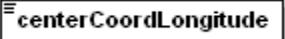
element

**level1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCenterCoordsGeographic**

diagram	 geographic center coordinates
annotation	documentation geographic center coordinates

element

**level1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCenterCoordsGeographic/centerCoordLongitude**

diagram	 geographical longitude, positive towards east
type	<b>longitudeDegType</b>
facets	minInclusive -180 maxInclusive 180
annotation	documentation geographical longitude, positive towards east

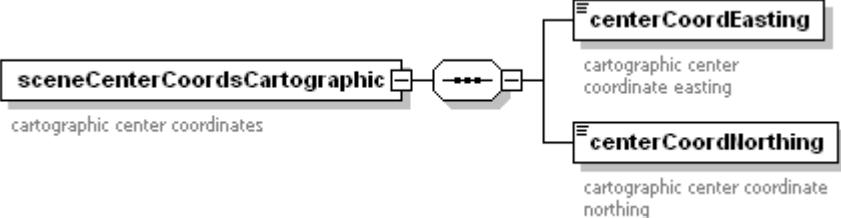
element

**level1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCenterCoordsGeographic/centerCoordLatitude**

diagram	 geographical latitude, positive towards north
type	<b>latitudeDegType</b>
facets	minInclusive -90 maxInclusive 90
annotation	documentation geographical latitude, positive towards north

element

**level1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCenterCoordsCartographic**

diagram	 <pre> classDiagram     class sceneCenterCoordsCartographic {         &lt;&lt;cartographic center coordinates&gt;&gt;     }     class centerCoordEasting {         &lt;&lt;cartographic center coordinate easting&gt;&gt;     }     class centerCoordNorthing {         &lt;&lt;cartographic center coordinate northing&gt;&gt;     }     sceneCenterCoordsCartographic "3" --&gt; centerCoordEasting :      sceneCenterCoordsCartographic "3" --&gt; centerCoordNorthing :   </pre>
annotation	documentation cartographic center coordinates

element

**level1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCenterCoordsCartographic/centerCoordEasting**

diagram	 <pre> classDiagram     class centerCoordEasting {         &lt;&lt;cartographic center coordinate easting&gt;&gt;     }     class sceneCenterCoordsCartographic {         &lt;&lt;cartographic center coordinates&gt;&gt;     }     centerCoordEasting "3" --&gt; sceneCenterCoordsCartographic :   </pre>
type	<b>xs:double</b>
annotation	documentation cartographic center coordinate easting

element

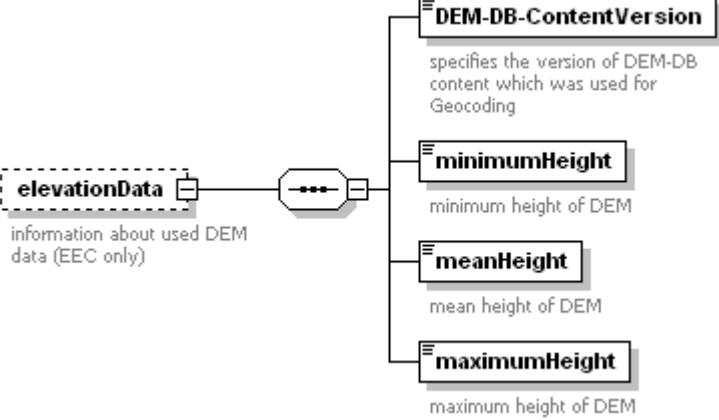
**level1Product/productSpecific/geocodedImageInfo/geoParameter/sceneCenterCoordsCartographic/centerCoordNorthing**

diagram	 <pre> classDiagram     class centerCoordNorthing {         &lt;&lt;cartographic center coordinate northing&gt;&gt;     }     class sceneCenterCoordsCartographic {         &lt;&lt;cartographic center coordinates&gt;&gt;     }     centerCoordNorthing "3" --&gt; sceneCenterCoordsCartographic :   </pre>
type	<b>xs:double</b>
annotation	documentation cartographic center coordinate northing

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

diagram	 <pre> classDiagram     class imageResamplingMethod {         &lt;&lt;used interpolation for image resampling. One of: NN, BI, CC&gt;&gt;     }     class level1Product {         &lt;&lt;productSpecific&gt;&gt;     }     class geoParameter {         &lt;&lt;geocodedImageInfo&gt;&gt;     }     level1Product "3" --&gt; geoParameter :      geoParameter "3" --&gt; imageResamplingMethod :   </pre>
type	<b>string20</b>
facets	maxLength 20
annotation	documentation used interpolation for image resampling. One of: NN, BI, CC

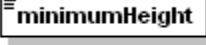
element **level1Product/productSpecific/geocodedImageInfo/elevationData**

diagram	 <p>The diagram illustrates the structure of the elevationData element. It consists of a dashed box labeled 'elevationData' containing a sequence of three nodes: a square node, a rounded rectangle node with three dots, and another square node. An arrow points from 'elevationData' to a box labeled 'DEM-DB-ContentVersion'. From 'DEM-DB-ContentVersion', three arrows point to three separate boxes: 'minimumHeight', 'meanHeight', and 'maximumHeight'. Below each box is its corresponding documentation.</p>
annotation	documentation information about used DEM data (EEC only)

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

diagram	 <p>specifies the version of DEM-DB content which was used for Geocoding</p>
type	extension of <a href="#">string80</a>
facets	maxLength 80
annotation	documentation specifies the version of DEM-DB content which was used for Geocoding

#### element level1Product/productSpecific/geocodedImageInfo/elevationData/minimumHeight

diagram	 <p>minimum height of DEM</p>
type	<a href="#">xs:float</a>
annotation	documentation minimum height of DEM

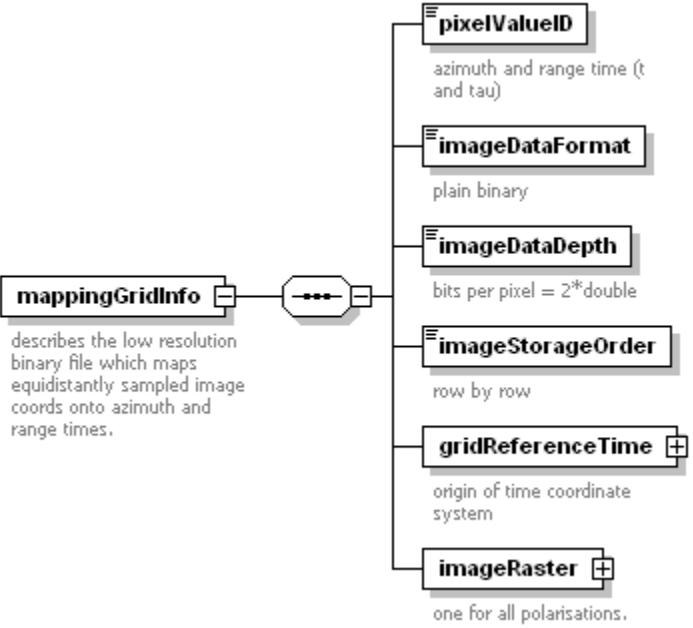
#### element level1Product/productSpecific/geocodedImageInfo/elevationData/meanHeight

diagram	 <p>mean height of DEM</p>
type	<a href="#">xs:float</a>
annotation	documentation mean height of DEM

#### element level1Product/productSpecific/geocodedImageInfo/elevationData/maximumHeight

diagram	 <p>maximum height of DEM</p>
type	<a href="#">xs:float</a>
annotation	documentation maximum height of DEM

### element level1Product/productSpecific/geocodedImageInfo/mappingGridInfo

diagram	 <pre> classDiagram     class mappingGridInfo {         &lt;&lt;describes the low resolution binary file which maps equidistantly sampled image coords onto azimuth and range times.&gt;&gt;     }     class pixelValueID {         &lt;&lt;azimuth and range time (t and tau)&gt;&gt;     }     class imageDataFormat {         &lt;&lt;plain binary&gt;&gt;     }     class imageDataDepth {         &lt;&lt;bits per pixel = 2*double&gt;&gt;     }     class imageStorageOrder {         &lt;&lt;row by row&gt;&gt;     }     class gridReferenceTime {         &lt;&lt;origin of time coordinate system&gt;&gt;     }     class imageRaster {         &lt;&lt;one for all polarisations.&gt;&gt;     }      mappingGridInfo "3" -- "4" pixelValueID     mappingGridInfo "3" -- "4" imageDataFormat     mappingGridInfo "3" -- "4" imageDataDepth     mappingGridInfo "3" -- "4" imageStorageOrder     mappingGridInfo "3" -- "4" gridReferenceTime     mappingGridInfo "3" -- "4" imageRaster   </pre>
annotation	documentation describes the low resolution binary file which maps equidistantly sampled image coords onto azimuth and range times.

### element level1Product/productSpecific/geocodedImageInfo/mappingGridInfo/pixelValueID

diagram	 <pre> classDiagram     class pixelValueID {         &lt;&lt;azimuth and range time (t and tau)&gt;&gt;     }   </pre>
type	<u>string128</u>
facets	maxLength 128
annotation	documentation azimuth and range time (t and tau)

### element level1Product/productSpecific/geocodedImageInfo/mappingGridInfo/imageDataFormat

diagram	 <pre> classDiagram     class imageDataFormat {         &lt;&lt;plain binary&gt;&gt;     }   </pre>
type	<u>string255</u>
facets	maxLength 255
annotation	documentation plain binary

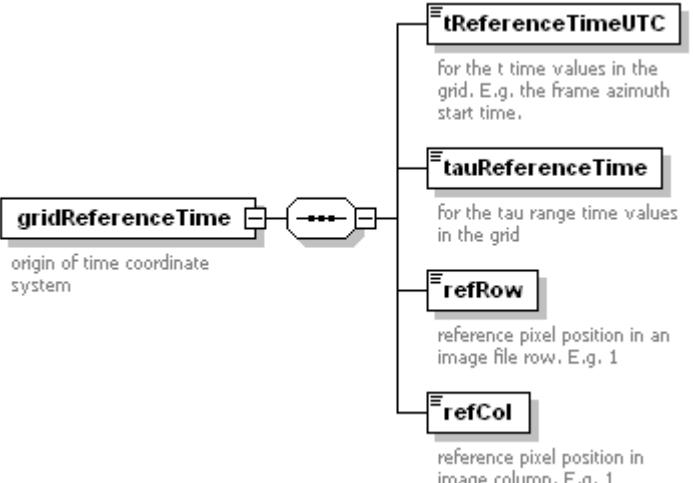
### element level1Product/productSpecific/geocodedImageInfo/mappingGridInfo/imageDataDepth

diagram	 <pre> classDiagram     class imageDataDepth {         &lt;&lt;bits per pixel = 2*double&gt;&gt;     }   </pre>
type	<u>xs:int</u>
annotation	documentation bits per pixel = 2*double

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

diagram	
type	restriction of <b>xs:NMTOKENS</b>
facets	enumeration ROWBYROW enumeration COLBYCOL enumeration UNDEFINED
annotation	documentation row by row

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

diagram	
annotation	documentation origin of time coordinate system

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

diagram	
type	<b>xs:dateTime</b>
annotation	documentation for the t time values in the grid. E.g. the frame azimuth start time.

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

diagram	
type	<b>xs:double</b>
annotation	documentation for the tau range time values in the grid

element

**level1Product/productSpecific/geocodedImageInfo/mappingGridInfo/gridReferenceTime/refRow**

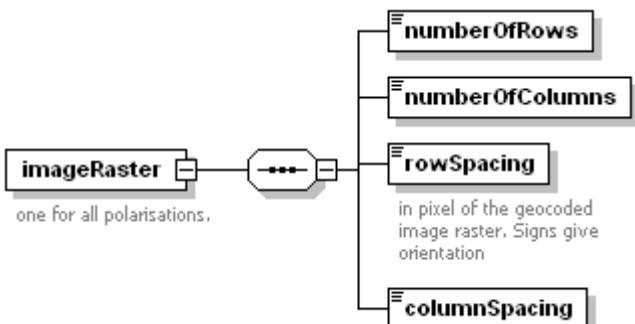
diagram	 <b>refRow</b> <small>reference pixel position in an image file row. E.g. 1</small>
type	<b>xs:long</b>
annotation	documentation reference pixel position in an image file row. E.g. 1

element

**level1Product/productSpecific/geocodedImageInfo/mappingGridInfo/gridReferenceTime/refCol**

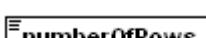
diagram	 <b>refCol</b> <small>reference pixel position in image column. E.g. 1</small>
type	<b>xs:long</b>
annotation	documentation reference pixel position in image column. E.g. 1

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

diagram	 <b>imageRaster</b> <small>one for all polarisations.</small>
annotation	documentation one for all polarisations.

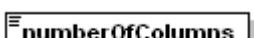
element

**level1Product/productSpecific/geocodedImageInfo/mappingGridInfo/imageRaster/numberOfRows**

diagram	 <b>numberOfRows</b>
type	<b>xs:int</b>

element

**level1Product/productSpecific/geocodedImageInfo/mappingGridInfo/imageRaster/numberOfColumns**

diagram	 <b>numberOfColumns</b>
type	<b>xs:int</b>

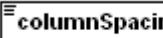
element

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

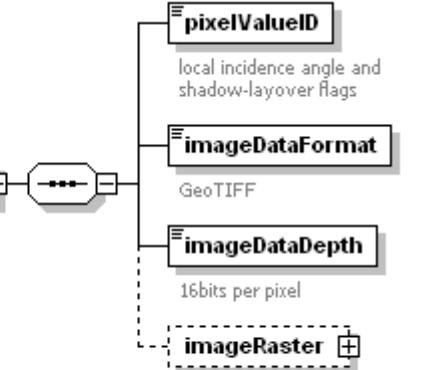
diagram	 <p>in pixel of the geocoded image raster. Signs give orientation</p>
type	<b>xs:float</b>
annotation	documentation in pixel of the geocoded image raster. Signs give orientation

element

**level1Product/productSpecific/geocodedImageInfo/mappingGridInfo/imageRaster/columnSpacing**

diagram	
type	<b>xs:float</b>

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

diagram	 <p>GIM format (for EECs only).</p>  <p><b>pixelValueID</b> local incidence angle and shadow-layover flags</p> <p><b>imageDataFormat</b> GeoTIFF</p> <p><b>imageDataDepth</b> 16bits per pixel</p> <p><b>imageRaster</b> + one for all polarisations. Has the same dimensions as the geocoded image.</p>
annotation	documentation GIM format (for EECs only).

element

**level1Product/productSpecific/geocodedImageInfo/incidenceAngleMaskDescription/pixelValueID**

diagram	 <p>local incidence angle and shadow-layover flags</p>
type	<b>string128</b>
facets	maxLength 128
annotation	documentation local incidence angle and shadow-layover flags

element

**level1Product/productSpecific/geocodedImageInfo/incidenceAngleMaskDescription/imageDataFormat**

diagram	 <p>GeoTIFF</p>
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type	<b>string255</b>
facets	maxLength 255
annotation	documentation GeoTIFF

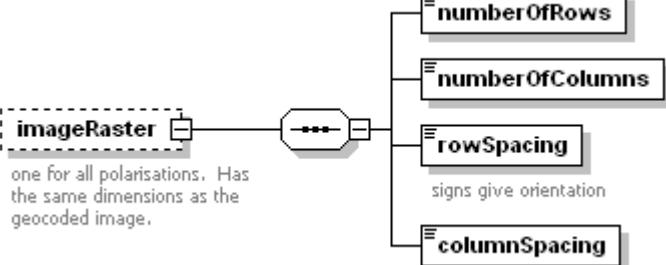
element

**level1Product/productSpecific/geocodedImageInfo/incidenceAngleMaskDescription/imageDataDepth**

diagram	 <b>imageDataDepth</b> 16bits per pixel
type	<b>xs:int</b>
annotation	documentation 16bits per pixel

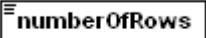
element

**level1Product/productSpecific/geocodedImageInfo/incidenceAngleMaskDescription/imageRaster**

diagram	 <b>imageRaster</b> one for all polarisations. Has the same dimensions as the geocoded image. signs give orientation
annotation	documentation one for all polarisations. Has the same dimensions as the geocoded image.

element

**level1Product/productSpecific/geocodedImageInfo/incidenceAngleMaskDescription/imageRaster/numberOfRows**

diagram	 <b>numberOfRows</b>
type	<b>xs:int</b>

element

**level1Product/productSpecific/geocodedImageInfo/incidenceAngleMaskDescription/imageRaster/numberOfColumns**

diagram	 <b>numberOfColumns</b>
type	<b>xs:int</b>

element

**level1Product/productSpecific/geocodedImageInfo/incidenceAngleMaskDescription/imageRaster/rowSpacing**

diagram	 <b>rowSpacing</b> signs give orientation
type	<b>xs:float</b>

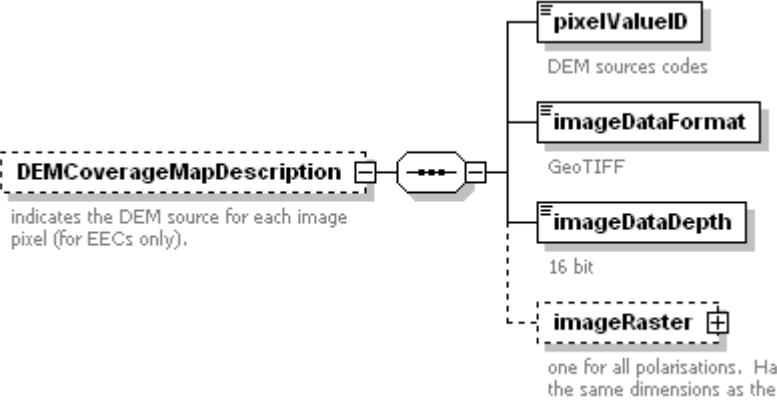
annotation	documentation signs give orientation
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element

**level1Product/productSpecific/geocodedImageInfo/incidenceAngleMaskDescription/imageRaster/columnSpacing**

diagram	
type	<b>xs:float</b>

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

diagram	
annotation	documentation indicates the DEM source for each image pixel (for EECs only).

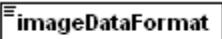
element

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

diagram	
	DEM sources codes
type	<b>string128</b>
facets	maxLength 128
annotation	documentation DEM sources codes

element

**level1Product/productSpecific/geocodedImageInfo/DEMCoverageMapDescription/imageDataFormat**

diagram	
	GeoTIFF
type	<b>string255</b>
facets	maxLength 255
annotation	documentation GeoTIFF

element

**level1Product/productSpecific/geocodedImageInfo/DEMCoverageMapDescription/imageDataDepth**

diagram	
	16 bit
type	<b>xs:int</b>
annotation	documentation 16 bit

element

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

diagram	<pre> graph LR     imageRaster[imageRaster] --- dots[...]     dots --- numberOfRows[numberOfRows]     dots --- numberOfColumns[numberOfColumns]     dots --- rowSpacing[rowSpacing]     dots --- columnSpacing[columnSpacing]     </pre> <p>one for all polarisations. Has the same dimensions as the geocoded image.</p>
annotation	documentation one for all polarisations. Has the same dimensions as the geocoded image.

element

**level1Product/productSpecific/geocodedImageInfo/DEMCoverageMapDescription/imageRaster/numberOfRows**

diagram	
type	<b>xs:int</b>

element

**level1Product/productSpecific/geocodedImageInfo/DEMCoverageMapDescription/imageRaster/numberOfColumns**

diagram	
type	<b>xs:int</b>

element

**level1Product/productSpecific/geocodedImageInfo/DEMCoverageMapDescription/imageRaster/rowSpacing**

diagram	
	signs give orientation
type	<b>xs:float</b>
annotation	documentation signs give orientation

element

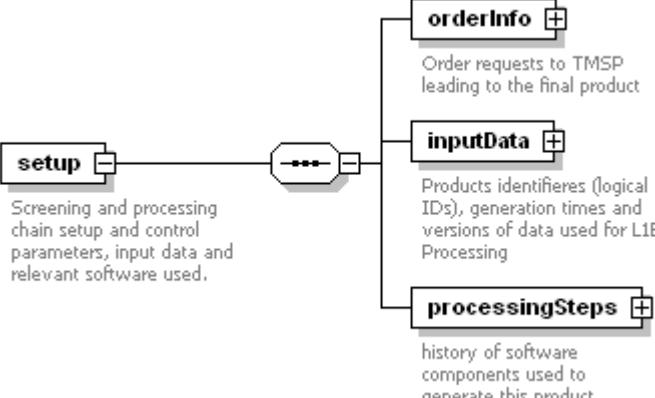
**level1Product/productSpecific/geocodedImageInfo/DEMCoverageMapDescription/imageRaster/columnSpacing**



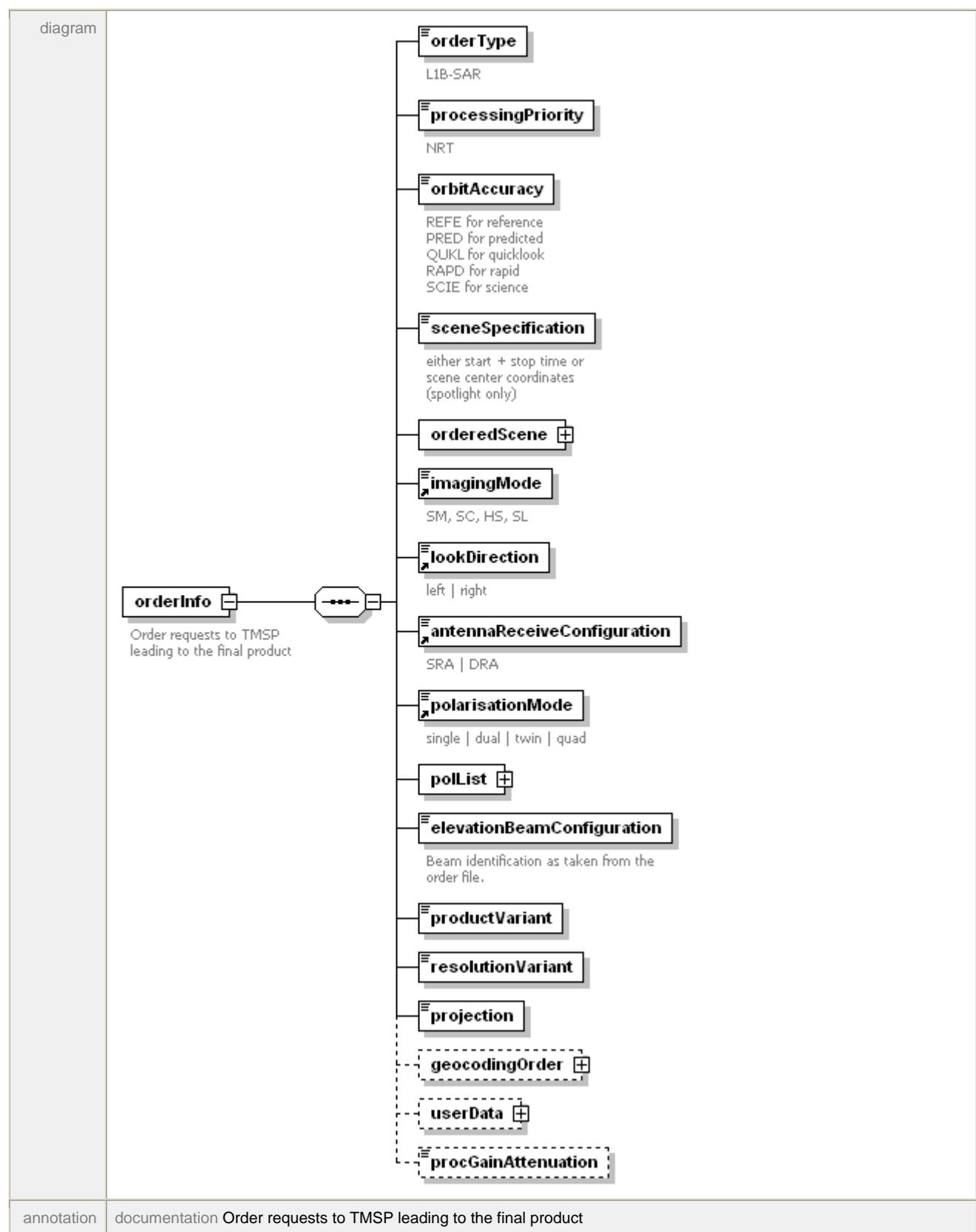
diagram	<b>columnSpacing</b>
type	<b>xs:float</b>

## 6.1.4 Setup

### element level1Product/setup

diagram	 <pre> graph LR     setup[setup] --- orderInfo[orderInfo]     setup --- inputData[inputData]     setup --- processingSteps[processingSteps]     </pre> <p>The diagram illustrates the structure of the setup element. It consists of a central rectangular box labeled "setup" with a minus sign icon. Three lines extend from this central box to three separate rectangular boxes, each with a plus sign icon. The first box is labeled "orderInfo" and contains the text: "Order requests to TMSP leading to the final product". The second box is labeled "inputData" and contains the text: "Products identifiers (logical IDs), generation times and versions of data used for LIB Processing". The third box is labeled "processingSteps" and contains the text: "history of software components used to generate this product".</p>
annotation	documentation Screening and processing chain setup and control parameters, input data and relevant software used.

### element level1Product/setup/orderInfo



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

diagram	 <b>orderType</b>
	L1B-SAR
type	<b>string128</b>
facets	maxLength 128
annotation	documentation L1B-SAR

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

diagram	 <b>processingPriority</b>
	NRT
type	<b>string20</b>
facets	maxLength 20
annotation	documentation NRT

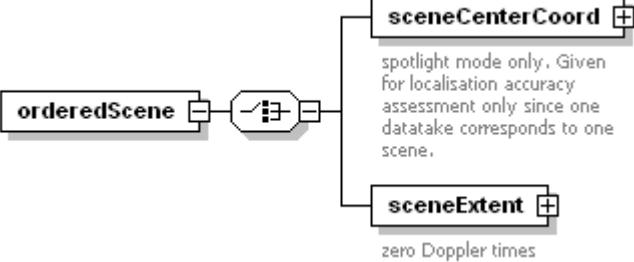
#### element **level1Product/setup/orderInfo/orbitAccuracy**

diagram	 <b>orbitAccuracy</b>  REFE for reference PRED for predicted QUKL for quicklook RAPD for rapid SCIE for science
type	restriction of <b>xs:NMTOKEN</b>
facets	enumeration REFE enumeration PRED enumeration QUKL enumeration RAPD enumeration SCIE enumeration UNDEFINED
annotation	documentation REFE for reference PRED for predicted QUKL for quicklook RAPD for rapid SCIE for science

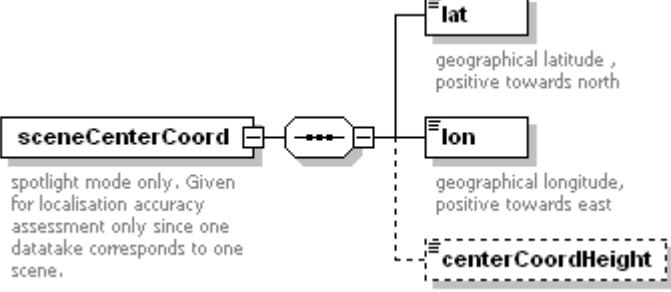
#### element **level1Product/setup/orderInfo/sceneSpecification**

diagram	 <b>sceneSpecification</b>  either start + stop time or scene center coordinates (spotlight only)
type	restriction of <b>xs:NMTOKENS</b>
facets	enumeration TIME enumeration CENTERCOORDS enumeration UNDEFINED
annotation	documentation either start + stop time or scene center coordinates (spotlight only)

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

diagram	 <p><b>sceneCenterCoord</b> +      spotlight mode only. Given for localisation accuracy assessment only since one datatake corresponds to one scene.</p> <p><b>sceneExtent</b> +      zero Doppler times</p>
---------	---

#### element level1Product/setup/orderInfo/orderedScene/sceneCenterCoord

diagram	 <p><b>lat</b>      geographical latitude , positive towards north</p> <p><b>lon</b>      geographical longitude, positive towards east</p> <p><b>centerCoordHeight</b></p> <p>spotlight mode only. Given for localisation accuracy assessment only since one datatake corresponds to one scene.</p>
annotation	documentation spotlight mode only. Given for localisation accuracy assessment only since one datatake corresponds to one scene.

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

diagram	 <p>geographical latitude , positive towards north</p>
type	<u>latitudeDegType</u>
facets	minInclusive -90 maxInclusive 90
annotation	documentation geographical latitude , positive towards north

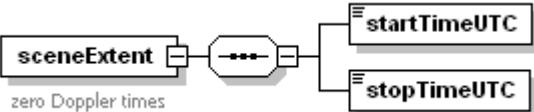
#### element level1Product/setup/orderInfo/orderedScene/sceneCenterCoord/lon

diagram	 <p>geographical longitude, positive towards east</p>
type	<u>longitudeDegType</u>
facets	minInclusive -180 maxInclusive 180
annotation	documentation geographical longitude, positive towards east

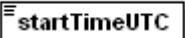
#### element level1Product/setup/orderInfo/orderedScene/sceneCenterCoord/centerCoordHeight

diagram	
type	<u>xs:double</u>

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

diagram	 <pre> sequenceDiagram     participant SE as sceneExtent     participant ST as startTimeUTC     participant ST2 as stopTimeUTC     SE-&gt;&gt;ST: zero Doppler times     SE-&gt;&gt;ST2: zero Doppler times   </pre>
annotation	documentation zero Doppler times

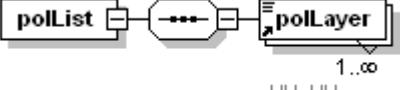
**element level1Product/setup/orderInfo/orderedScene/sceneExtent/startTimeUTC**

diagram	 <pre> classDiagram     class startTimeUTC   </pre>
type	<b>xs:dateTime</b>

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

diagram	 <pre> classDiagram     class stopTimeUTC   </pre>
type	<b>xs:dateTime</b>

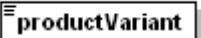
**element level1Product/setup/orderInfo/polList**

diagram	 <pre> sequenceDiagram     participant PL as polList     participant PL2 as polLayer     PL-&gt;&gt;PL2: 1..∞     PL2--&gt;&gt;PL2: HH, HV, ...   </pre>
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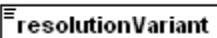
**element level1Product/setup/orderInfo/elevationBeamConfiguration**

diagram	 <pre> classDiagram     class elevationBeamConfiguration   </pre> <p>Beam identification as taken from the order file.</p>
type	<b>string20</b>
facets	maxLength 20
annotation	documentation Beam identification as taken from the order file.

**element level1Product/setup/orderInfo/productVariant**

diagram	 <pre> classDiagram     class productVariant   </pre>
type	restriction of <b>xs:NMTOKENS</b>
facets	enumeration SSC enumeration MGD enumeration GEC enumeration EEC enumeration UNDEFINED

**element level1Product/setup/orderInfo/resolutionVariant**

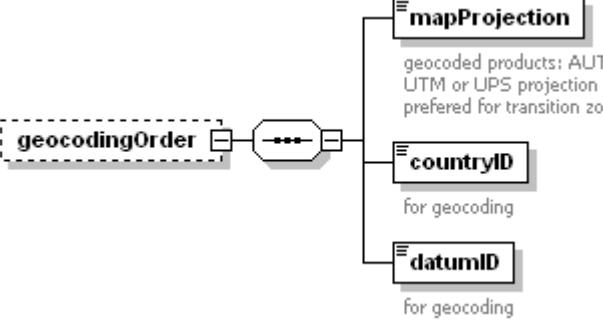
diagram	 <pre> classDiagram     class resolutionVariant   </pre>
---------	---

type	restriction of xs:NMTOKENS
facets	enumeration SE enumeration RE enumeration UNDEFINED

**element level1Product/setup/orderInfo/projection**

diagram	
type	restriction of xs:NMTOKENS
facets	enumeration GROUNDRANGE enumeration SLANTRANGE enumeration UNDEFINED enumeration MAP

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

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

diagram	 geocoded products: AUTO, UTM or UPS projection prefered for transition zones
type	restriction of xs:NMTOKENS
facets	enumeration UTM enumeration UPS enumeration UNDEFINED enumeration AUTO
annotation	documentation geocoded products: AUTO, UTM or UPS projection prefered for transition zones

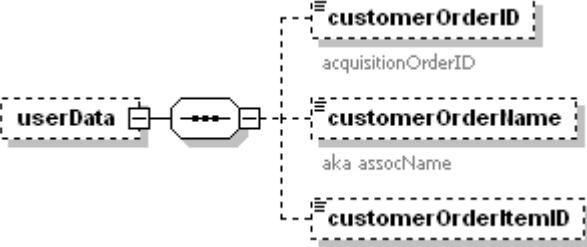
**element level1Product/setup/orderInfo/geocodingOrder/countryID**

diagram	 For geocoding
type	<u>string128</u>
facets	maxLength 128
annotation	documentation for geocoding

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

diagram	
type	<u>string128</u>
facets	maxLength 128
annotation	documentation for geocoding

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

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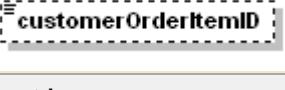
#### element **level1Product/setup/orderInfo/userData/customerOrderID**

diagram	
type	<u>xs:string</u>
annotation	documentation acquisitionOrderID

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

diagram	
type	<u>xs:string</u>
annotation	documentation aka assocName

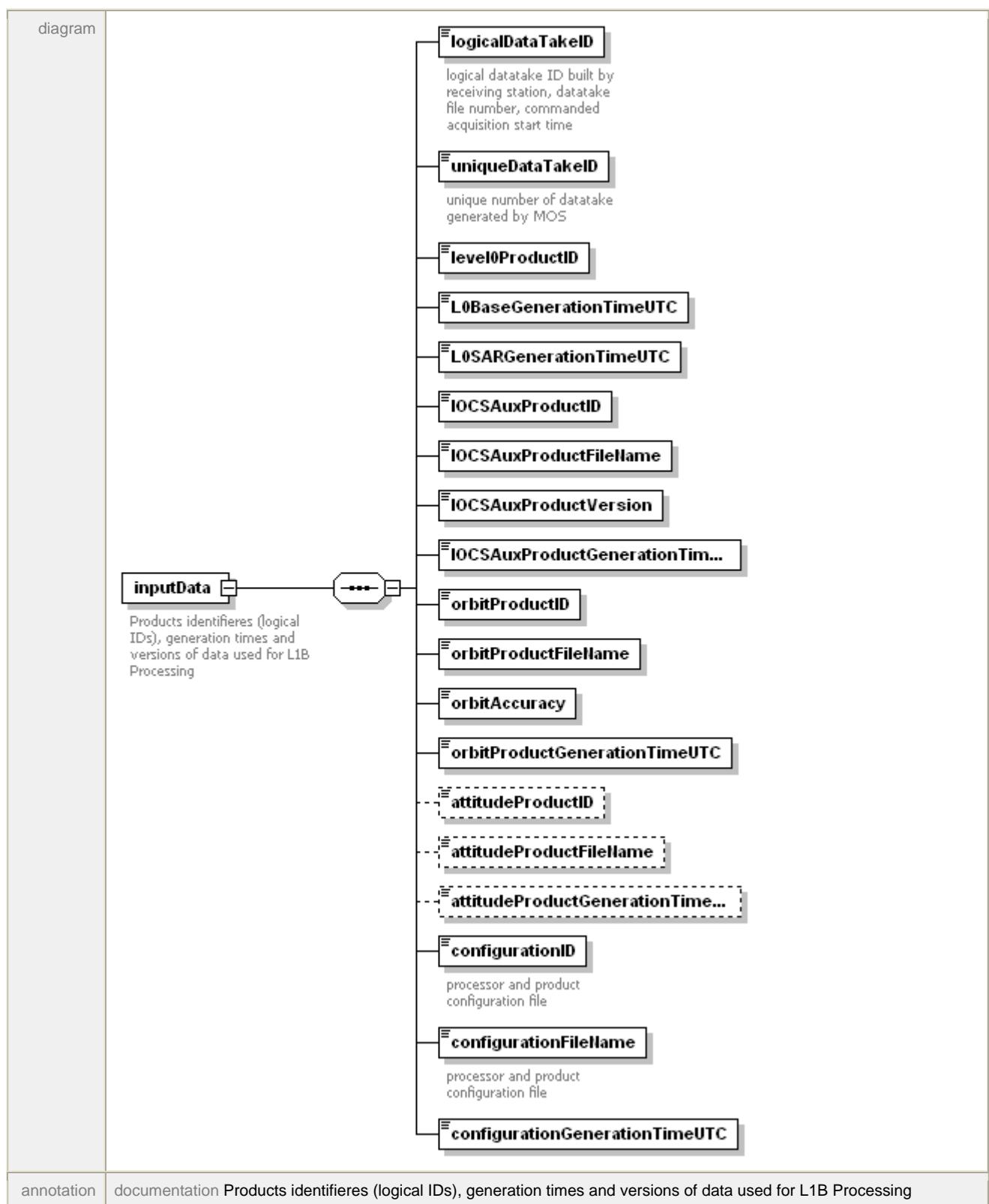
#### element **level1Product/setup/orderInfo/userData/customerOrderItemID**

diagram	
type	<u>xs:string</u>

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

diagram	
type	<u>xs:double</u>

#### element **level1Product/setup/inputData**



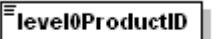
element **level1Product/setup/inputData/logicalDataTakeID**

diagram	 <b>logicalDataTakeID</b>
	logical datatake ID built by receiving station, datatake file number, commanded acquisition start time
type	<b>string1024</b>
facets	maxLength 1024
annotation	documentation logical datatake ID built by receiving station, datatake file number, commanded acquisition start time

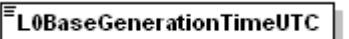
#### element **level1Product/setup/inputData/uniqueDataTakeID**

diagram	 <b>uniqueDataTakeID</b>
	unique number of datatake generated by MOS
type	<b>string1024</b>
facets	maxLength 1024

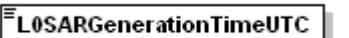
#### element **level1Product/setup/inputData/level0ProductID**

diagram	 <b>level0ProductID</b>
type	<b>string1024</b>
facets	maxLength 1024

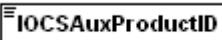
#### element **level1Product/setup/inputData/L0BaseGenerationTimeUTC**

diagram	 <b>L0BaseGenerationTimeUTC</b>
type	<b>xs:dateTime</b>

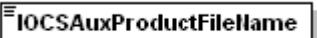
#### element **level1Product/setup/inputData/L0SARGenerationTimeUTC**

diagram	 <b>L0SARGenerationTimeUTC</b>
type	<b>xs:dateTime</b>

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

diagram	 <b>IOCSAuxProductID</b>
type	<b>string1024</b>
facets	maxLength 1024

#### element **level1Product/setup/inputData/IOCSAuxProductName**

diagram	 <b>IOCSAuxProductName</b>
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type	<u>string1024</u>
facets	maxLength 1024

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

diagram	 <b>IOCSAuxProductVersion</b>
type	<u>string80</u>
facets	maxLength 80

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

diagram	 <b>IOCSAuxProductGenerationTim...</b>
type	<u>xs:dateTime</u>

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

diagram	 <b>orbitProductID</b>
type	<u>string1024</u>
facets	maxLength 1024

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

diagram	 <b>orbitProductFileName</b>
type	<u>string1024</u>
facets	maxLength 1024

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

diagram	 <b>orbitAccuracy</b>
type	restriction of <u>xs:string</u>
facets	maxLength 20 enumeration REFE enumeration PRED enumeration QUKL enumeration RAPD enumeration SCIE

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

diagram	 <b>orbitProductGenerationTimeUTC</b>
type	<u>xs:dateTime</u>

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

diagram	 <b>attitudeProductID</b>
type	<b>string1024</b>
facets	maxLength 1024

**element level1Product/setup/inputData/attitudeProductName**

diagram	 <b>attitudeProductName</b>
type	<b>string1024</b>
facets	maxLength 1024

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

diagram	 <b>attitudeProductGenerationTime...</b>
type	<b>xs:dateTime</b>

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

diagram	 <b>configurationID</b>  processor and product configuration file
type	<b>string1024</b>
facets	maxLength 1024
annotation	documentation processor and product configuration file

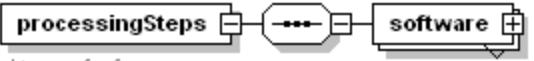
**element level1Product/setup/inputData/configurationFileName**

diagram	 <b>configurationFileName</b>  processor and product configuration file
type	<b>string1024</b>
facets	maxLength 1024
annotation	documentation processor and product configuration file

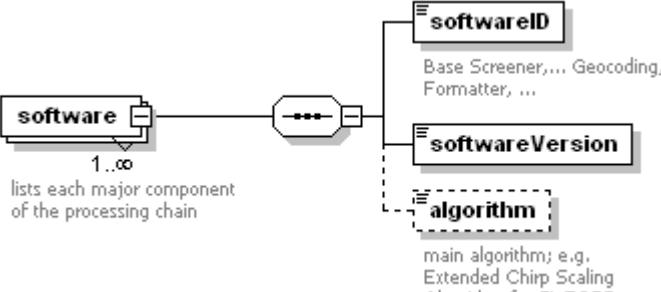
**element level1Product/setup/inputData/configurationGenerationTimeUTC**

diagram	 <b>configurationGenerationTimeUTC</b>
type	<b>xs:dateTime</b>

**element level1Product/setup/processingSteps**

diagram	 <p>history of software components used to generate this product</p>
annotation	documentation history of software components used to generate this product

#### element level1Product/setup/processingSteps/software

diagram	 <p>lists each major component of the processing chain</p>
annotation	documentation lists each major component of the processing chain

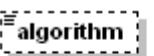
#### element level1Product/setup/processingSteps/software/softwareID

diagram	 <p>Base Screener,... Geocoding, Formatter, ...</p>
type	<u>string128</u>
facets	maxLength 128
annotation	documentation Base Screener,... Geocoding, Formatter, ...

#### element level1Product/setup/processingSteps/software/softwareVersion

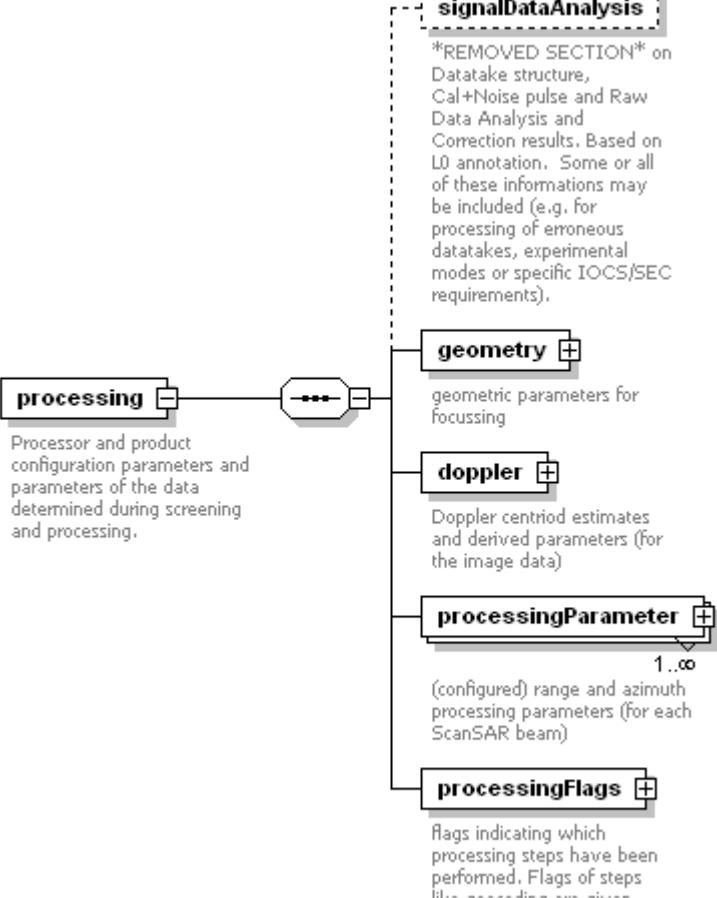
diagram	
type	<u>string128</u>
facets	maxLength 128

#### element level1Product/setup/processingSteps/software/algorithm

diagram	 <p>main algorithm; e.g. Extended Chirp Scaling Algorithm for SL ECSS,...</p>
type	<u>string255</u>
facets	maxLength 255
annotation	documentation main algorithm; e.g. Extended Chirp Scaling Algorithm for SL ECSS,...

## 6.1.5 Processing

### element level1Product/processing

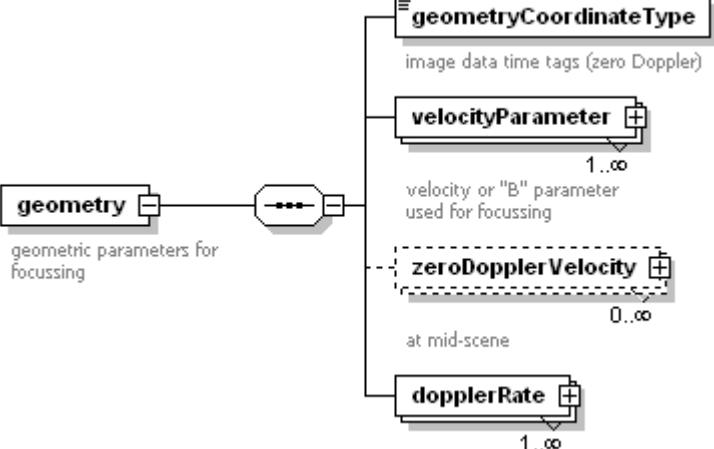
diagram	 <pre> graph LR     processing[processing] --&gt; dots1((...))     dots1 --- signalDataAnalysis[signalDataAnalysis]     signalDataAnalysis --- geometry[geometry]     signalDataAnalysis --- doppler[doppler]     signalDataAnalysis --- processingParameter[processingParameter]     signalDataAnalysis --- processingFlags[processingFlags]     </pre> <p>The diagram illustrates the structure of the processing element. It starts with a 'processing' block, which connects to a dashed-line box labeled 'signalDataAnalysis'. This box contains several sub-blocks: 'geometry' (with a plus sign), 'doppler' (with a plus sign), 'processingParameter' (with a plus sign and a value of 1..oo), and 'processingFlags' (with a plus sign). Each of these sub-blocks has a brief description below it.</p>
annotation	documentation Processor and product configuration parameters and parameters of the data determined during screening and processing.

### element level1Product/processing/signalDataAnalysis

diagram	 <p>*REMOVED SECTION* on Datatake structure, Cal+Noise pulse and Raw Data Analysis and Correction results. Based on L0 annotation. Some or all of these informations may be included (e.g. for processing of erroneous datatakes, experimental modes or specific IOCS/SEC requirements).</p>
annotation	documentation *REMOVED SECTION* on Datatake structure, Cal+Noise pulse and Raw Data Analysis and Correction results. Based on L0 annotation. Some or all of these informations may be included (e.g. for processing of erroneous datatakes, experimental modes or specific IOCS/SEC requirements).

### element level1Product/processing/geometry

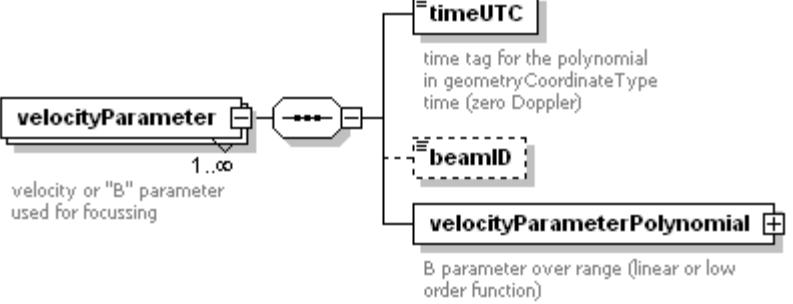
Public

diagram	 <pre> classDiagram     class geometry     class geometryCoordinateType {         &lt;&lt;image data time tags (zero Doppler)&gt;&gt;     }     class velocityParameter {         &lt;&lt;velocity or "B" parameter used for focussing&gt;&gt;         &lt;&lt;1..&gt;&gt;     }     class zeroDopplerVelocity {         &lt;&lt;0..&gt;&gt;         &lt;&lt;at mid-scene&gt;&gt;     }     class dopplerRate {         &lt;&lt;1..&gt;&gt;     }      geometry --&gt; geometryCoordinateType     geometryCoordinateType &lt; -- velocityParameter     geometryCoordinateType &lt; -- zeroDopplerVelocity     geometryCoordinateType &lt; -- dopplerRate   </pre> <p>The diagram shows a class named <b>geometry</b> connected to a class named <b>geometryCoordinateType</b>. The <b>geometryCoordinateType</b> class has three subclasses: <b>velocityParameter</b>, <b>zeroDopplerVelocity</b>, and <b>dopplerRate</b>. Each subclass has its own documentation string below it.</p>
annotation	documentation geometric parameters for focussing

#### element level1Product/processing/geometry/geometryCoordinateType

diagram	 <pre> classDiagram     class geometryCoordinateType {         &lt;&lt;image data time tags (zero Doppler)&gt;&gt;     }   </pre> <p>The diagram shows a class named <b>geometryCoordinateType</b> with its documentation string below it.</p>
type	<b>string20</b>
facets	maxLength 20
annotation	documentation image data time tags (zero Doppler)

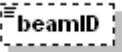
#### element level1Product/processing/geometry/velocityParameter

diagram	 <pre> classDiagram     class velocityParameter {         &lt;&lt;velocity or "B" parameter used for focussing&gt;&gt;         &lt;&lt;1..&gt;&gt;     }     class timeUTC {         &lt;&lt;time tag for the polynomial in geometryCoordinateType time (zero Doppler)&gt;&gt;     }     class beamID {         &lt;&lt;beam ID&gt;&gt;     }     class velocityParameterPolynomial {         &lt;&lt;B parameter over range (linear or low order function)&gt;&gt;     }     velocityParameter --&gt; timeUTC     velocityParameter --&gt; beamID     velocityParameter --&gt; velocityParameterPolynomial   </pre> <p>The diagram shows a class named <b>velocityParameter</b> connected to three other classes: <b>timeUTC</b>, <b>beamID</b>, and <b>velocityParameterPolynomial</b>. Each class has its own documentation string below it.</p>
annotation	documentation velocity or "B" parameter used for focussing

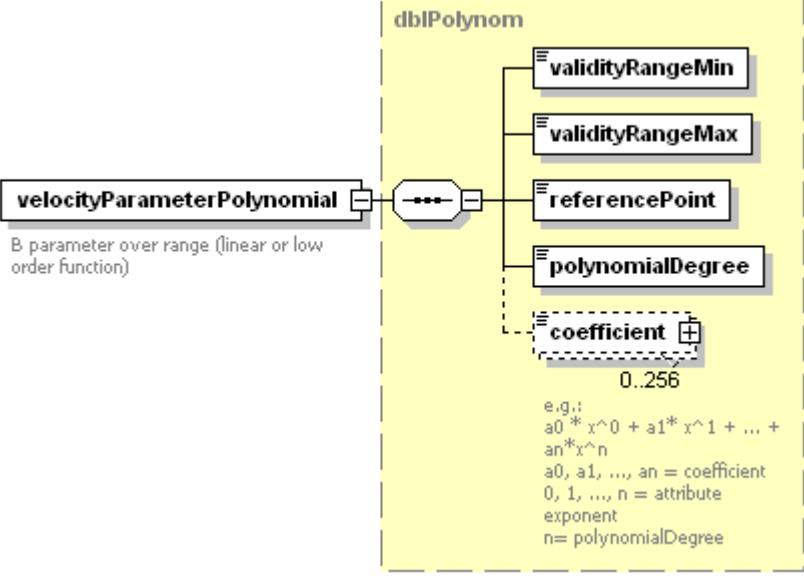
#### element level1Product/processing/geometry/velocityParameter/timeUTC

diagram	 <pre> classDiagram     class timeUTC {         &lt;&lt;time tag for the polynomial in geometryCoordinateType time (zero Doppler)&gt;&gt;     }   </pre> <p>The diagram shows a class named <b>timeUTC</b> with its documentation string below it.</p>
type	<b>xs:dateTime</b>
annotation	documentation time tag for the polynomial in geometryCoordinateType time (zero Doppler)

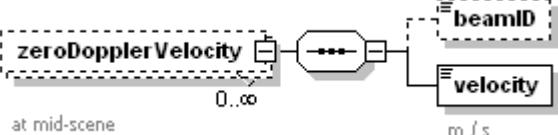
#### element level1Product/processing/geometry/velocityParameter/beamID

diagram	
type	<u>string20</u>
facets	maxLength 20

#### element level1Product/processing/geometry/velocityParameter/velocityParameterPolynomial

diagram	
type	<u>dblPolynom</u>
annotation	documentation B parameter over range (linear or low order function)

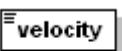
#### element level1Product/processing/geometry/zeroDopplerVelocity

diagram	
annotation	documentation at mid-scene

#### element level1Product/processing/geometry/zeroDopplerVelocity/beamID

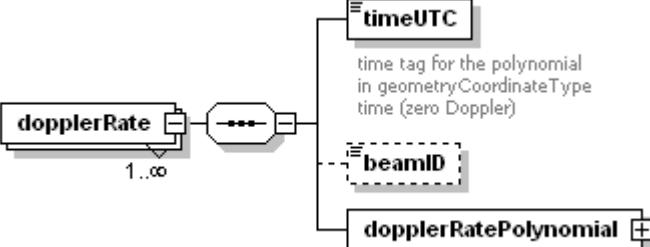
diagram	
type	<u>string20</u>
facets	maxLength 20

#### element level1Product/processing/geometry/zeroDopplerVelocity/velocity

diagram	
type	<u>xs:double</u>

annotation	documentation m / s
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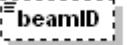
#### element **level1Product/processing/geometry/dopplerRate**

diagram	 <p>time tag for the polynomial in geometryCoordinateType time (zero Doppler)</p> <p>beamID</p> <p>dopplerRatePolynomial</p>
---------	---

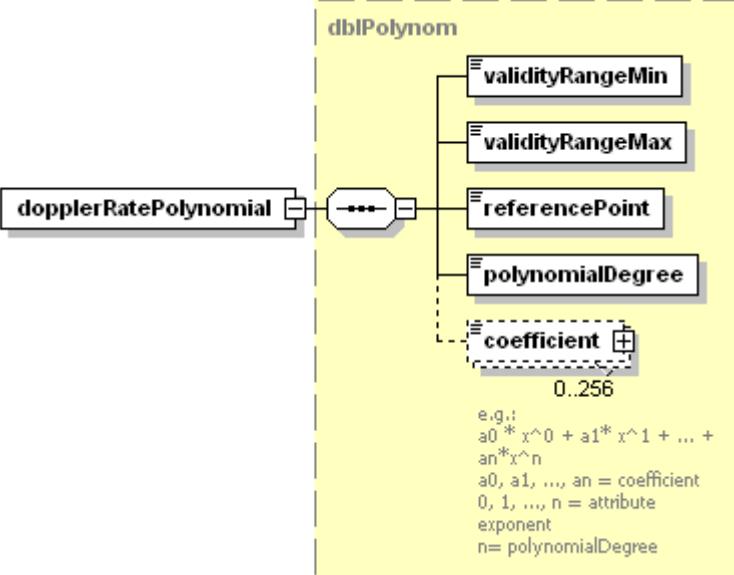
#### element **level1Product/processing/geometry/dopplerRate/timeUTC**

diagram	 <p>time tag for the polynomial in geometryCoordinateType time (zero Doppler)</p>
type	<b>xs:dateTime</b>
annotation	documentation time tag for the polynomial in geometryCoordinateType time (zero Doppler)

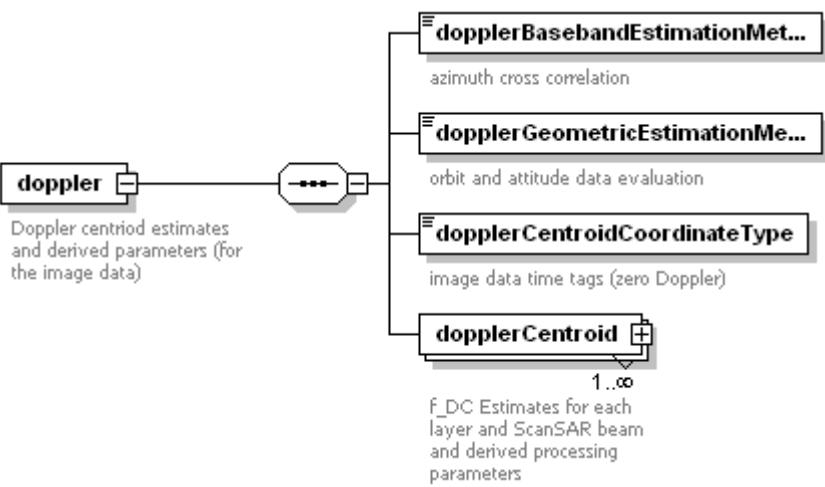
#### element **level1Product/processing/geometry/dopplerRate/beamID**

diagram	
type	<b>string20</b>
facets	maxLength 20

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

diagram	 <p>dblPolynom</p> <p>validityRangeMin</p> <p>validityRangeMax</p> <p>referencePoint</p> <p>polynomialDegree</p> <p>coefficient</p> <p>0.256</p> <p>e.g.:  <math>a_0 \cdot x^0 + a_1 \cdot x^1 + \dots + a_n \cdot x^n</math>  <math>a_0, a_1, \dots, a_n = \text{coefficient}</math>  <math>0, 1, \dots, n = \text{attribute exponent}</math>  <math>n = \text{polynomialDegree}</math></p>
type	<b>dblPolynom</b>

### element level1Product/processing/doppler

diagram	 <pre> classDiagram     class doppler {         &lt;&lt;Doppler centroid estimates and derived parameters (for the image data)&gt;&gt;     }     class dopplerBasebandEstimationMethod {         &lt;&lt;azimuth cross correlation&gt;&gt;     }     class dopplerGeometricEstimationMethod {         &lt;&lt;orbit and attitude data evaluation&gt;&gt;     }     class dopplerCentroidCoordinateType {         &lt;&lt;image data time tags (zero Doppler)&gt;&gt;     }     class dopplerCentroid {         &lt;&lt;F_DC Estimates for each layer and ScanSAR beam and derived processing parameters&gt;&gt;         &lt;&lt;1..&gt;&gt;     }      doppler --&gt; dopplerBasebandEstimationMethod     doppler --&gt; dopplerGeometricEstimationMethod     doppler --&gt; dopplerCentroidCoordinateType     doppler --&gt; dopplerCentroid   </pre>
annotation	documentation Doppler centroid estimates and derived parameters (for the image data)

### element level1Product/processing/doppler/dopplerBasebandEstimationMethod

diagram	 <pre> classDiagram     class dopplerBasebandEstimationMethod {         &lt;&lt;azimuth cross correlation&gt;&gt;     }   </pre>
type	<u>string255</u>
facets	maxLength 255
annotation	documentation azimuth cross correlation

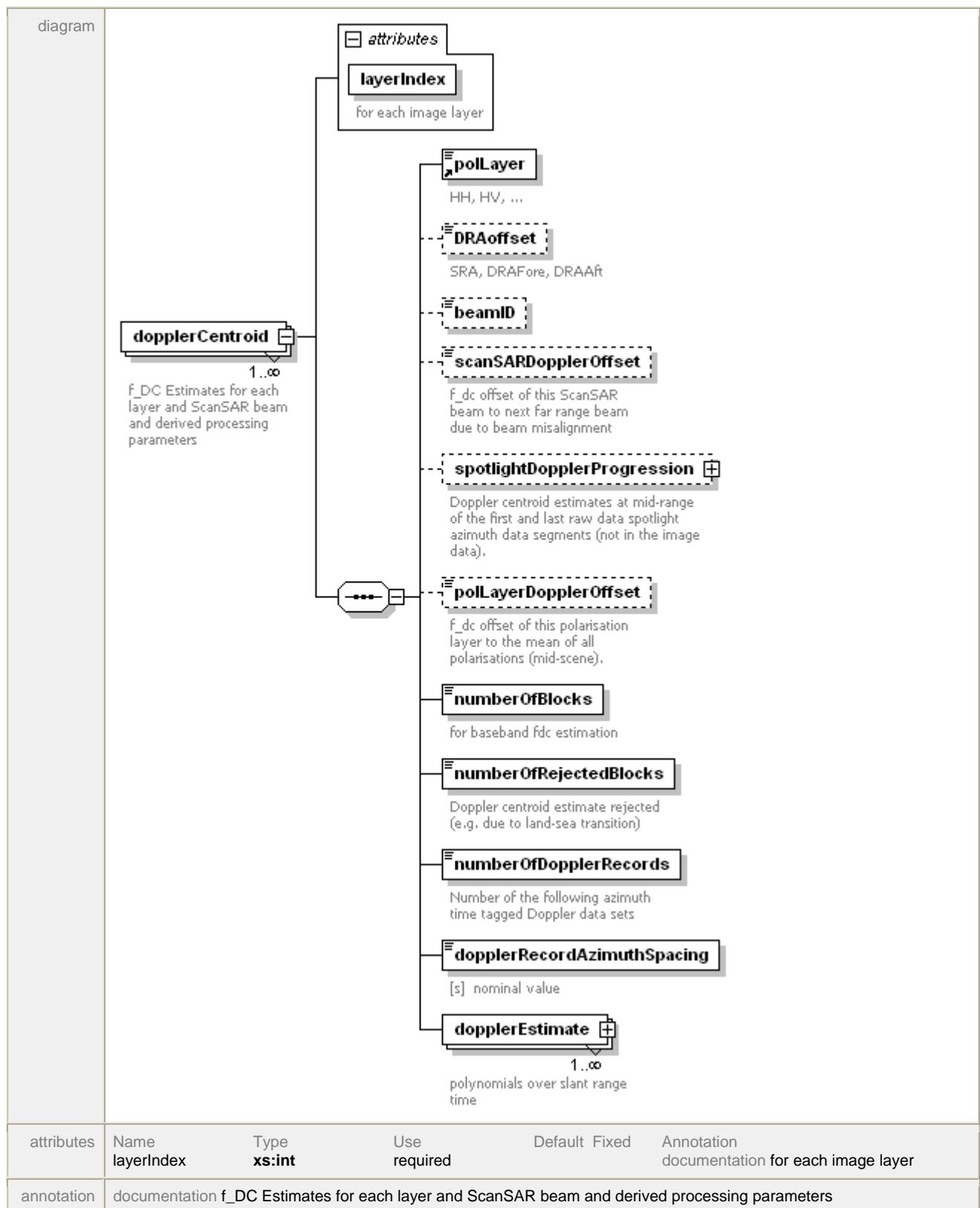
### element level1Product/processing/doppler/dopplerGeometricEstimationMethod

diagram	 <pre> classDiagram     class dopplerGeometricEstimationMethod {         &lt;&lt;orbit and attitude data evaluation&gt;&gt;     }   </pre>
type	<u>string255</u>
facets	maxLength 255
annotation	documentation orbit and attitude data evaluation

### element level1Product/processing/doppler/dopplerCentroidCoordinateType

diagram	 <pre> classDiagram     class dopplerCentroidCoordinateType {         &lt;&lt;image data time tags (zero Doppler)&gt;&gt;     }   </pre>
type	restriction of <u>string20</u>
facets	maxLength 20 enumeration RAW enumeration ZERODOPPLER enumeration UNDEFINED
annotation	documentation image data time tags (zero Doppler)

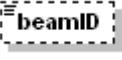
### element level1Product/processing/doppler/dopplerCentroid



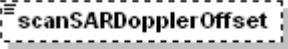
element **level1Product/processing/doppler/dopplerCentroid/DRAoffset**

diagram	
	SRA, DRAFore, DRAAft
type	restriction of xs:NMTOKENS
facets	enumeration SRA enumeration DRAFore enumeration DRAAft
annotation	documentation SRA, DRAFore, DRAAft

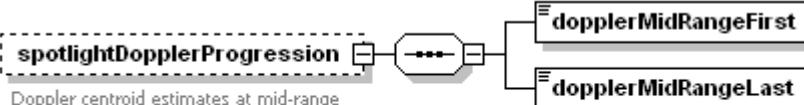
**element level1Product/processing/doppler/dopplerCentroid/beamID**

diagram	
type	<u>string20</u>
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	<u>xs:double</u>
annotation	documentation f_dc offset of this ScanSAR beam to next far range beam due to beam misalignment

**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).
annotation	documentation Doppler centroid estimates at mid-range of the first and last raw data spotlight azimuth data segments (not in the image data).

**element  
level1Product/processing/doppler/dopplerCentroid/spotlightDopplerProgression/dopplerMidRangeFirst**

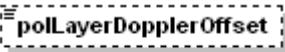
diagram	
type	<u>xs:double</u>

**element  
level1Product/processing/doppler/dopplerCentroid/spotlightDopplerProgression/dopplerMidRangeLast**

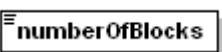
diagram	
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type	<b>xs:double</b>
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**element level1Product/processing/doppler/dopplerCentroid/polLayerDopplerOffset**

diagram	 <b>polLayerDopplerOffset</b> <small>F_dc offset of this polarisation layer to the mean of all polarisations (mid-scene).</small>
type	<b>xs:double</b>
annotation	documentation f_dc offset of this polarisation layer to the mean of all polarisations (mid-scene).

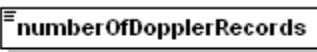
**element level1Product/processing/doppler/dopplerCentroid/numberOfBlocks**

diagram	 <b>numberOfBlocks</b> <small>for baseband fdc estimation</small>
type	<b>xs:int</b>
annotation	documentation for baseband fdc estimation

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

diagram	 <b>numberOfRejectedBlocks</b> <small>Doppler centroid estimate rejected (e.g. due to land-sea transition)</small>
type	<b>xs:int</b>
annotation	documentation Doppler centroid estimate rejected (e.g. due to land-sea transition)

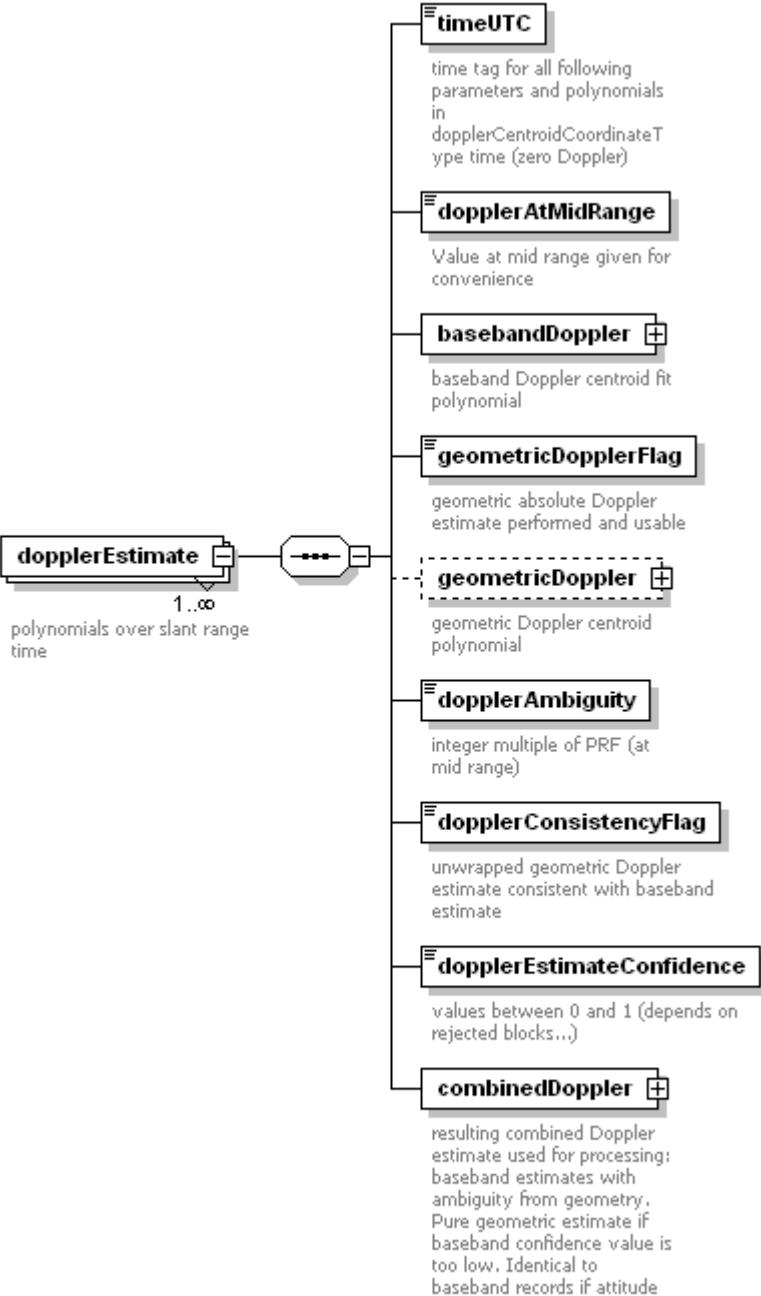
**element level1Product/processing/doppler/dopplerCentroid/numberOfDopplerRecords**

diagram	 <b>numberOfDopplerRecords</b> <small>Number of the following azimuth time tagged Doppler data sets</small>
type	<b>xs:int</b>
annotation	documentation Number of the following azimuth time tagged Doppler data sets

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

diagram	 <b>dopplerRecordAzimuthSpacing</b> <small>[s] nominal value</small>
type	<b>xs:float</b>
annotation	documentation [s] nominal value

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

diagram	 <pre> graph LR     DE[dopplerEstimate] -- "1..∞ polynomials over slant range time" --&gt; BBD[basebandDoppler]     BBD --&gt; GDF[geometricDopplerFlag]     GDF --&gt; GD[geometricDoppler]     GD --&gt; DA[dopplerAmbiguity]     DA --&gt; DC[geometricDopplerConsistencyFlag]     DC --&gt; DEC[dopplerEstimateConfidence]     DEC --&gt; CD[combinedDoppler]     </pre> <p>The diagram illustrates the processing flow for Doppler estimation. It starts with a block labeled <b>dopplerEstimate</b>, which is described as having 1..∞ polynomials over slant range time. This block connects to a <b>basebandDoppler</b> block, represented by a rectangle with a plus sign (+). From there, it leads to a <b>geometricDopplerFlag</b> block, also with a plus sign (+). A dashed line then connects to a <b>geometricDoppler</b> block, which is also a rectangle with a plus sign (+) and is described as a geometric Doppler centroid polynomial. This is followed by a <b>dopplerAmbiguity</b> block (rectangle with plus sign), a <b>geometricDopplerConsistencyFlag</b> block (rectangle with plus sign), and a <b>dopplerEstimateConfidence</b> block (rectangle with plus sign). Finally, the flow ends at a <b>combinedDoppler</b> block (rectangle with plus sign), which is described as resulting combined Doppler estimate used for processing.</p>
annotation	documentation polynomials over slant range time

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

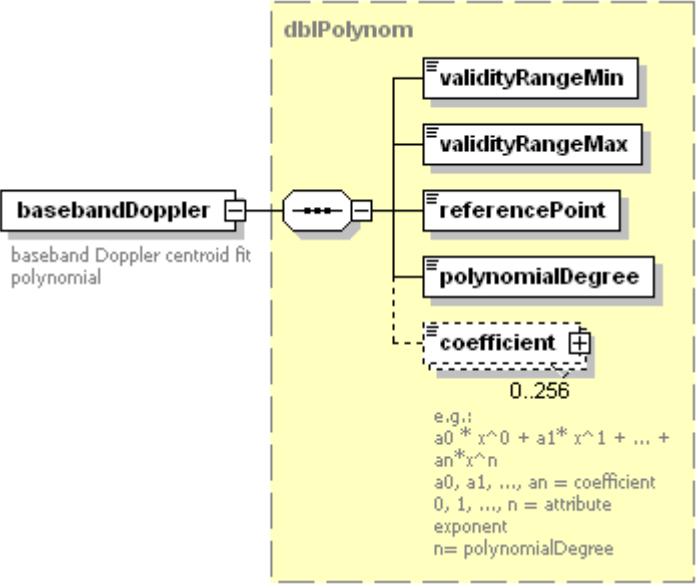
diagram	 <p>The diagram shows a single parameter block labeled <b>timeUTC</b>, which is a rectangle with a plus sign (+). It is described as a time tag for all following parameters and polynomials in dopplerCentroidCoordinateType time (zero Doppler).</p>
type	<b>xs:dateTime</b>

annotation	documentation time tag for all following parameters and polynomials in dopplerCentroidCoordinateType time (zero Doppler)
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**element level1Product/processing/doppler/dopplerCentroid/dopplerEstimate/dopplerAtMidRange**

diagram	 <p>Value at mid range given for convenience</p>
type	<b>xs:double</b>
annotation	documentation Value at mid range given for convenience

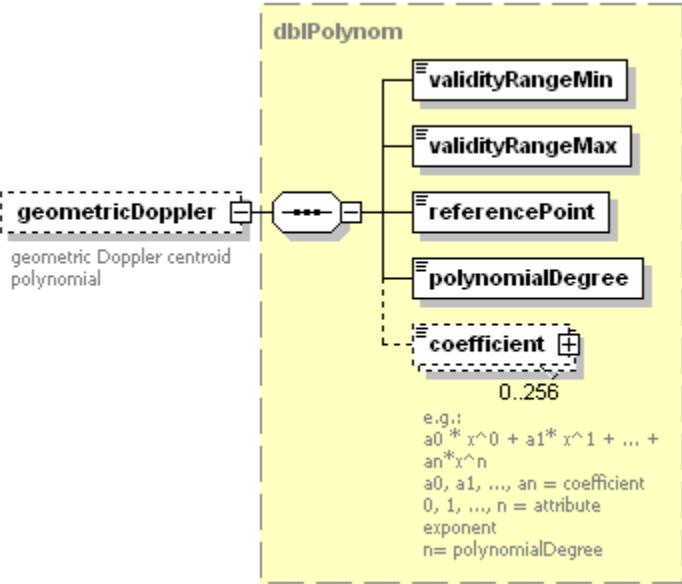
**element level1Product/processing/doppler/dopplerCentroid/dopplerEstimate/basebandDoppler**

diagram	 <p>basebandDoppler centroid fit polynomial</p> <p>dblPolynom</p> <ul style="list-style-type: none"> <li>= validityRangeMin</li> <li>= validityRangeMax</li> <li>= referencePoint</li> <li>= polynomialDegree</li> <li>= coefficient</li> </ul> <p>0.256</p> <p>e.g.,  <math>a_0 * x^0 + a_1 * x^1 + \dots + a_n * x^n</math>  <math>a_0, a_1, \dots, a_n = \text{coefficient}</math>  <math>0, 1, \dots, n = \text{attribute exponent}</math>  <math>n = \text{polynomialDegree}</math></p>
type	<b>dblPolynom</b>
annotation	documentation baseband Doppler centroid fit polynomial

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

diagram	 <p>geometric absolute Doppler estimate performed and usable</p>
type	<b>xs:boolean</b>
annotation	documentation geometric absolute Doppler estimate performed and usable

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

diagram	 <pre> classDiagram     class dblPolynom {         &lt;&lt;geometricDoppler&gt;&gt;         &lt;&lt;geometric Doppler centroid polynomial&gt;&gt;         &lt;&lt;referencePoint&gt;&gt;         &lt;&lt;polynomialDegree&gt;&gt;         &lt;&lt;coefficient&gt;&gt;         &lt;&lt;validityRangeMin&gt;&gt;         &lt;&lt;validityRangeMax&gt;&gt;     }     dblPolynom "0.256" --&gt; coefficient     dblPolynom "e.g.: a0 * x^0 + a1 * x^1 + ... + an * x^n" --&gt; coefficient     dblPolynom "a0, a1, ..., an = coefficient" --&gt; coefficient     dblPolynom "0, 1, ..., n = attribute exponent" --&gt; coefficient     dblPolynom "n = polynomialDegree" --&gt; coefficient   </pre>
type	<b><u>dblPolynom</u></b>
annotation	documentation geometric Doppler centroid polynomial

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

diagram	 <pre> classDiagram     class dopplerAmbiguity   </pre> <p>integer multiple of PRF (at mid range)</p>
type	<b><u>xs:int</u></b>
annotation	documentation integer multiple of PRF (at mid range)

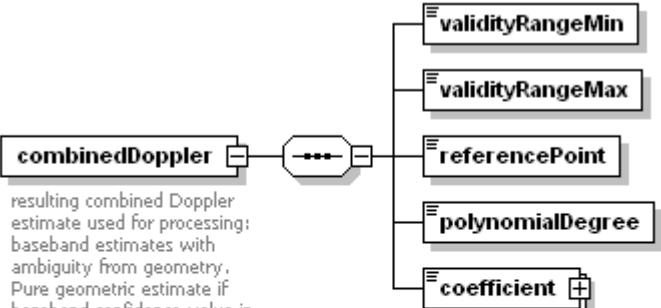
#### element level1Product/processing/doppler/dopplerCentroid/dopplerEstimate/dopplerConsistencyFlag

diagram	 <pre> classDiagram     class dopplerConsistencyFlag   </pre> <p>unwrapped geometric Doppler estimate consistent with baseband estimate</p>
type	<b><u>xs:boolean</u></b>
annotation	documentation unwrapped geometric Doppler estimate consistent with baseband estimate

#### element level1Product/processing/doppler/dopplerCentroid/dopplerEstimate/dopplerEstimateConfidence

diagram	 <pre> classDiagram     class dopplerEstimateConfidence   </pre> <p>values between 0 and 1 (depends on rejected blocks...)</p>
type	<b><u>xs:float</u></b>
annotation	documentation values between 0 and 1 (depends on rejected blocks...)

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

diagram	 <p>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.</p> <p>e.g.:  <math>a_0 * x^0 + a_1 * x^1 + \dots + a_n * x^n</math>  <math>a_0, a_1, \dots, a_n = \text{coefficient}</math>  <math>0, 1, \dots, n = \text{attribute exponent}</math>  <math>n = \text{polynomialDegree}</math></p>
annotation	documentation 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.

element

**level1Product/processing/doppler/dopplerCentroid/dopplerEstimate/combinedDoppler/validityRangeMin**

diagram	
type	<code>xs:double</code>

element

**level1Product/processing/doppler/dopplerCentroid/dopplerEstimate/combinedDoppler/validityRangeMax**

diagram	
type	<code>xs:double</code>

element

**level1Product/processing/doppler/dopplerCentroid/dopplerEstimate/combinedDoppler/referencePoint**

diagram	
type	<code>xs:double</code>

element

**level1Product/processing/doppler/dopplerCentroid/dopplerEstimate/combinedDoppler/polynomialDegree**

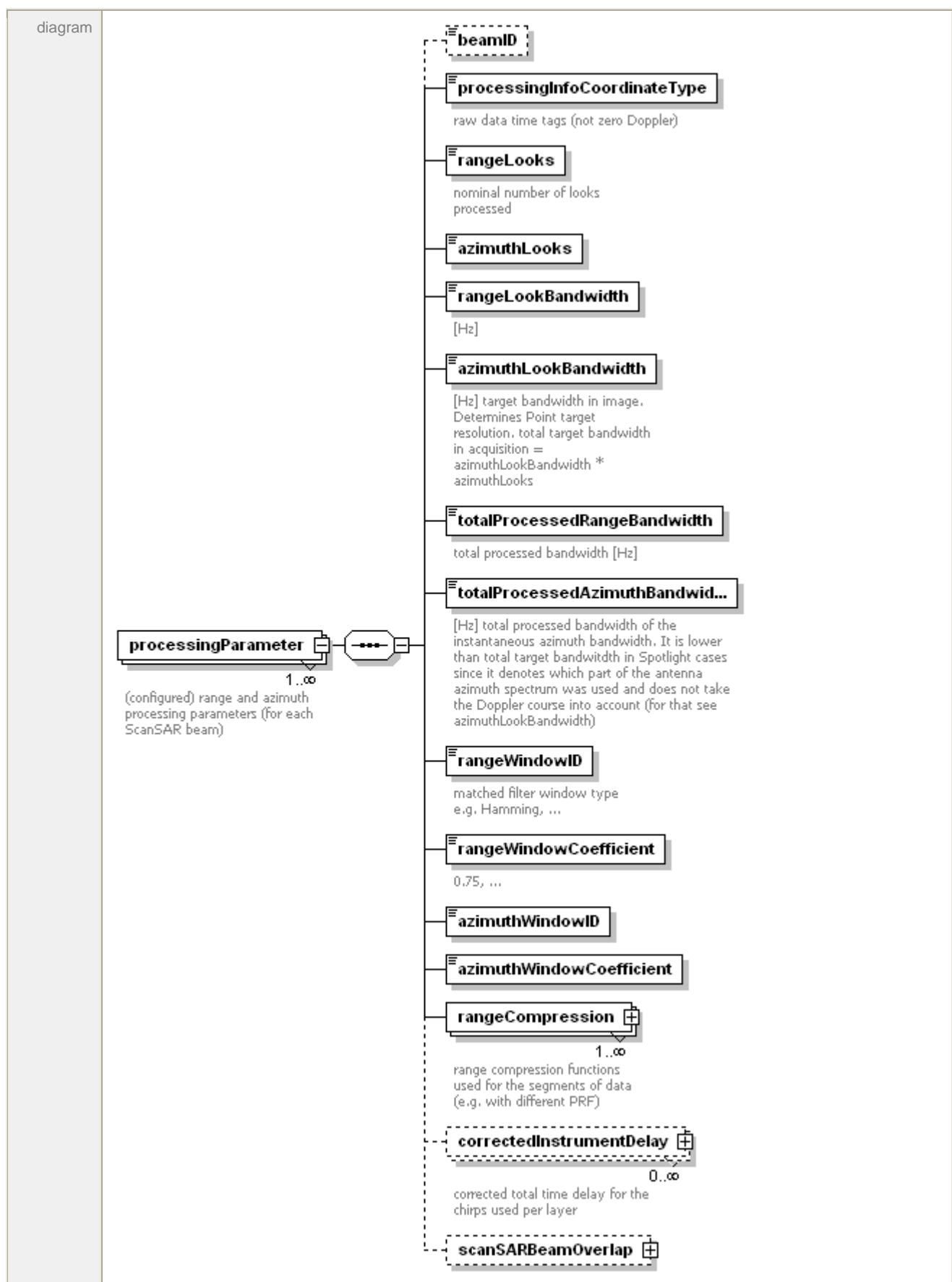
diagram	
type	<code>xs:unsignedInt</code>

element

**level1Product/processing/doppler/dopplerCentroid/dopplerEstimate/combinedDoppler/coefficient**

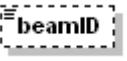
diagram	 <pre> classDiagram     class coefficient {         &lt;&lt;1..256&gt;&gt;         &lt;&lt;attributes&gt;&gt;         &lt;&lt;exponent&gt;&gt;     }     coefficient "1..256" --&gt; exponent : attributes   </pre> <p>e.g.:  <math>a_0 * x^0 + a_1 * x^1 + \dots + a_n * x^n</math>  <math>a_0, a_1, \dots, a_n = \text{coefficient}</math>  <math>0, 1, \dots, n = \text{attribute exponent}</math>  <math>n = \text{polynomialDegree}</math></p>												
type	extension of <b>xs:double</b>												
attributes	<table style="width: 100%; border-collapse: collapse;"> <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>exponent</td> <td><b>xs:unsignedInt</b></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Name	Type	Use	Default	Fixed	Annotation	exponent	<b>xs:unsignedInt</b>				
Name	Type	Use	Default	Fixed	Annotation								
exponent	<b>xs:unsignedInt</b>												
annotation	<p>documentation e.g.:</p> $a_0 * x^0 + a_1 * x^1 + \dots + a_n * x^n$ $a_0, a_1, \dots, a_n = \text{coefficient}$ $0, 1, \dots, n = \text{attribute exponent}$ $n = \text{polynomialDegree}$												

element **level1Product/processing/processingParameter**



annotation	documentation (configured) range and azimuth processing parameters (for each ScanSAR beam)
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**element level1Product/processing/processingParameter/beamID**

diagram	
type	<u>string20</u>
facets	maxLength 20

**element level1Product/processing/processingParameter/processingInfoCoordinateType**

diagram	 raw data time tags (not zero Doppler)
type	restriction of <u>string20</u>
facets	maxLength 20 enumeration RAW enumeration ZERODOPPLER enumeration UNDEFINED
annotation	documentation raw data time tags (not zero Doppler)

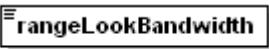
**element level1Product/processing/processingParameter/rangeLooks**

diagram	 nominal number of looks processed
type	<u>xs:float</u>
annotation	documentation nominal number of looks processed

**element level1Product/processing/processingParameter/azimuthLooks**

diagram	
type	<u>xs:float</u>

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

diagram	 [Hz]
type	<u>xs:double</u>
annotation	documentation [Hz]

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

diagram	 <b>azimuthLookBandwidth</b>
	[Hz] target bandwidth in image. Determines Point target resolution, total target bandwidth in acquisition = azimuthLookBandwidth * azimuthLooks
type	<b>xs:double</b>
annotation	documentation [Hz] target bandwidth in image. Determines Point target resolution. total target bandwidth in acquisition = azimuthLookBandwidth * azimuthLooks

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

diagram	 <b>totalProcessedRangeBandwidth</b>
	total processed bandwidth [Hz]
type	<b>xs:double</b>
annotation	documentation total processed bandwidth [Hz]

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

diagram	 <b>totalProcessedAzimuthBandwid...</b>
	[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	<b>xs:double</b>
annotation	documentation [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)

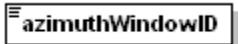
#### element **level1Product/processing/processingParameter/rangeWindowID**

diagram	 <b>rangeWindowID</b>
	matched filter window type e.g. Hamming, ...
type	<b>string20</b>
facets	maxLength 20
annotation	documentation matched filter window type e.g. Hamming, ...

#### element **level1Product/processing/processingParameter/rangeWindowCoefficient**

diagram	 <b>rangeWindowCoefficient</b>
	0.75, ...
type	<b>xs:float</b>
annotation	documentation 0.75, ...

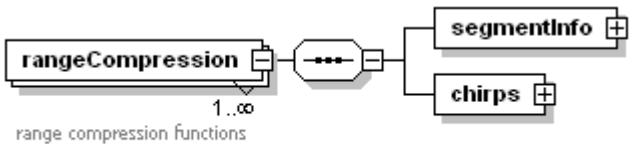
**element level1Product/processing/processingParameter/azimuthWindowID**

diagram	
type	<u>string20</u>
facets	maxLength 20

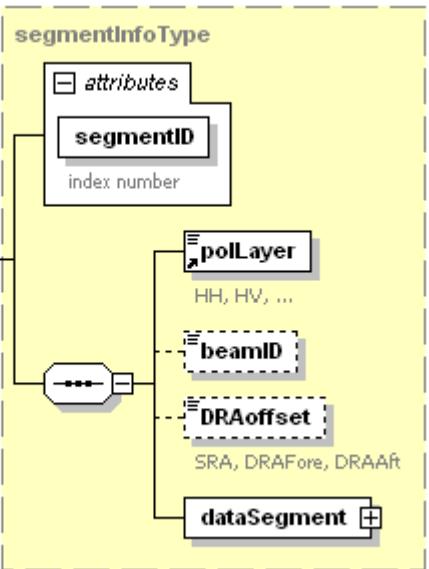
**element level1Product/processing/processingParameter/azimuthWindowCoefficient**

diagram	
type	<u>xs:float</u>

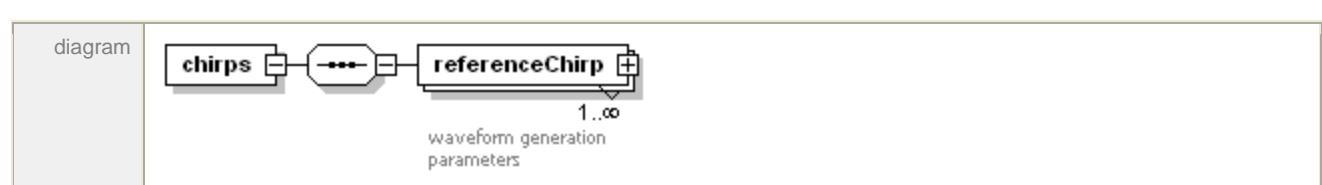
**element level1Product/processing/processingParameter/rangeCompression**

diagram	  range compression functions used for the segments of data (e.g. with different PRF)
annotation	documentation range compression functions used for the segments of data (e.g. with different PRF)

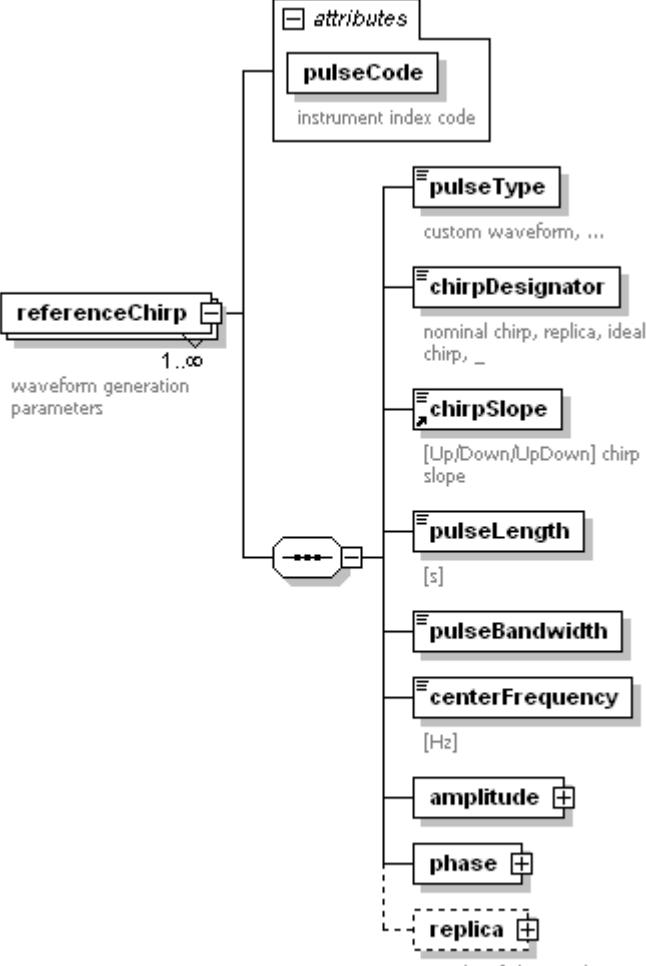
**element level1Product/processing/processingParameter/rangeCompression/segmentInfo**

diagram						
type	<u>segmentInfoType</u>					
attributes	Name segmentID segmentID	Type <u>xs:int</u>	Use required	Default	Fixed	Annotation documentation index number

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



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

diagram	 <p>waveform generation parameters</p>																
attributes	<table border="1"> <tr> <td>Name</td><td>pulseCode</td> <td>Type</td><td>xs:int</td> <td>Use</td><td>Default</td> <td>Fixed</td> <td>Annotation</td> </tr> <tr> <td></td><td></td> <td></td><td></td> <td>required</td> <td></td> <td></td> <td>documentation instrument index code</td> </tr> </table>	Name	pulseCode	Type	xs:int	Use	Default	Fixed	Annotation					required			documentation instrument index code
Name	pulseCode	Type	xs:int	Use	Default	Fixed	Annotation										
				required			documentation instrument index code										
annotation	documentation waveform generation parameters																

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

diagram	 <p>custom waveform, ...</p>
type	<u>string80</u>
facets	maxLength 80

annotation	documentation custom waveform, ...
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element  
**level1Product/processing/processingParameter/rangeCompression/chirps/referenceChirp/chirpDesignator**

diagram	 <b>chirpDesignator</b>
	nominal chirp, replica, ideal chirp, _
type	restriction of <b>xs:NMTOKENS</b>
facets	enumeration IDEAL enumeration NOMINAL enumeration REPLICA enumeration MODEL enumeration CUSTOM enumeration UNDEFINED
annotation	documentation nominal chirp, replica, ideal chirp, _

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

diagram	 <b>pulseLength</b>
	[s]
type	<b>xs:double</b>
annotation	documentation [s]

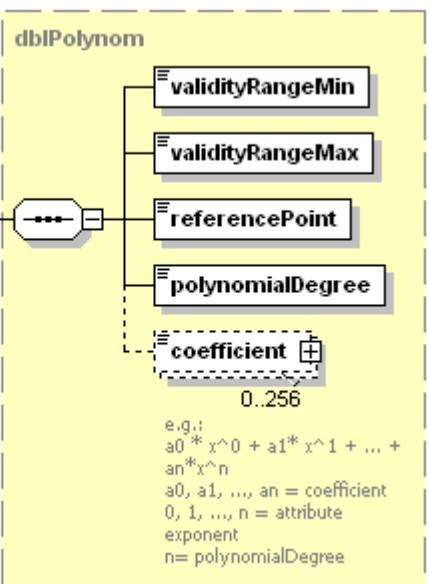
element  
**level1Product/processing/processingParameter/rangeCompression/chirps/referenceChirp/pulseBandwidth**

diagram	 <b>pulseBandwidth</b>
type	<b>xs:double</b>

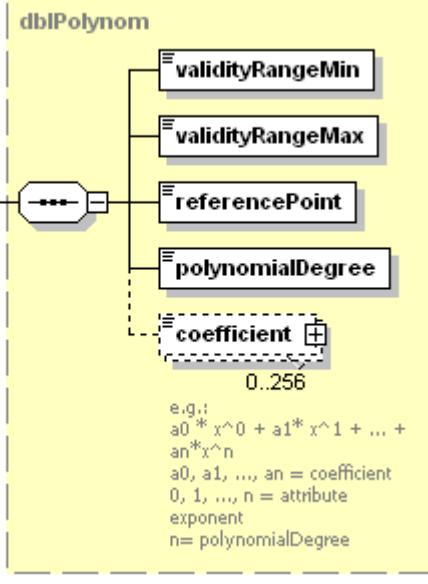
element  
**level1Product/processing/processingParameter/rangeCompression/chirps/referenceChirp/centerFrequency**

diagram	 <b>centerFrequency</b>
	[Hz]
type	<b>xs:double</b>
annotation	documentation [Hz]

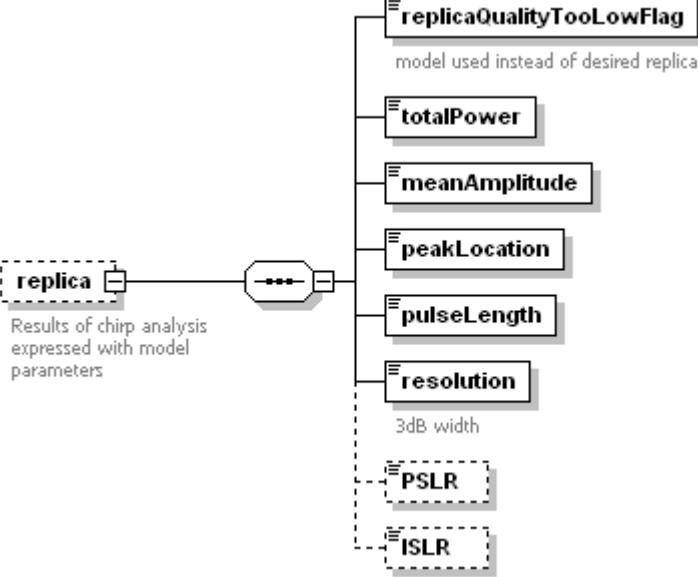
element  
**level1Product/processing/processingParameter/rangeCompression/chirps/referenceChirp/amplitude**

diagram	 <pre> graph LR     amplitude[amplitude] --&gt; conn1(( ))     conn1 --- dblPolynom1[dblPolynom]     dblPolynom1 --- validityRangeMin1[validityRangeMin]     dblPolynom1 --- validityRangeMax1[validityRangeMax]     dblPolynom1 --- referencePoint1[referencePoint]     dblPolynom1 --- polynomialDegree1[polynomialDegree]     dblPolynom1 --- coefficient1["coefficient +"]     coefficient1 --- note1[e.g., a0 * x^0 + a1 * x^1 + ... + an * x^n a0, a1, ..., an = coefficient 0, 1, ..., n = attribute exponent n = polynomialDegree]   </pre>
type	<u><a href="#">dblPolynom</a></u>

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

diagram	 <pre> graph LR     phase[phase] --&gt; conn2(( ))     conn2 --- dblPolynom2[dblPolynom]     dblPolynom2 --- validityRangeMin2[validityRangeMin]     dblPolynom2 --- validityRangeMax2[validityRangeMax]     dblPolynom2 --- referencePoint2[referencePoint]     dblPolynom2 --- polynomialDegree2[polynomialDegree]     dblPolynom2 --- coefficient2["coefficient +"]     coefficient2 --- note2[e.g., a0 * x^0 + a1 * x^1 + ... + an * x^n a0, a1, ..., an = coefficient 0, 1, ..., n = attribute exponent n = polynomialDegree]   </pre>
type	<u><a href="#">dblPolynom</a></u>

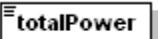
element  
**level1Product/processing/processingParameter/rangeCompression/chirps/referenceChirp/replica**

diagram	 <pre> graph LR     replica[replica] --- bus(( ))     bus --- totalPower[totalPower]     bus --- meanAmplitude[meanAmplitude]     bus --- peakLocation[peakLocation]     bus --- pulseLength[pulseLength]     bus --- resolution[resolution]     bus --- PSLR[PSLR]     bus --- ISLR[ISLR]   </pre> <p>Results of chirp analysis expressed with model parameters</p>
annotation	documentation Results of chirp analysis expressed with model parameters

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

diagram	 <pre> graph LR     replicaQualityTooLowFlag[replicaQualityTooLowFlag]   </pre> <p>model used instead of desired replica</p>
type	<b>xs:boolean</b>
annotation	documentation model used instead of desired replica

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

diagram	 <pre> graph LR     totalPower[totalPower]   </pre>
type	<b>xs:float</b>

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

diagram	 <pre> graph LR     meanAmplitude[meanAmplitude]   </pre>
type	<b>xs:float</b>

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

diagram	 <pre> graph LR     peakLocation[peakLocation]   </pre>
---------	--

type	<b>xs:double</b>
------	------------------

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

diagram	
type	<b>xs:float</b>

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

diagram	
	3dB width
type	<b>xs:float</b>
annotation	documentation 3dB width

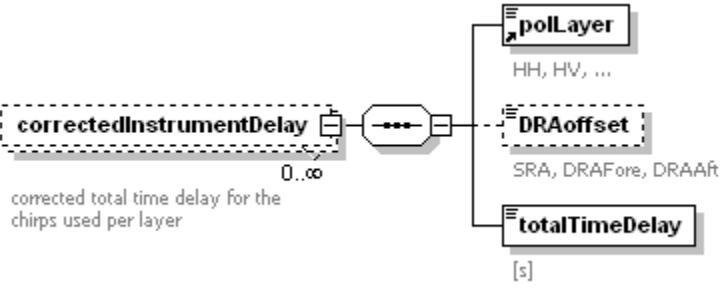
element  
**level1Product/processing/processingParameter/rangeCompression/chirps/referenceChirp/replica/PSLR**

diagram	
type	<b>xs:float</b>

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

diagram	
type	<b>xs:float</b>

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

diagram	 <p>corrected total time delay for the chirps used per layer</p>
annotation	documentation corrected total time delay for the chirps used per layer

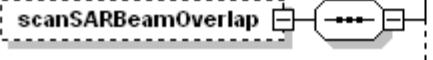
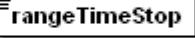
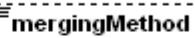
element **level1Product/processing/processingParameter/correctedInstrumentDelay/DRAoffset**

diagram	
	SRA, DRAFore, DRAAft
type	restriction of xs:NMTOKENS
facets	enumeration SRA enumeration DRAFore enumeration DRAAft
annotation	documentation SRA, DRAFore, DRAAft

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

diagram	
	[s]
type	xs:double
annotation	documentation [s]

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

diagram	 <div style="border: 1px dashed black; padding: 5px;">  <p>range start time of overlap to next ScanSAR beam</p>       <p>derived end of this beam (midle 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.</p>    <p>ScanSAR beam merging for detected products</p>    <p>ScanSAR subswath look summation weighting coefficient</p> </div>
---------	--

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

diagram	
	range start time of overlap to next ScanSAR beam
type	xs:double
annotation	documentation range start time of overlap to next ScanSAR beam

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

diagram	 <b>rangeTimeStop</b>
type	<b>xs:double</b>

element

**level1Product/processing/processingParameter/scanSARBeamOverlap/farRangeBeamBorderTime**

diagram	 <b>farRangeBeamBorderTime</b>
	derived end of this beam (midle 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	<b>xs:double</b>
annotation	documentation derived end of this beam (midle 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.

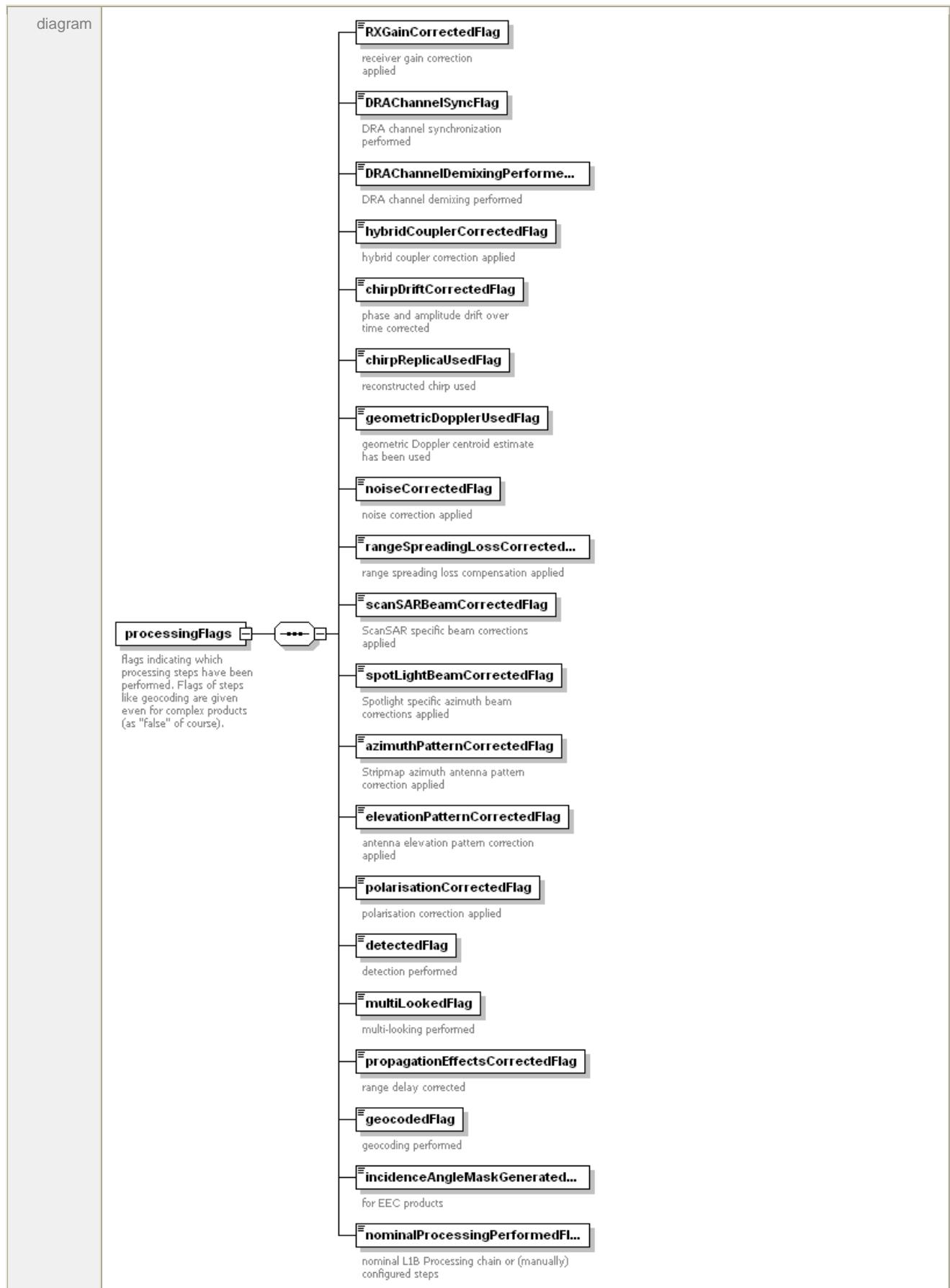
element **level1Product/processing/processingParameter/scanSARBeamOverlap/mergingMethod**

diagram	 <b>mergingMethod</b>
	ScanSAR beam merging for detected products
type	<b>string128</b>
facets	maxLength 128
annotation	documentation ScanSAR beam merging for detected products

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

diagram	 <b>lookWeight</b>
	ScanSAR subswath look summation weighting coefficient
type	extension of <b>xs:float</b>
annotation	documentation ScanSAR subswath look summation weighting coefficient

element **level1Product/processing/processingFlags**

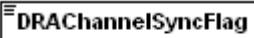


annotation	documentation flags indicating which processing steps have been performed. Flags of steps like geocoding are given even for complex products (as "false" of course).
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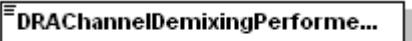
**element level1Product/processing/processingFlags/RXGainCorrectedFlag**

diagram	 receiver gain correction applied
type	<b>xs:boolean</b>
annotation	documentation receiver gain correction applied

**element level1Product/processing/processingFlags/DRAChannelSyncFlag**

diagram	 DRA channel synchronization performed
type	<b>xs:boolean</b>
annotation	documentation DRA channel synchronization performed

**element level1Product/processing/processingFlags/DRAChannelDemixingPerformedFlag**

diagram	 DRA channel demixing performed
type	<b>xs:boolean</b>
annotation	documentation DRA channel demixing performed

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

diagram	 hybrid coupler correction applied
type	<b>xs:boolean</b>
annotation	documentation hybrid coupler correction applied

**element level1Product/processing/processingFlags/chirpDriftCorrectedFlag**

diagram	 phase and amplitude drift over time corrected
type	<b>xs:boolean</b>
annotation	documentation phase and amplitude drift over time corrected

**element level1Product/processing/processingFlags/chirpReplicaUsedFlag**

diagram	 reconstructed chirp used
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type	<b>xs:boolean</b>
annotation	documentation reconstructed chirp used

**element level1Product/processing/processingFlags/geometricDopplerUsedFlag**

diagram	 <b>geometricDopplerUsedFlag</b> <small>geometric Doppler centroid estimate has been used</small>
type	<b>xs:boolean</b>
annotation	documentation geometric Doppler centroid estimate has been used

**element level1Product/processing/processingFlags/noiseCorrectedFlag**

diagram	 <b>noiseCorrectedFlag</b> <small>noise correction applied</small>
type	<b>xs:boolean</b>
annotation	documentation noise correction applied

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

diagram	 <b>rangeSpreadingLossCorrected...</b> <small>range spreading loss compensation applied</small>
type	<b>xs:boolean</b>
annotation	documentation range spreading loss compensation applied

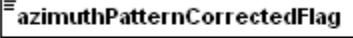
**element level1Product/processing/processingFlags/scanSARBeamCorrectedFlag**

diagram	 <b>scanSARBeamCorrectedFlag</b> <small>ScanSAR specific beam corrections applied</small>
type	<b>xs:boolean</b>
annotation	documentation ScanSAR specific beam corrections applied

**element level1Product/processing/processingFlags/spotLightBeamCorrectedFlag**

diagram	 <b>spotLightBeamCorrectedFlag</b> <small>Spotlight specific azimuth beam corrections applied</small>
type	<b>xs:boolean</b>
annotation	documentation Spotlight specific azimuth beam corrections applied

**element level1Product/processing/processingFlags/azimuthPatternCorrectedFlag**

diagram	
Stripmap azimuth antenna pattern correction applied	
type	<b>xs:boolean</b>
annotation	documentation Stripmap azimuth antenna pattern correction applied

#### element **level1Product/processing/processingFlags/elevationPatternCorrectedFlag**

diagram	
antenna elevation pattern correction applied	
type	<b>xs:boolean</b>
annotation	documentation antenna elevation pattern correction applied

#### element **level1Product/processing/processingFlags/polarisationCorrectedFlag**

diagram	
polarisation correction applied	
type	<b>xs:boolean</b>
annotation	documentation polarisation correction applied

#### element **level1Product/processing/processingFlags/detectedFlag**

diagram	
detection performed	
type	<b>xs:boolean</b>
annotation	documentation detection performed

#### element **level1Product/processing/processingFlags/multiLookedFlag**

diagram	
multi-looking performed	
type	<b>xs:boolean</b>
annotation	documentation multi-looking performed

#### element **level1Product/processing/processingFlags/propagationEffectsCorrectedFlag**

diagram	
range delay corrected	
type	<b>xs:boolean</b>
annotation	documentation range delay corrected

#### element **level1Product/processing/processingFlags/geocodedFlag**

diagram	 <b>geocodedFlag</b>
	geocoding performed
type	<b>xs:boolean</b>
annotation	documentation geocoding performed

**element level1Product/processing/processingFlags/incidenceAngleMaskGeneratedFlag**

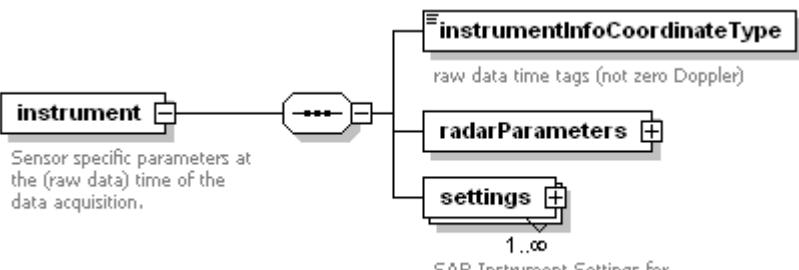
diagram	 <b>incidenceAngleMaskGenerated...</b>
	for EEC products
type	<b>xs:boolean</b>
annotation	documentation for EEC products

**element level1Product/processing/processingFlags/nominalProcessingPerformedFlag**

diagram	 <b>nominalProcessingPerformedFl...</b>
	nominal L1B Processing chain or (manually) configured steps
type	<b>xs:boolean</b>
annotation	documentation nominal L1B Processing chain or (manually) configured steps

## 6.1.6 Instrument

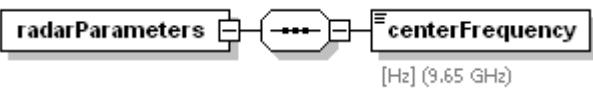
### element level1Product/instrument

diagram	 <pre> classDiagram     class instrument {         &lt;&lt;Sensor specific parameters at the (raw data) time of the data acquisition.&gt;&gt;     }     class radarParameters {         &lt;&lt;SAR Instrument Settings for different beams/polarisations&gt;&gt;     }     class settings {         &lt;&lt;1..&lt;&lt;SAR Instrument Settings for different beams/polarisations&gt;&gt;&gt;&gt;     }     instrument --&gt; radarParameters     instrument --&gt; settings     radarParameters &lt; -- instrumentInfoCoordinateType     settings &lt; -- instrumentInfoCoordinateType   </pre>
annotation	documentation Sensor specific parameters at the (raw data) time of the data acquisition.

### element level1Product/instrument/instrumentInfoCoordinateType

diagram	 <pre> classDiagram     class instrumentInfoCoordinateType {         &lt;&lt;raw data time tags (not zero Doppler)&gt;&gt;     }   </pre>
type	restriction of <u>string20</u>
facets	maxLength 20 enumeration RAW enumeration ZERODOPPLER enumeration UNDEFINED
annotation	documentation raw data time tags (not zero Doppler)

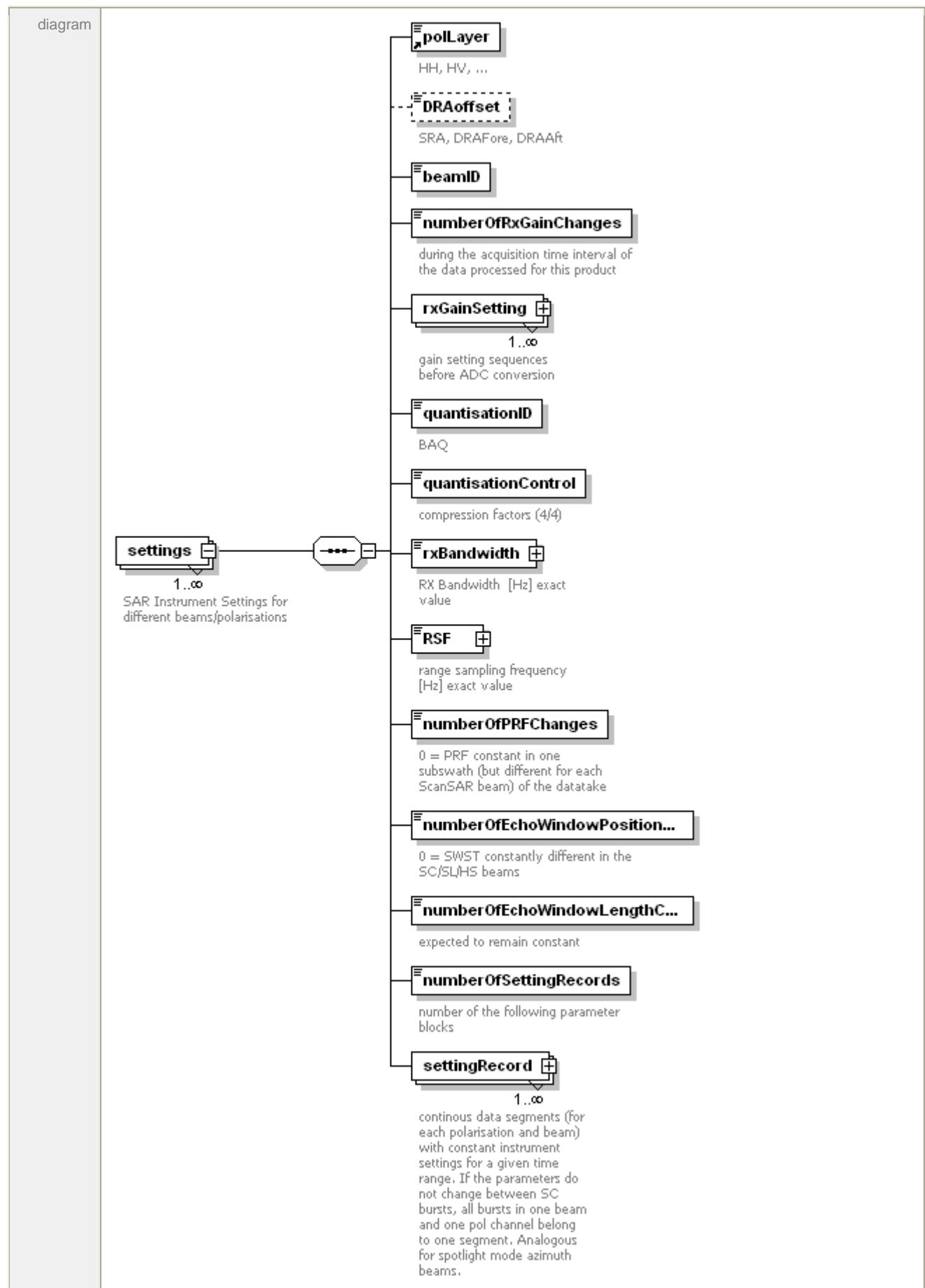
### element level1Product/instrument/radarParameters

diagram	 <pre> classDiagram     class radarParameters {         &lt;&lt;centerFrequency&gt;&gt;     }     class centerFrequency {         &lt;&lt;[Hz] (9.65 GHz)&gt;&gt;     }     radarParameters --&gt; centerFrequency   </pre>
---------	--

### element level1Product/instrument/radarParameters/centerFrequency

diagram	 <pre> classDiagram     class centerFrequency {         &lt;&lt;[Hz] (9.65 GHz)&gt;&gt;     }   </pre>
type	<b>xs:double</b>
annotation	documentation [Hz] (9.65 GHz)

### element level1Product/instrument/settings



annotation	documentation SAR Instrument Settings for different beams/polarisations
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**element level1Product/instrument/settings/DRAoffset**

diagram	
	SRA, DRAFore, DRAAft
type	restriction of xs:NMTOKENS
facets	enumeration SRA enumeration DRAFore enumeration DRAAft
annotation	documentation SRA, DRAFore, DRAAft

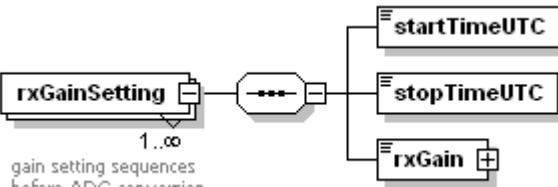
**element level1Product/instrument/settings/beamID**

diagram	
type	<u>string20</u>
facets	maxLength 20

**element level1Product/instrument/settings/numberOfRxGainChanges**

diagram	
	during the acquisition time interval of the data processed for this product
type	xs:int
annotation	documentation during the acquisition time interval of the data processed for this product

**element level1Product/instrument/settings/rxGainSetting**

diagram	 gain setting sequences before ADC conversion
annotation	documentation gain setting sequences before ADC conversion

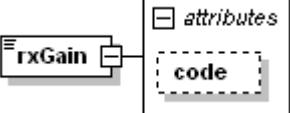
**element level1Product/instrument/settings/rxGainSetting/startTimeUTC**

diagram	
type	xs:dateTime

**element level1Product/instrument/settings/rxGainSetting/stopTimeUTC**

diagram	
type	xs:dateTime

#### element level1Product/instrument/settings/rxGainSetting/rxGain

diagram													
type	extension of <code>xs:float</code>												
attributes	<table> <tr> <td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>Annotation</td></tr> <tr> <td>code</td><td></td><td></td><td></td><td></td><td></td></tr> </table>	Name	Type	Use	Default	Fixed	Annotation	code					
Name	Type	Use	Default	Fixed	Annotation								
code													

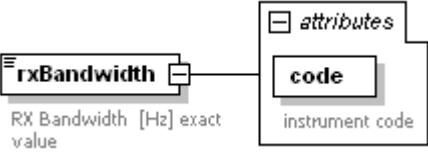
#### element level1Product/instrument/settings/quantisationID

diagram	
type	<code>string20</code>
facets	maxLength 20
annotation	documentation BAQ

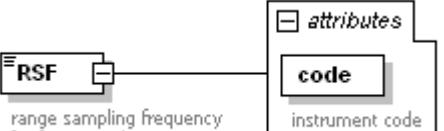
#### element level1Product/instrument/settings/quantisationControl

diagram	
type	extension of <code>string20</code>
facets	maxLength 20
annotation	documentation compression factors (4/4)

#### element level1Product/instrument/settings/rxBandwidth

diagram													
type	extension of <code>xs:double</code>												
attributes	<table> <tr> <td>Name</td><td>Type</td><td>Use</td><td>Default</td><td>Fixed</td><td>Annotation</td></tr> <tr> <td>code</td><td><code>string20</code></td><td>required</td><td></td><td></td><td>documentation instrument code</td></tr> </table>	Name	Type	Use	Default	Fixed	Annotation	code	<code>string20</code>	required			documentation instrument code
Name	Type	Use	Default	Fixed	Annotation								
code	<code>string20</code>	required			documentation instrument code								
annotation	documentation RX Bandwidth [Hz] exact value												

#### element level1Product/instrument/settings/RSF

diagram	
type	extension of <code>xs:double</code>

attributes	Name	Type	Use	Default	Fixed	Annotation
	code	<u>string20</u>	required			documentation instrument code
annotation	documentation	range sampling frequency [Hz]	exact value			

#### element **level1Product/instrument/settings/numberOfPRFChanges**

diagram	 <b>numberOfPRFChanges</b> 0 = PRF constant in one subswath (but different for each ScanSAR beam) of the datatake
type	<b>xs:int</b>
annotation	documentation 0 = PRF constant in one subswath (but different for each ScanSAR beam) of the datatake

#### element **level1Product/instrument/settings/numberOfEchoWindowPositionChanges**

diagram	 <b>numberOfEchoWindowPosition...</b> 0 = SWST constantly different in the SC/SL/HS beams
type	<b>xs:int</b>
annotation	documentation 0 = SWST constantly different in the SC/SL/HS beams

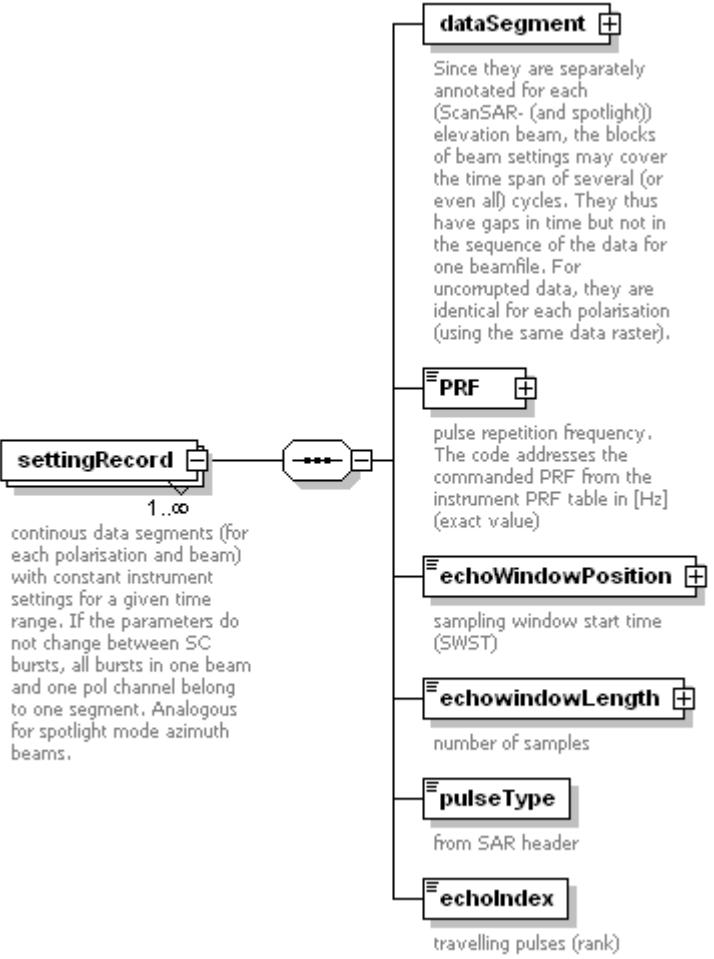
#### element **level1Product/instrument/settings/numberOfEchoWindowLengthChanges**

diagram	 <b>numberOfEchoWindowLengthC...</b> expected to remain constant
type	<b>xs:int</b>
annotation	documentation expected to remain constant

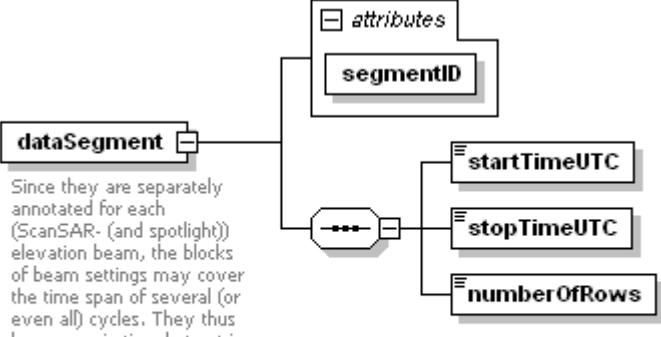
#### element **level1Product/instrument/settings/numberOfSettingRecords**

diagram	 <b>numberOfSettingRecords</b> number of the following parameter blocks
type	<b>xs:int</b>
annotation	documentation number of the following parameter blocks

#### element **level1Product/instrument/settings/settingRecord**

diagram	 <pre> classDiagram     class settingRecord {         &lt;&lt;continuous data segments (for each polarisation and beam) with constant instrument settings for a given time range. If the parameters do not change between SC bursts, all bursts in one beam and one pol channel belong to one segment. Analogous for spotlight mode azimuth beams.&gt;&gt;     }     class dataSegment {         &lt;&lt;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).&gt;&gt;     }     class PRF {         &lt;&lt;pulse repetition frequency. The code addresses the commanded PRF from the instrument PRF table in [Hz] (exact value)&gt;&gt;     }     class echoWindowPosition {         &lt;&lt;sampling window start time (SWST)&gt;&gt;     }     class echowindowLength {         &lt;&lt;number of samples&gt;&gt;     }     class pulseType {         &lt;&lt;from SAR header&gt;&gt;     }     class echoIndex {         &lt;&lt;travelling pulses (rank)&gt;&gt;     }      settingRecord "1..∞" --&gt; dataSegment     dataSegment --&gt; PRF     dataSegment --&gt; echoWindowPosition     dataSegment --&gt; echowindowLength     dataSegment --&gt; pulseType     dataSegment --&gt; echoIndex   </pre>
annotation	<p>documentation continuous data segments (for each polarisation and beam) with constant instrument settings for a given time range. If the parameters do not change between SC bursts, all bursts in one beam and one pol channel belong to one segment. Analogous for spotlight mode azimuth beams.</p>

#### element level1Product/instrument/settings/settingRecord/dataSegment

diagram	 <pre> classDiagram     class dataSegment {         &lt;&lt;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).&gt;&gt;     }     class attributes {         &lt;&lt;attributes&gt;&gt;     }     class segmentID {         &lt;&lt;segmentID&gt;&gt;     }     class startTimeUTC {         &lt;&lt;start Time UTC&gt;&gt;     }     class stopTimeUTC {         &lt;&lt;stop Time UTC&gt;&gt;     }     class numberOfRows {         &lt;&lt;number of rows&gt;&gt;     }      dataSegment --&gt; attributes     attributes --&gt; segmentID     dataSegment --&gt; startTimeUTC     dataSegment --&gt; stopTimeUTC     dataSegment --&gt; numberOfRows   </pre>												
attributes	<table border="1"> <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>segmentID</td><td>xs:int</td><td>required</td><td></td><td></td><td></td></tr> </tbody> </table>	Name	Type	Use	Default	Fixed	Annotation	segmentID	xs:int	required			
Name	Type	Use	Default	Fixed	Annotation								
segmentID	xs:int	required											

annotation	documentation 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).
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**element level1Product/instrument/settings/settingRecord/dataSegment/startTimeUTC**

diagram	
type	<b>xs:dateTime</b>

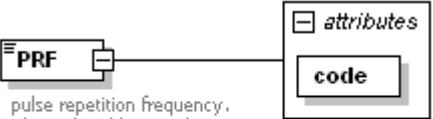
**element level1Product/instrument/settings/settingRecord/dataSegment/stopTimeUTC**

diagram	
type	<b>xs:dateTime</b>

**element level1Product/instrument/settings/settingRecord/dataSegment/numberOfRows**

diagram	
type	<b>xs:int</b>

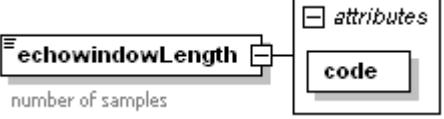
**element level1Product/instrument/settings/settingRecord/PRF**

diagram	 pulse repetition frequency. The code addresses the commanded PRF from the instrument PRF table in [Hz] (exact value)
type	extension of <b>xs:double</b>
attributes	Name Type Use Default Fixed Annotation code <b>string20</b> required
annotation	documentation pulse repetition frequency. The code addresses the commanded PRF from the instrument PRF table in [Hz] (exact value)

**element level1Product/instrument/settings/settingRecord/echoWindowPosition**

diagram	 sampling window start time (SWST)
type	extension of <b>xs:double</b>
attributes	Name Type Use Default Fixed Annotation code <b>string20</b> required
annotation	documentation sampling window start time (SWST)

**element level1Product/instrument/settings/settingRecord/echowindowLength**

diagram	 <p>The diagram shows the <code>echowindowLength</code> element. It has a box labeled <code>number of samples</code> connected to a larger box containing <code>attributes</code> and <code>code</code>.</p>												
type	extension of <code>xs:double</code>												
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>code</td> <td><u><a href="#">string20</a></u></td> <td>required</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Name	Type	Use	Default	Fixed	Annotation	code	<u><a href="#">string20</a></u>	required			
Name	Type	Use	Default	Fixed	Annotation								
code	<u><a href="#">string20</a></u>	required											
annotation	documentation <code>number of samples</code>												

#### element `level1Product/instrument/settings/settingRecord/pulseType`

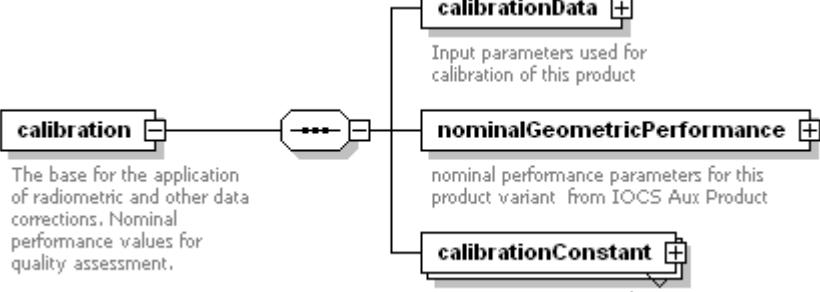
diagram	 <p>The diagram shows the <code>pulseType</code> element. It has a box labeled <code>from SAR header</code> below it.</p>
type	<u><a href="#">string20</a></u>
facets	maxLength 20
annotation	documentation <code>from SAR header</code>

#### element `level1Product/instrument/settings/settingRecord/echoIndex`

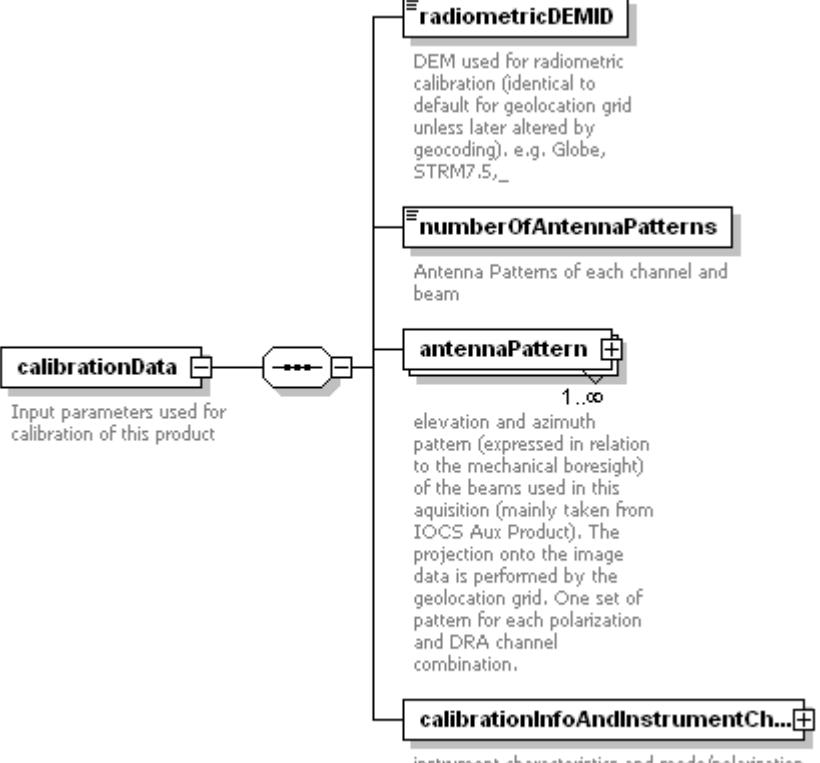
diagram	 <p>The diagram shows the <code>echoIndex</code> element. It has a box labeled <code>travelling pulses (rank)</code> below it.</p>
type	<u><a href="#">xs:int</a></u>
annotation	documentation <code>travelling pulses (rank)</code>

## 6.1.7 Calibration

### element level1Product/calibration

diagram	 <pre> graph LR     calibration[calibration] ---&gt; calibrationData[calibrationData]     calibration ---&gt; nominalGP[nominalGeometricPerformance]     calibration ---&gt; calibrationConstant[calibrationConstant]     </pre> <p>The base for the application of radiometric and other data corrections. Nominal performance values for quality assessment.</p>
annotation	documentation The base for the application of radiometric and other data corrections. Nominal performance values for quality assessment.

### element level1Product/calibration/calibrationData

diagram	 <pre> graph LR     calibrationData[calibrationData] ---&gt; radiometricDEMID[radiometricDEMID]     calibrationData ---&gt; numberAP[numberOfAntennaPatterns]     calibrationData ---&gt; antennaPattern[antennaPattern]     calibrationData ---&gt; calibrationInfo[calibrationInfoAndInstrumentCh...]     </pre> <p>Input parameters used for calibration of this product</p>
annotation	documentation Input parameters used for calibration of this product

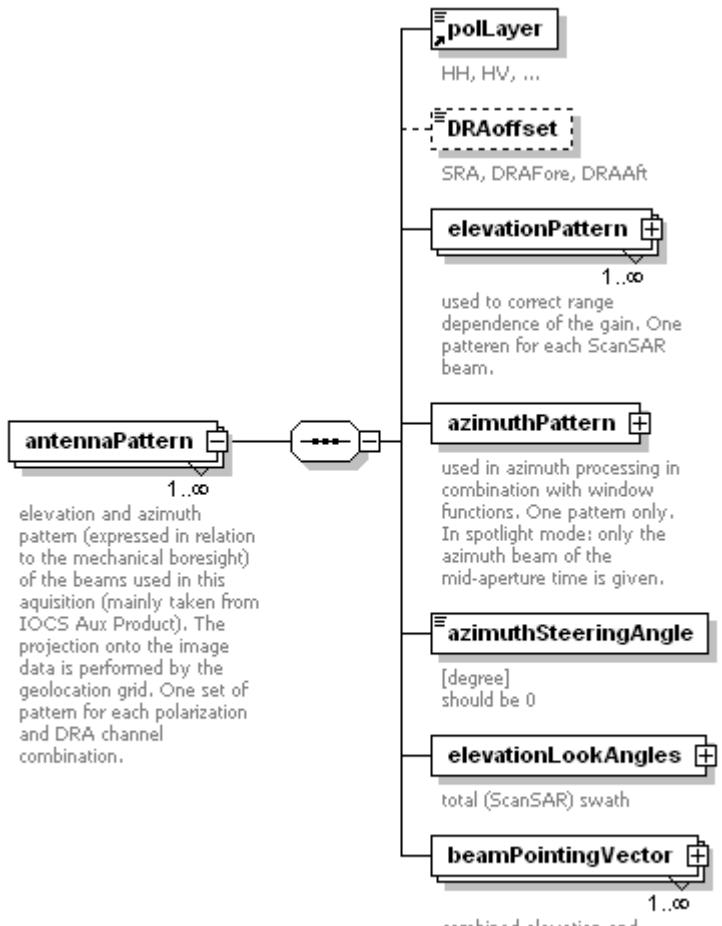
### element level1Product/calibration/calibrationData/radiometricDEMID

diagram	 <p><b>radiometricDEMID</b></p>
	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><a href="#">string255</a></u>
facets	maxLength 255
annotation	documentation DEM used for radiometric calibration (identical to default for geolocation grid unless later altered by geocoding). e.g. Globe, STRM7.5,...

**element level1Product/calibration/calibrationData/numberOfAntennaPatterns**

diagram	 <p><b>numberOfAntennaPatterns</b></p>
	Antenna Patterns of each channel and beam
type	<b>xs:int</b>
annotation	documentation Antenna Patterns of each channel and beam

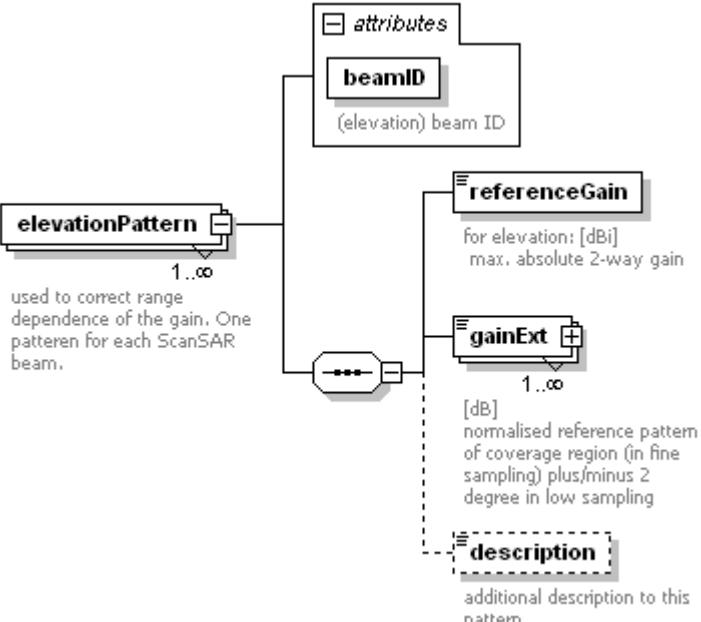
**element level1Product/calibration/calibrationData/antennaPattern**

diagram	 <pre> classDiagram     class antennaPattern {         &lt;&lt;1..&gt;&gt;         &lt;&lt;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.&gt;&gt;     }     class polLayer {         &lt;&lt;HH, HV, ...&gt;&gt;     }     class DRAoffset {         &lt;&lt;SRA, DRAFore, DRAAft&gt;&gt;     }     class elevationPattern {         &lt;&lt;1..&gt;&gt;         &lt;&lt;used to correct range dependence of the gain. One pattern for each ScanSAR beam.&gt;&gt;     }     class azimuthPattern {         &lt;&lt;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.&gt;&gt;     }     class azimuthSteeringAngle {         &lt;&lt;[degree] should be 0&gt;&gt;     }     class elevationLookAngles {         &lt;&lt;total (ScanSAR) swath&gt;&gt;     }     class beamPointingVector {         &lt;&lt;1..&gt;&gt;         &lt;&lt;combined elevation and azimuth pointing direction or misalignment expressed as vector in the Mech Frame.&gt;&gt;     }      antennaPattern --&gt; DRAoffset     antennaPattern --&gt; polLayer     antennaPattern --&gt; elevationPattern     antennaPattern --&gt; azimuthPattern     antennaPattern --&gt; azimuthSteeringAngle     antennaPattern --&gt; elevationLookAngles     antennaPattern --&gt; beamPointingVector   </pre>
annotation	documentation 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.

#### element level1Product/calibration/calibrationData/antennaPattern/DRAoffset

diagram	 <pre> classDiagram     class DRAoffset {         &lt;&lt;SRA, DRAFore, DRAAft&gt;&gt;     }   </pre>
type	restriction of xs:NMTOKENS
facets	enumeration SRA enumeration DRAFore enumeration DRAAft
annotation	documentation SRA, DRAFore, DRAAft

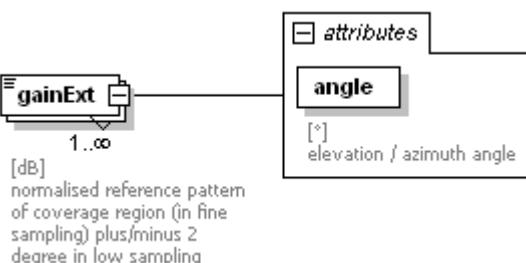
#### element level1Product/calibration/calibrationData/antennaPattern/elevationPattern

diagram	 <pre> classDiagram     class elevationPattern {         &lt;&lt;used to correct range dependence of the gain. One pattern for each ScanSAR beam.&gt;&gt;     }     class attributes {         beamID     }     class referenceGain {         &lt;&lt;for elevation: [dBi] max. absolute 2-way gain&gt;&gt;     }     class gainExt {         &lt;&lt;[dB] normalised reference pattern of coverage region (in fine sampling) plus/minus 2 degree in low sampling&gt;&gt;     }     elevationPattern "1..&gt;" --&gt; attributes     elevationPattern "1..&gt;" --&gt; referenceGain     attributes --&gt; gainExt     referenceGain --&gt; gainExt     </pre>										
attributes	<table style="width: 100%; border-collapse: collapse;"> <tr> <td>Name</td><td>beamID</td> <td>Type</td><td><u>string20</u></td> <td>Use</td><td>required</td> <td>Default</td><td>Fixed</td> <td>Annotation documentation</td> <td>(elevation) beam ID</td> </tr> </table>	Name	beamID	Type	<u>string20</u>	Use	required	Default	Fixed	Annotation documentation	(elevation) beam ID
Name	beamID	Type	<u>string20</u>	Use	required	Default	Fixed	Annotation documentation	(elevation) beam ID		
annotation	documentation used to correct range dependence of the gain. One pattern for each ScanSAR beam.										

#### element level1Product/calibration/calibrationData/antennaPattern/elevationPattern/referenceGain

diagram	 <pre> classDiagram     class referenceGain {         &lt;&lt;for elevation: [dBi] max. absolute 2-way gain&gt;&gt;     }     </pre>
type	<b>xs:float</b>
annotation	documentation for elevation: [dBi] max. absolute 2-way gain

#### element level1Product/calibration/calibrationData/antennaPattern/elevationPattern/gainExt

diagram	 <pre> classDiagram     class gainExt {         &lt;&lt;[dB] normalised reference pattern of coverage region (in fine sampling) plus/minus 2 degree in low sampling&gt;&gt;     }     class attributes {         angle     }     gainExt "1..&gt;" --&gt; attributes     </pre>										
type	extension of <b>xs:float</b>										
attributes	<table style="width: 100%; border-collapse: collapse;"> <tr> <td>Name</td><td>angle</td> <td>Type</td><td><u>xs:float</u></td> <td>Use</td><td>required</td> <td>Default</td><td>Fixed</td> <td>Annotation documentation</td> <td>[°] elevation / azimuth angle</td> </tr> </table>	Name	angle	Type	<u>xs:float</u>	Use	required	Default	Fixed	Annotation documentation	[°] elevation / azimuth angle
Name	angle	Type	<u>xs:float</u>	Use	required	Default	Fixed	Annotation documentation	[°] elevation / azimuth angle		

annotation	documentation [dB] normalised reference pattern of coverage region (in fine sampling) plus/minus 2 degree in low sampling
------------	--

**element level1Product/calibration/calibrationData/antennaPattern/elevationPattern/description**

diagram	
type	<b>string1024</b>
facets	maxLength 1024
annotation	documentation additional description to this pattern

**element level1Product/calibration/calibrationData/antennaPattern/azimuthPattern**

diagram										
attributes	<table> <tr> <td>Name</td><td>azimuthBeamID</td> <td>Type</td><td><b>string20</b></td> <td>Use</td><td>required</td> <td>Default</td><td>Fixed</td> <td>Annotation</td> </tr> </table>	Name	azimuthBeamID	Type	<b>string20</b>	Use	required	Default	Fixed	Annotation
Name	azimuthBeamID	Type	<b>string20</b>	Use	required	Default	Fixed	Annotation		
annotation	documentation 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.									

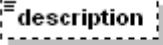
**element level1Product/calibration/calibrationData/antennaPattern/azimuthPattern/referenceGain**

diagram	
type	<b>xs:float</b>
annotation	documentation for azimuth: [dB] gain difference to azimuth boresight max. absolute 2-way gain

### element level1Product/calibration/calibrationData/antennaPattern/azimuthPattern/gainExt

diagram	 <p>The diagram shows the <code>gainExt</code> element with its attributes. The <code>angle</code> attribute is highlighted.</p>																
type	extension of <code>xs:float</code>																
attributes	<table> <tr> <td>Name</td><td>angle</td> <td>Type</td><td><code>xs:float</code></td> <td>Use required</td> <td>Default</td> <td>Fixed</td> <td>Annotation documentation [°]</td> </tr> <tr> <td></td><td></td> <td></td><td></td> <td></td> <td></td> <td></td> <td>elevation / azimuth angle</td> </tr> </table>	Name	angle	Type	<code>xs:float</code>	Use required	Default	Fixed	Annotation documentation [°]								elevation / azimuth angle
Name	angle	Type	<code>xs:float</code>	Use required	Default	Fixed	Annotation documentation [°]										
							elevation / azimuth angle										
annotation	<p>documentation [dB]          normalised reference pattern of pattern to -12dB.</p>																

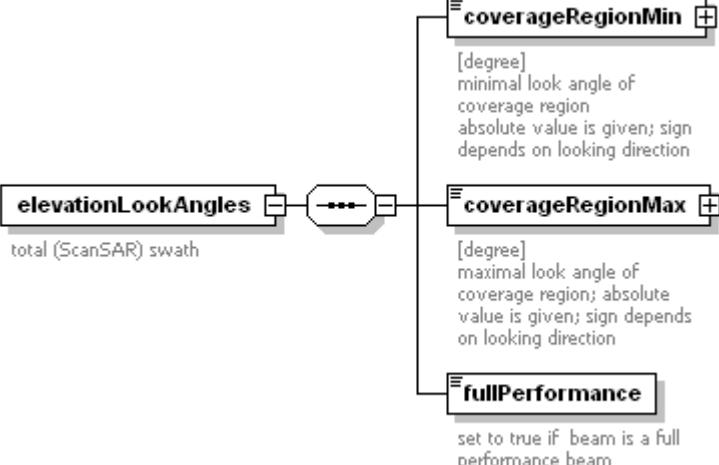
### element level1Product/calibration/calibrationData/antennaPattern/azimuthPattern/description

diagram	 <p>The diagram shows the <code>description</code> element.</p>
	additional description to this pattern
type	<u><a href="#">string1024</a></u>
facets	maxLength 1024
annotation	documentation additional description to this pattern

### element level1Product/calibration/calibrationData/antennaPattern/azimuthSteeringAngle

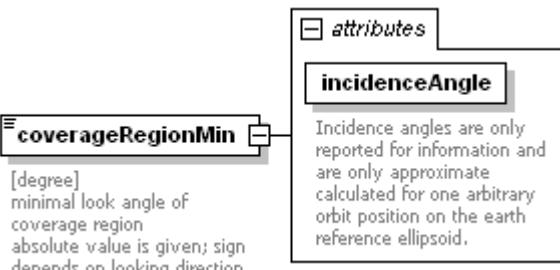
diagram	 <p>The diagram shows the <code>azimuthSteeringAngle</code> element.</p>
	[degree] should be 0
type	<code>xs:float</code>
annotation	documentation [degree] should be 0

### element level1Product/calibration/calibrationData/antennaPattern/elevationLookAngles

diagram	 <pre> graph LR     A[elevationLookAngles] --- B[...]     B --- C[coverageRegionMin]     B --- D[coverageRegionMax]     C --- E[fullPerformance]     D --- E   </pre> <p>The diagram illustrates the relationship between the <code>elevationLookAngles</code> element and the <code>coverageRegionMin</code>, <code>coverageRegionMax</code>, and <code>fullPerformance</code> elements. The <code>elevationLookAngles</code> element is connected to both <code>coverageRegionMin</code> and <code>coverageRegionMax</code>. These two elements are then connected to the <code>fullPerformance</code> element.</p>
annotation	documentation total (ScanSAR) swath

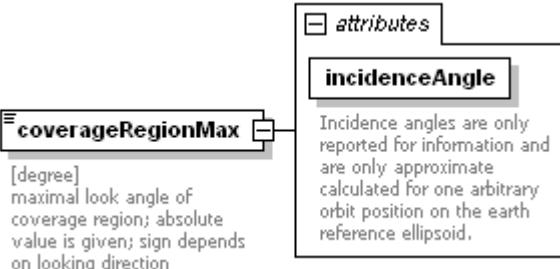
element

**level1Product/calibration/calibrationData/antennaPattern/elevationLookAngles/coverageRegionMin**

diagram	 <pre> graph LR     A[coverageRegionMin] --- B[attributes]     A --- C[incidenceAngle]   </pre> <p>The diagram shows the <code>coverageRegionMin</code> element connected to its attributes and the <code>incidenceAngle</code> element.</p>												
type	extension of <code>xs:float</code>												
attributes	<table border="1"> <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>incidenceAngle</td> <td><code>xs:float</code></td> <td>required</td> <td></td> <td></td> <td>documentation Incidence angles are only reported for information and are only approximate calculated for one arbitrary orbit position on the earth reference ellipsoid.</td> </tr> </tbody> </table>	Name	Type	Use	Default	Fixed	Annotation	incidenceAngle	<code>xs:float</code>	required			documentation Incidence angles are only reported for information and are only approximate calculated for one arbitrary orbit position on the earth reference ellipsoid.
Name	Type	Use	Default	Fixed	Annotation								
incidenceAngle	<code>xs:float</code>	required			documentation Incidence angles are only reported for information and are only approximate calculated for one arbitrary orbit position on the earth reference ellipsoid.								
annotation	documentation [degree] minimal look angle of coverage region absolute value is given; sign depends on looking direction												

element

**level1Product/calibration/calibrationData/antennaPattern/elevationLookAngles/coverageRegionMax**

diagram	 <pre> graph LR     A[coverageRegionMax] --- B[attributes]     A --- C[incidenceAngle]   </pre> <p>The diagram shows the <code>coverageRegionMax</code> element connected to its attributes and the <code>incidenceAngle</code> element.</p>
type	extension of <code>xs:float</code>

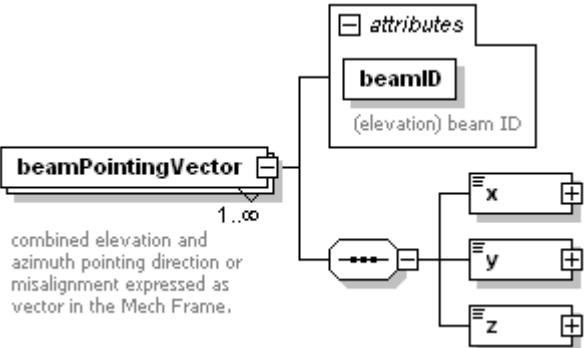
attributes	Name	Type	Use	Default	Fixed	Annotation	documentation
	incidenceAngle	<b>xs:float</b>	required				Incidence angles are only reported for information and are only approximate calculated for one arbitrary orbit position on the earth reference ellipsoid.
annotation	documentation [degree] maximal look angle of coverage region; absolute value is given; sign depends on looking direction						

element

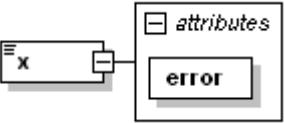
**level1Product/calibration/calibrationData/antennaPattern/elevationLookAngles/fullPerformance**

diagram	 <b>fullPerformance</b> <small>set to true if beam is a full performance beam</small>
type	<b>xs:boolean</b>
annotation	documentation set to true if beam is a full performance beam

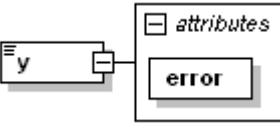
element **level1Product/calibration/calibrationData/antennaPattern/beamPointingVector**

diagram	 <p><b>beamPointingVector</b>  <small>combined elevation and azimuth pointing direction or misalignment expressed as vector in the Mech Frame.</small></p>						
attributes	Name	Type	Use	Default	Fixed	Annotation	documentation
	beamID	<b>string20</b>	required				(elevation) beam ID
annotation	documentation combined elevation and azimuth pointing direction or misalignment expressed as vector in the Mech Frame.						

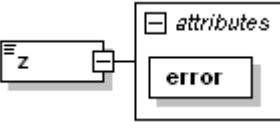
element **level1Product/calibration/calibrationData/antennaPattern/beamPointingVector/x**

diagram						
type	extension of <b>xs:double</b>					
attributes	Name	Type	Use	Default	Fixed	Annotation
	error	<b>xs:double</b>	required			

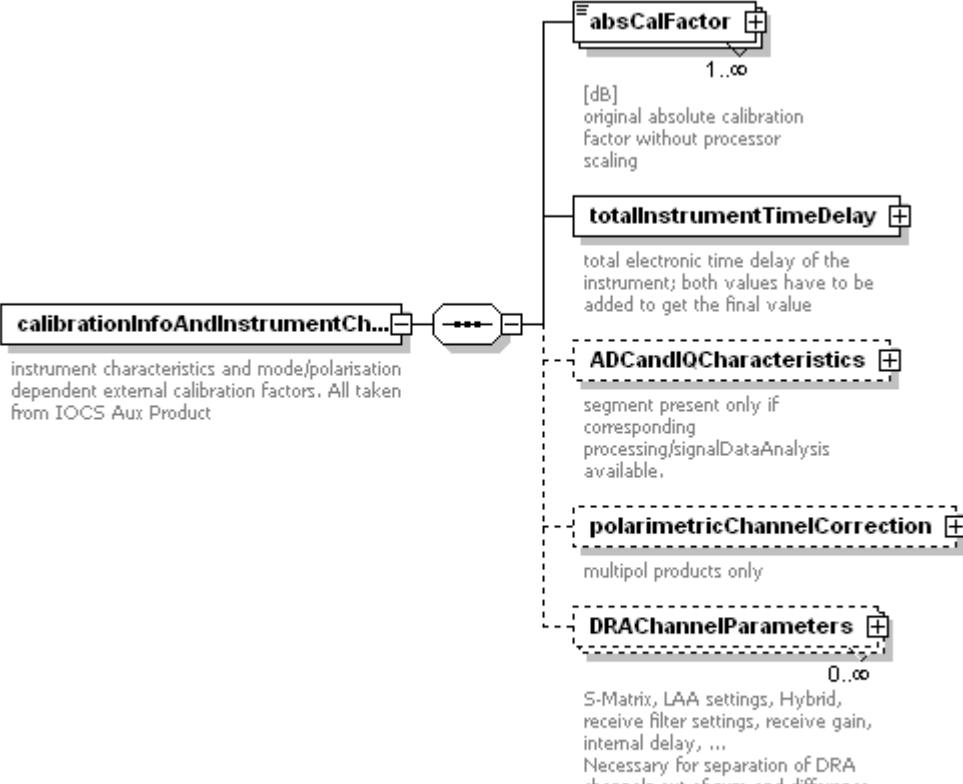
element **level1Product/calibration/calibrationData/antennaPattern/beamPointingVector/y**

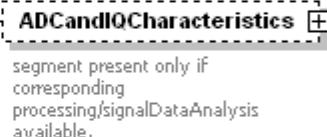
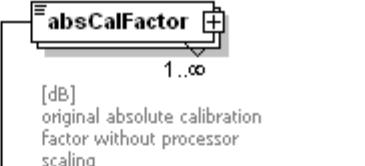
diagram													
type	extension of <b>xs:double</b>												
attributes	<table> <thead> <tr> <th>Name</th> <th>Type</th> <th>Use</th> <th>Default</th> <th>Fixed</th> <th>Annotation</th> </tr> </thead> <tbody> <tr> <td>error</td> <td><b>xs:double</b></td> <td>required</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Name	Type	Use	Default	Fixed	Annotation	error	<b>xs:double</b>	required			
Name	Type	Use	Default	Fixed	Annotation								
error	<b>xs:double</b>	required											

**element level1Product/calibration/calibrationData/antennaPattern/beamPointingVector/z**

diagram													
type	extension of <b>xs:double</b>												
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>error</td> <td><b>xs:double</b></td> <td>required</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Name	Type	Use	Default	Fixed	Annotation	error	<b>xs:double</b>	required			
Name	Type	Use	Default	Fixed	Annotation								
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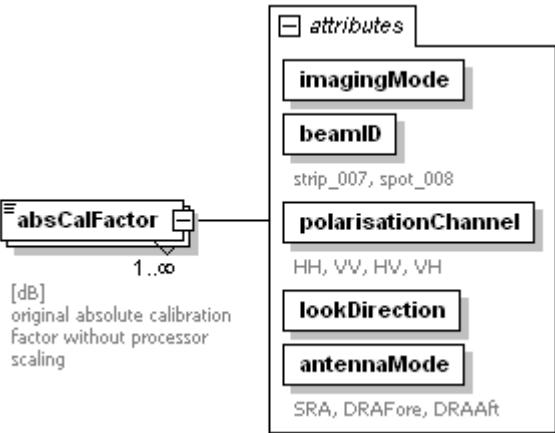
**element level1Product/calibration/calibrationData/calibrationInfoAndInstrumentCharacteristics**

diagram	 <p>instrument characteristics and mode/polarisation dependent external calibration factors. All taken from IOCS Aux Product</p>
annotation	documentation instrument characteristics and mode/polarisation dependent external calibration factors. All taken from IOCS Aux Product



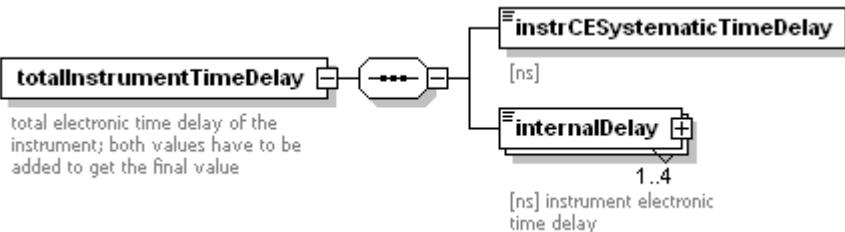
element

**level1Product/calibration/calibrationData/calibrationInfoAndInstrumentCharacteristics/absCalFactor**

diagram	 <pre> classDiagram     class absCalFactor {         imagingMode         beamID         strip_007, spot_008         polarisationChannel         HH, VV, HV, VH         lookDirection         antennaMode         SRA, DRAFore, DRAAft     }     absCalFactor &lt; --&gt; imagingMode     absCalFactor &lt; --&gt; beamID     absCalFactor &lt; --&gt; strip_007     absCalFactor &lt; --&gt; spot_008     absCalFactor &lt; --&gt; polarisationChannel     absCalFactor &lt; --&gt; HH     absCalFactor &lt; --&gt; VV     absCalFactor &lt; --&gt; HV     absCalFactor &lt; --&gt; VH     absCalFactor &lt; --&gt; lookDirection     absCalFactor &lt; --&gt; antennaMode     absCalFactor &lt; --&gt; SRA     absCalFactor &lt; --&gt; DRAFore     absCalFactor &lt; --&gt; DRAAft </pre> <p>[dB] original absolute calibration factor without processor scaling</p>																																				
type	extension of xs:float																																				
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Name	Type	Use	Default	Fixed	Annotation																																
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annotation	documentation [dB] original absolute calibration factor without processor scaling																																				

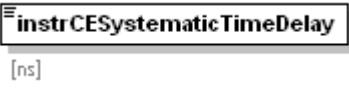
element

**level1Product/calibration/calibrationData/calibrationInfoAndInstrumentCharacteristics/totalInstrumentTimeDelay/instrCESystematicTimeDelay**

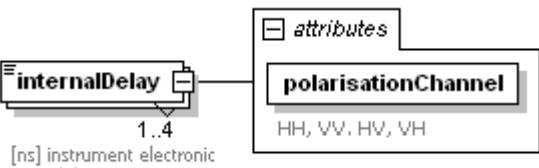
diagram	 <pre> classDiagram     class totalInstrumentTimeDelay {         ---&gt; instrCESystematicTimeDelay         ---&gt; internalDelay     }     instrCESystematicTimeDelay &lt; --&gt; totalInstrumentTimeDelay     internalDelay &lt; --&gt; totalInstrumentTimeDelay     [ns]     1..4     [ns] instrument electronic time delay </pre> <p>total electronic time delay of the instrument; both values have to be added to get the final value</p>
annotation	documentation total electronic time delay of the instrument; both values have to be added to get the final value

element

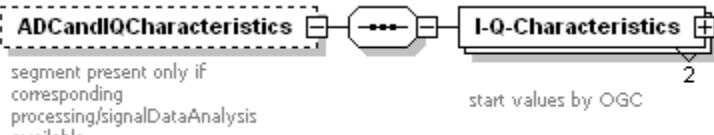
**level1Product/calibration/calibrationData/calibrationInfoAndInstrumentCharacteristics/totalInstrumentTimeDelay/instrCESystematicTimeDelay**

diagram	 <pre> classDiagram     class instrCESystematicTimeDelay {         [ns]     } </pre>
type	<u>xs:float</u>
annotation	documentation [ns]

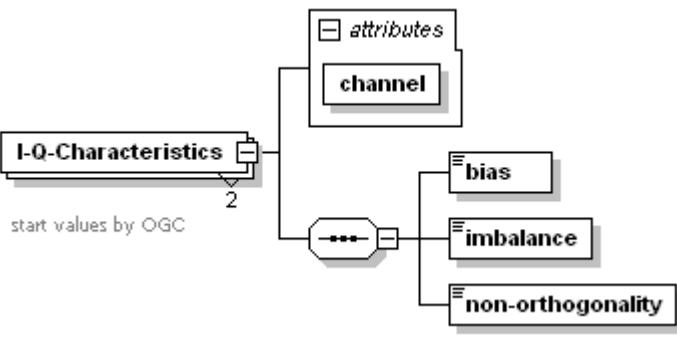
element  
**level1Product/calibration/calibrationData/calibrationInfoAndInstrumentCharacteristics/totalInstrumentTimeDelay/internalDelay**

diagram	 <pre> classDiagram     class internalDelay {         &lt;&lt;xs:float&gt;&gt;         &lt;&lt;1..4&gt;&gt;         &lt;&lt;[ns] instrument electronic time delay&gt;&gt;         attribute polarisationChannel {             type derived by: xs:NMTOKEN             values HH, VV, HV, VH         }     } </pre>									
type	extension of <code>xs:float</code>									
attributes	<table> <tr> <td>Name</td><td><code>polarisationChannel</code></td> <td>Type</td><td><code>derived by: xs:NMTOKEN</code></td> <td>Use</td><td>required</td> <td>Default</td><td>Fixed</td> <td>Annotation documentation</td> </tr> </table>	Name	<code>polarisationChannel</code>	Type	<code>derived by: xs:NMTOKEN</code>	Use	required	Default	Fixed	Annotation documentation
Name	<code>polarisationChannel</code>	Type	<code>derived by: xs:NMTOKEN</code>	Use	required	Default	Fixed	Annotation documentation		
annotation	documentation [ns] instrument electronic time delay									

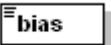
element  
**level1Product/calibration/calibrationData/calibrationInfoAndInstrumentCharacteristics/ADCandIQCharacteristics**

diagram	 <pre> classDiagram     class ADCandIQCharacteristics     class I_Q_Characteristics {         attribute channel     }     ADCandIQCharacteristics --&gt; I_Q_Characteristics </pre> <p>segment present only if corresponding processing/signalDataAnalysis available.</p>
annotation	documentation segment present only if corresponding processing/signalDataAnalysis available.

element  
**level1Product/calibration/calibrationData/calibrationInfoAndInstrumentCharacteristics/ADCandIQCharacteristics/I-Q-Characteristics**

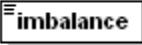
diagram	 <pre> classDiagram     class I_Q_Characteristics {         attribute channel     }     channel --&gt; bias     channel --&gt; imbalance     channel --&gt; nonOrthogonality </pre> <p>start values by OGC</p>									
attributes	<table> <tr> <td>Name</td><td><code>channel</code></td> <td>Type</td><td><code>derived by: xs:NMTOKEN</code></td> <td>Use</td><td>required</td> <td>Default</td><td>Fixed</td> <td>Annotation</td> </tr> </table>	Name	<code>channel</code>	Type	<code>derived by: xs:NMTOKEN</code>	Use	required	Default	Fixed	Annotation
Name	<code>channel</code>	Type	<code>derived by: xs:NMTOKEN</code>	Use	required	Default	Fixed	Annotation		
annotation	documentation start values by OGC									

element  
**level1Product/calibration/calibrationData/calibrationInfoAndInstrumentCharacteristics/ADCandIQCharacteristics/I-Q-Characteristics/bias**

diagram	
type	<b>xs:double</b>

element

**level1Product/calibration/calibrationData/calibrationInfoAndInstrumentCharacteristics/ADCandIQCharacteristics/I-Q-Characteristics/imbalance**

diagram	
type	<b>xs:double</b>

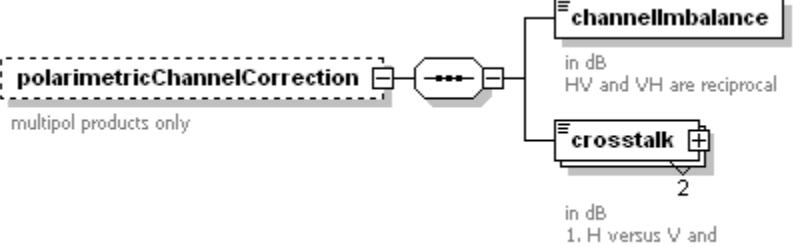
element

**level1Product/calibration/calibrationData/calibrationInfoAndInstrumentCharacteristics/ADCandIQCharacteristics/I-Q-Characteristics/non-orthogonality**

diagram	
type	<b>xs:double</b>

element

**level1Product/calibration/calibrationData/calibrationInfoAndInstrumentCharacteristics/polarimetricChannelCorrection**

diagram	 <p><b>polarimetricChannelCorrection</b> multipol products only</p>
annotation	documentation multipol products only

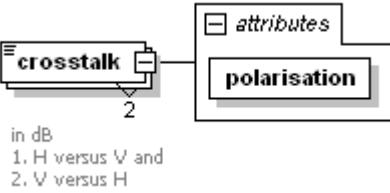
element

**level1Product/calibration/calibrationData/calibrationInfoAndInstrumentCharacteristics/polarimetricChannelCorrection/channelImbalance**

diagram	
	in dB HV and VH are reciprocal
type	<b>xs:float</b>
annotation	documentation in dB HV and VH are reciprocal

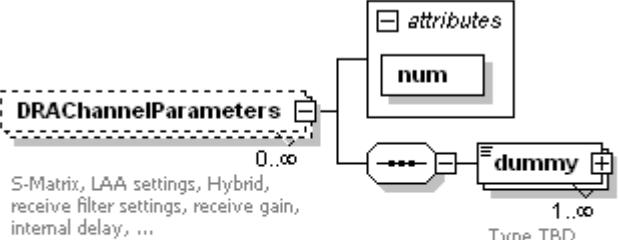
element

**level1Product/calibration/calibrationData/calibrationInfoAndInstrumentCharacteristics/polarimetricChannelCorrection/crosstalk**

diagram										
type	extension of <b>xs:float</b>									
attributes	<table> <tr> <td>Name</td><td>polarisation</td> <td>Type</td><td><b>derived by: xs:NMTOKEN</b></td> <td>Use</td><td>required</td> <td>Default</td><td>Fixed</td> <td>Annotation</td> </tr> </table>	Name	polarisation	Type	<b>derived by: xs:NMTOKEN</b>	Use	required	Default	Fixed	Annotation
Name	polarisation	Type	<b>derived by: xs:NMTOKEN</b>	Use	required	Default	Fixed	Annotation		
annotation	<p>documentation in dB</p> <p>1. H versus V and 2. V versus H</p>									

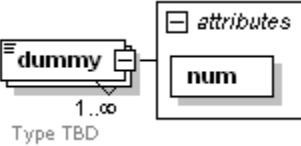
element

**level1Product/calibration/calibrationData/calibrationInfoAndInstrumentCharacteristics/DRAChannelParameters**

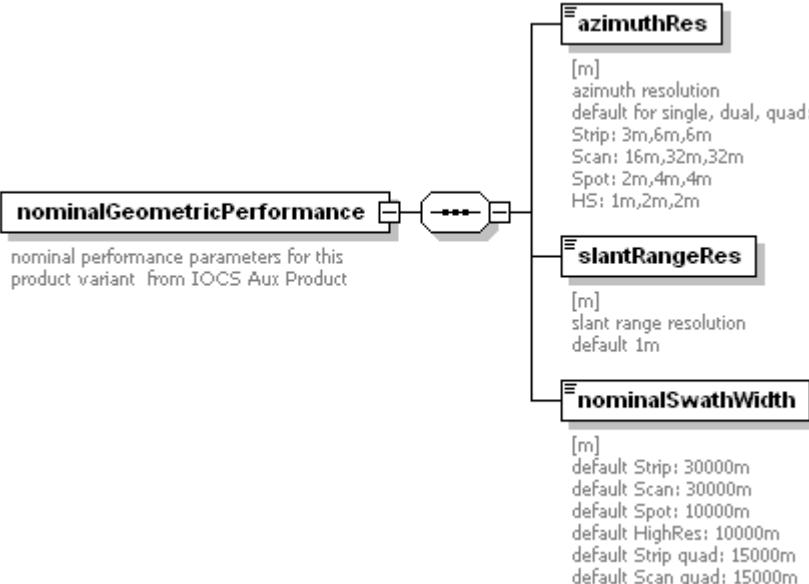
diagram										
attributes	<table> <tr> <td>Name</td><td>num</td> <td>Type</td><td><b>xs:unsignedLong</b></td> <td>Use</td><td>required</td> <td>Default</td><td>Fixed</td> <td>Annotation</td> </tr> </table>	Name	num	Type	<b>xs:unsignedLong</b>	Use	required	Default	Fixed	Annotation
Name	num	Type	<b>xs:unsignedLong</b>	Use	required	Default	Fixed	Annotation		
annotation	<p>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.</p>									

element

**level1Product/calibration/calibrationData/calibrationInfoAndInstrumentCharacteristics/DRAChannelParameters/dummy**

diagram										
type	extension of <b>xs:double</b>									
attributes	<table> <tr> <td>Name</td><td>num</td> <td>Type</td><td><b>xs:unsignedLong</b></td> <td>Use</td><td>required</td> <td>Default</td><td>Fixed</td> <td>Annotation</td> </tr> </table>	Name	num	Type	<b>xs:unsignedLong</b>	Use	required	Default	Fixed	Annotation
Name	num	Type	<b>xs:unsignedLong</b>	Use	required	Default	Fixed	Annotation		
annotation	documentation Type TBD									

element **level1Product/calibration/nominalGeometricPerformance**

diagram	 <pre> classDiagram     class nominalGeometricPerformance     class azimuthRes     class slantRangeRes     class nominalSwathWidth      nominalGeometricPerformance &lt; -- azimuthRes     nominalGeometricPerformance &lt; -- slantRangeRes     nominalGeometricPerformance &lt; -- nominalSwathWidth   </pre> <p>nominal performance parameters for this product variant from IOCS Aux Product</p>
annotation	documentation nominal performance parameters for this product variant from IOCS Aux Product

#### element level1Product/calibration/nominalGeometricPerformance/azimuthRes

diagram	 <p>[m]          azimuth resolution          default for single, dual, quad:          Strip: 3m,6m,6m          Scan: 16m,32m,32m          Spot: 2m,4m,4m          HS: 1m,2m,2m</p>
type	<b>xs:float</b>
annotation	documentation [m] azimuth resolution default for single, dual, quad: Strip: 3m,6m,6m Scan: 16m,32m,32m Spot: 2m,4m,4m HS: 1m,2m,2m

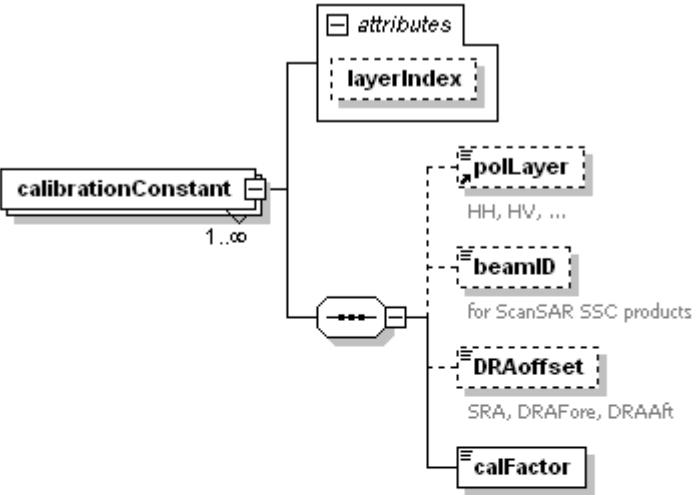
#### element level1Product/calibration/nominalGeometricPerformance/slantRangeRes

diagram	 <p>[m]          slant range resolution          default 1m</p>
type	<b>xs:float</b>
annotation	documentation [m] slant range resolution default 1m

#### element level1Product/calibration/nominalGeometricPerformance/nominalSwathWidth

diagram	 <p>[m]          default Strip: 30000m          default Scan: 30000m          default Spot: 10000m          default HighRes: 10000m          default Strip quad: 15000m          default Scan quad: 15000m</p>																		
type	<b>xs:float</b>																		
annotation	<p>documentation [m]</p> <table> <tr><td>default</td><td>Strip:</td><td>30000m</td></tr> <tr><td>default</td><td>Scan:</td><td>30000m</td></tr> <tr><td>default</td><td>Spot:</td><td>10000m</td></tr> <tr><td>default</td><td>HighRes:</td><td>10000m</td></tr> <tr><td>default</td><td>Strip quad:</td><td>15000m</td></tr> <tr><td>default</td><td>Scan quad:</td><td>15000m</td></tr> </table>	default	Strip:	30000m	default	Scan:	30000m	default	Spot:	10000m	default	HighRes:	10000m	default	Strip quad:	15000m	default	Scan quad:	15000m
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	 <p><b>calibrationConstant</b> (1..∞)</p> <ul style="list-style-type: none"> <li><b>layerIndex</b></li> <li><b>polLayer</b>: HH, HV, ...</li> <li><b>beamID</b>: for ScanSAR SSC products</li> <li><b>DRAoffset</b>: SRA, DRAFore, DRARft</li> <li><b>calFactor</b>: 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.</li> </ul>												
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></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Name	Type	Use	Default	Fixed	Annotation	layerIndex					
Name	Type	Use	Default	Fixed	Annotation								
layerIndex													

#### element **level1Product/calibration/calibrationConstant/beamID**

diagram	 <p>for ScanSAR SSC products</p>
type	<b>string20</b>

facets	maxLength 20
annotation	documentation for ScanSAR SSC products

**element level1Product/calibration/calibrationConstant/DRAoffset**

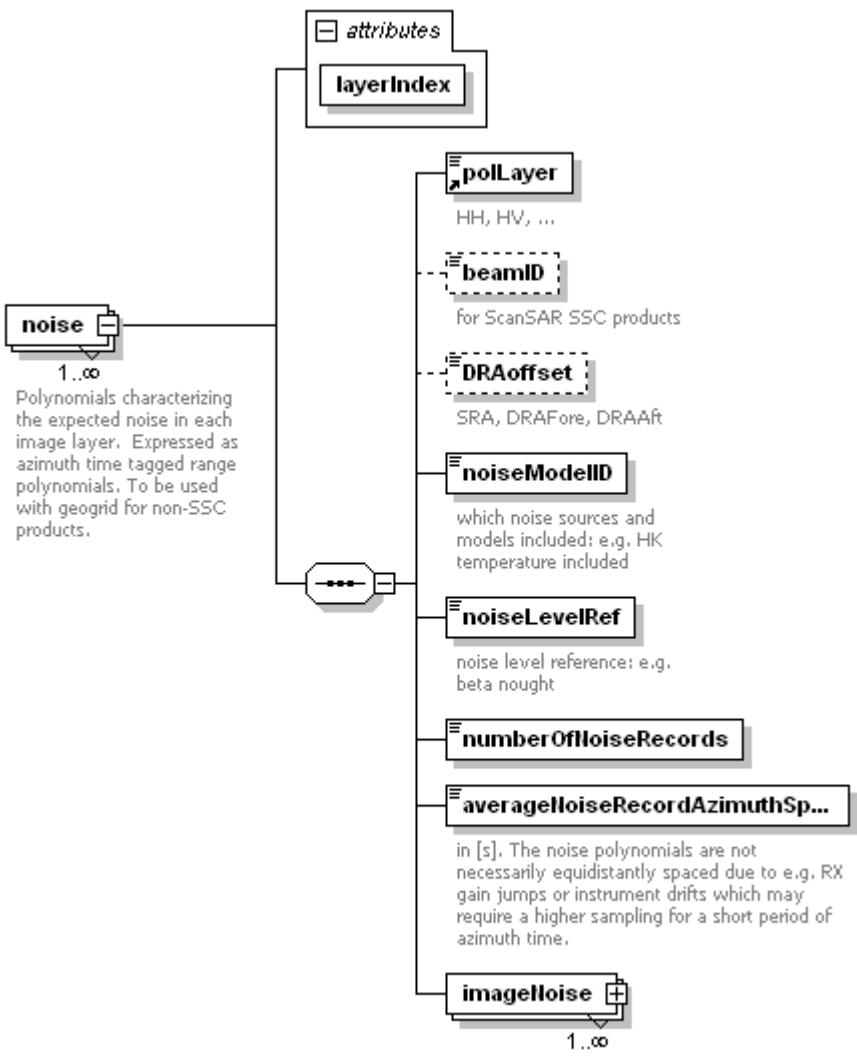
diagram	 <b>DRAoffset</b> SRA, DRAFore, DRAAft
type	restriction of <b>xs:NMTOKENS</b>
facets	enumeration SRA enumeration DRAFore enumeration DRAAft
annotation	documentation SRA, DRAFore, DRAAft

**element level1Product/calibration/calibrationConstant/calFactor**

diagram	 <b>calFactor</b> 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 <b>xs:double</b>
annotation	documentation 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.

### 6.1.8 Noise

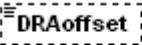
**element level1Product/noise**

diagram	 <pre> classDiagram     class noise {         &lt;&lt;1..&gt;&gt;         &lt;&lt;Polynomials characterizing the expected noise in each image layer. Expressed as azimuth time tagged range polynomials. To be used with geogrid for non-SSC products.&gt;&gt;     }     class attributes {         &lt;&lt;layerIndex&gt;&gt;     }     class polLayer {         &lt;&lt;HH, HV, ...&gt;&gt;     }     class beamID {         &lt;&lt;for ScanSAR SSC products&gt;&gt;     }     class DRAoffset {         &lt;&lt;SRA, DRAFore, DRAAft&gt;&gt;     }     class noiseModelID {         &lt;&lt;which noise sources and models included: e.g. HK temperature included&gt;&gt;     }     class noiseLevelRef {         &lt;&lt;noise level reference: e.g. beta nought&gt;&gt;     }     class numberOfNoiseRecords {         &lt;&lt;&gt;&gt;     }     class averageNoiseRecordAzimuthSp... {         &lt;&lt;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.&gt;&gt;     }     class imageNoise {         &lt;&lt;1..&gt;&gt;         &lt;&lt;Noise power polynomials for the azimuth reference times as function of range.&gt;&gt;     }     noise --&gt; attributes     noise --&gt; polLayer     noise --&gt; beamID     noise --&gt; DRAoffset     noise --&gt; noiseModelID     noise --&gt; noiseLevelRef     noise --&gt; numberOfNoiseRecords     noise --&gt; averageNoiseRecordAzimuthSp...     noise --&gt; imageNoise   </pre>												
attributes	<table border="1" style="width: 100%; border-collapse: collapse;"> <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:int</td><td>required</td><td></td><td></td><td></td></tr> </tbody> </table>	Name	Type	Use	Default	Fixed	Annotation	layerIndex	xs:int	required			
Name	Type	Use	Default	Fixed	Annotation								
layerIndex	xs:int	required											
annotation	documentation Polynomials characterizing the expected noise in each image layer. Expressed as azimuth time tagged range polynomials. To be used with geogrid for non-SSC products.												

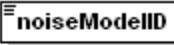
#### element level1Product/noise/beamID

diagram	 <pre> classDiagram     class beamID {         &lt;&lt;for ScanSAR SSC products&gt;&gt;     }   </pre>
type	<u>string20</u>
facets	maxLength 20
annotation	documentation for ScanSAR SSC products

#### element level1Product/noise/DRAoffset

diagram	 <b>DRAoffset</b> SRA, DRAFore, DRAAft
type	restriction of <b>xs:NMTOKENS</b>
facets	enumeration SRA enumeration DRAFore enumeration DRAAft
annotation	documentation SRA, DRAFore, DRAAft

#### element **level1Product/noise/noiseModelID**

diagram	 <b>noiseModelID</b> which noise sources and models included: e.g. HK temperature included
type	<b>string255</b>
facets	maxLength 255
annotation	documentation which noise sources and models included: e.g. HK temperature included

#### element **level1Product/noise/noiseLevelRef**

diagram	 <b>noiseLevelRef</b> noise level reference: e.g. beta nought
type	<b>string80</b>
facets	maxLength 80
annotation	documentation noise level reference: e.g. beta nought

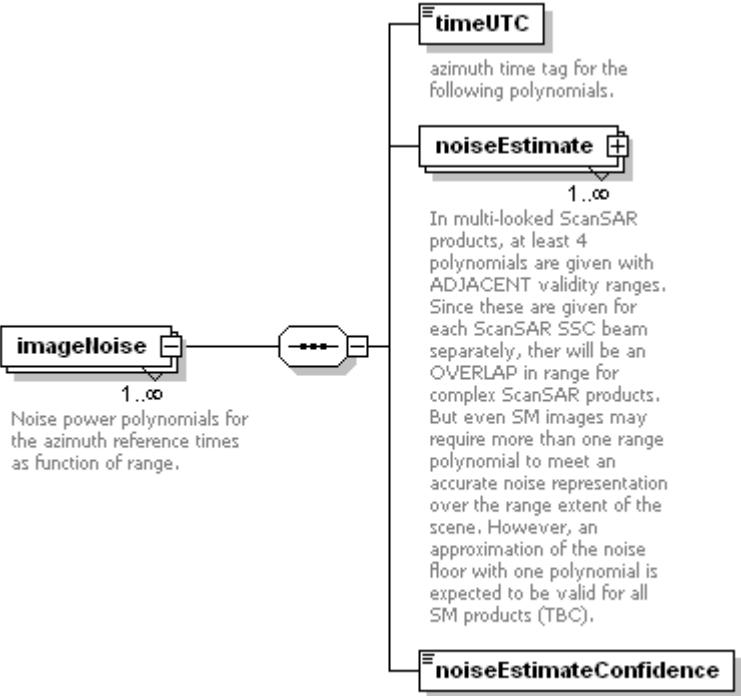
#### element **level1Product/noise/numberOfNoiseRecords**

diagram	 <b>numberOfNoiseRecords</b>
type	<b>xs:int</b>

#### element **level1Product/noise/averageNoiseRecordAzimuthSpacing**

diagram	 <b>averageNoiseRecordAzimuthSp...</b>  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	<b>xs:float</b>
annotation	documentation 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.

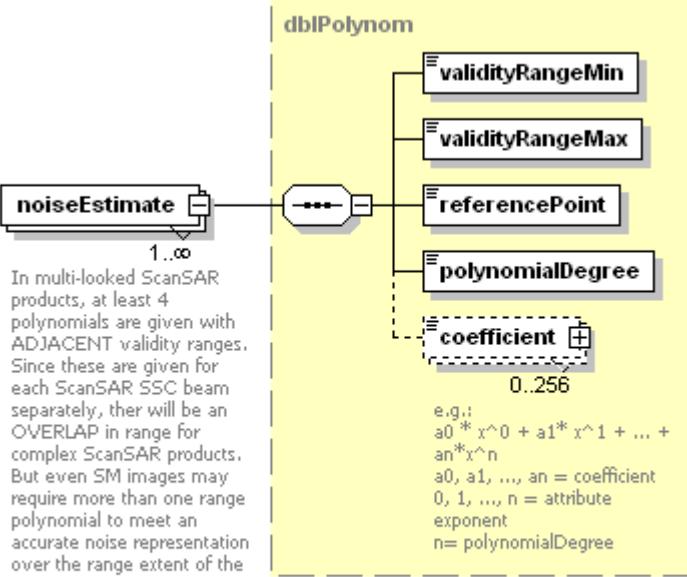
#### element **level1Product/noise/imageNoise**

diagram	 <pre> classDiagram     class imageNoise     class timeUTC     class noiseEstimate     class noiseEstimateConfidence      imageNoise --&gt; timeUTC :      imageNoise --&gt; noiseEstimate :      imageNoise --&gt; noiseEstimateConfidence :    </pre> <p>The diagram shows a sequence of four UML classes connected by directed associations. On the left is the <b>imageNoise</b> class, which has three outgoing associations. The first points to the <b>timeUTC</b> class, labeled with a multiplicity of 1..∞. The second points to the <b>noiseEstimate</b> class, also labeled with 1..∞. The third points to the <b>noiseEstimateConfidence</b> class, also labeled with 1..∞. Each class is enclosed in a rectangular box with a thin border.</p>
annotation	documentation Noise power polynomials for the azimuth reference times as function of range.

#### element level1Product/noise/imageNoise/timeUTC

diagram	 <pre> classDiagram     class timeUTC   </pre> <p>The diagram shows the <b>timeUTC</b> class from the previous fragment, enclosed in a rectangular box with a thin border. Below it is its detailed documentation: "azimuth time tag for the following polynomials."</p>
type	<b>xs:dateTime</b>
annotation	documentation azimuth time tag for the following polynomials.

#### element level1Product/noise/imageNoise/noiseEstimate

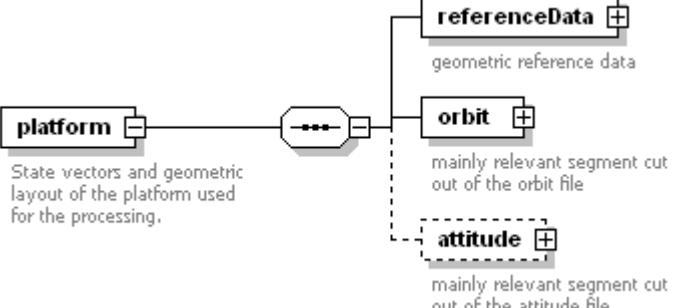
diagram	 <pre> classDiagram     class dblPolynom {         &lt;&lt;noiseEstimate&gt;&gt;         &lt;&lt;validityRangeMin&gt;&gt;         &lt;&lt;validityRangeMax&gt;&gt;         &lt;&lt;referencePoint&gt;&gt;         &lt;&lt;polynomialDegree&gt;&gt;         &lt;&lt;coefficient&gt;&gt;     }     noiseEstimate --&gt; dblPolynom     dblPolynom &lt; -- validityRangeMin     dblPolynom &lt; -- validityRangeMax     dblPolynom &lt; -- referencePoint     dblPolynom &lt; -- polynomialDegree     dblPolynom &lt; -- coefficient     coefficient &lt; -- coefficient   </pre> <p>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).</p>
type	<b>dblPolynom</b>
annotation	documentation 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).

#### element level1Product/noise/imageNoise/noiseEstimateConfidence

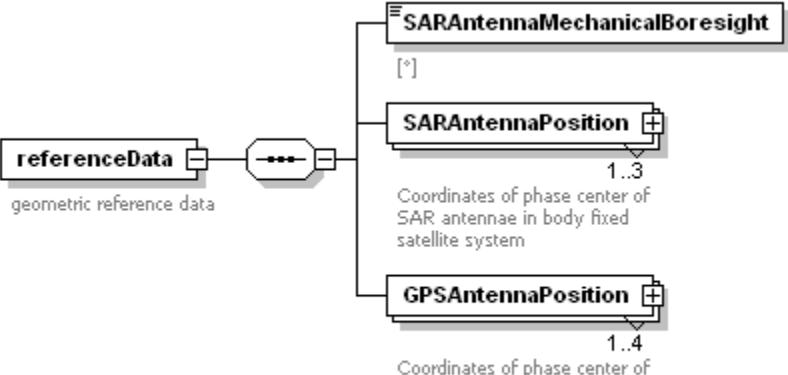
diagram	 <pre> classDiagram     class noiseEstimateConfidence   </pre> <p>0...1 (derived from the fit results). 1 is best.</p>
type	<b>xs:float</b>
annotation	documentation 0...1 (derived from the fit results). 1 is best.

## 6.1.9 Platform

### element **level1Product/platform**

diagram	 <pre> graph LR     platform[platform] ---&gt; refData[referenceData]     platform ---&gt; orbit[orbit]     platform ---&gt; attitude[attitude]     refData ---&gt; orbit     refData ---&gt; attitude   </pre> <p>The diagram illustrates the structure of the <code>level1Product/platform</code> element. It starts with a <code>platform</code> node, which has three outgoing connections. One connection leads to a <code>referenceData</code> node, another to an <code>orbit</code> node, and the third to an <code>attitude</code> node. The <code>referenceData</code> node is associated with "geometric reference data". The <code>orbit</code> node is associated with "mainly relevant segment cut out of the orbit file". The <code>attitude</code> node is also associated with "mainly relevant segment cut out of the attitude file".</p>
annotation	documentation State vectors and geometric layout of the platform used for the processing.

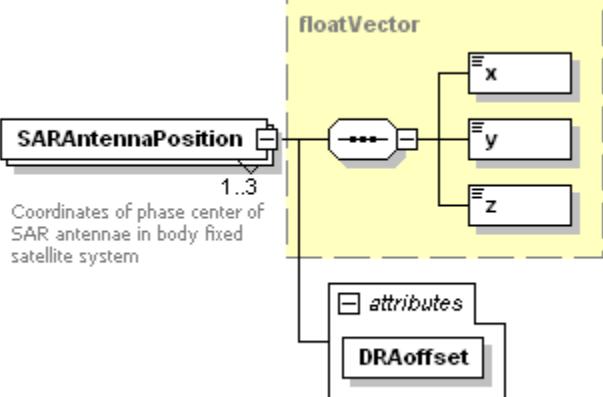
### element **level1Product/platform/referenceData**

diagram	 <pre> graph LR     refData[referenceData] ---&gt; SARAntennaMechanicalBoresight[SARAntennaMechanicalBoresight]     refData ---&gt; SARAntennaPosition[SARAntennaPosition]     refData ---&gt; GPSAntennaPosition[GPSAntennaPosition]     SARAntennaMechanicalBoresight ---&gt; SARAntennaPosition     SARAntennaMechanicalBoresight ---&gt; GPSAntennaPosition   </pre> <p>The diagram illustrates the structure of the <code>level1Product/platform/referenceData</code> element. It starts with a <code>referenceData</code> node, which has three outgoing connections. One connection leads to a <code>SARAntennaMechanicalBoresight</code> node, another to a <code>SARAntennaPosition</code> node, and the third to a <code>GPSAntennaPosition</code> node. The <code>SARAntennaMechanicalBoresight</code> node is associated with "geometric reference data". The <code>SARAntennaPosition</code> node is associated with "Coordinates of phase center of SAR antennae in body fixed satellite system". The <code>GPSAntennaPosition</code> node is associated with "Coordinates of phase center of the GPS antenna used for the orbit file in body fixed satellite system".</p>
annotation	documentation geometric reference data

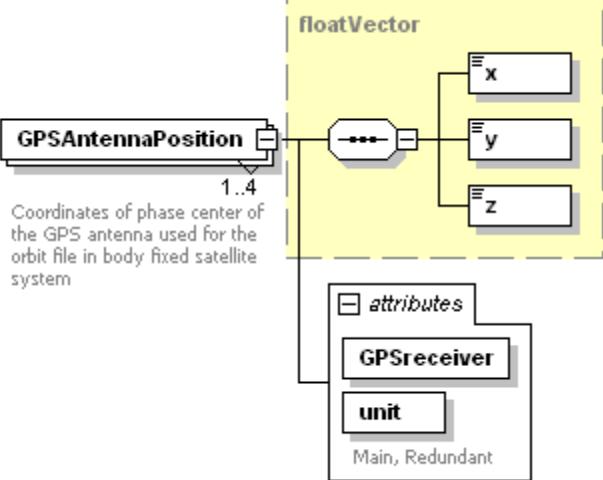
### element **level1Product/platform/referenceData/SARAntennaMechanicalBoresight**

diagram	 <pre> graph LR     SARAntennaMechanicalBoresight[SARAntennaMechanicalBoresight]   </pre> <p>The diagram shows a single <code>SARAntennaMechanicalBoresight</code> node, which is a simple rectangular box with a double-line border.</p>
type	<b>xs:double</b>
annotation	documentation [°]

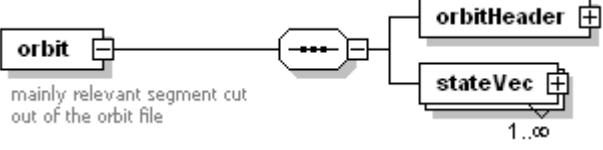
### element **level1Product/platform/referenceData/SARAntennaPosition**

diagram	 <pre> classDiagram     class SARAntennaPosition {         &lt;&lt;1..3 Coordinates of phase center of SAR antennae in body fixed satellite system&gt;&gt;     }     class floatVector {         &lt;&lt;3D vector type&gt;&gt;         &lt;&lt;x, y, z components&gt;&gt;     }     class DRAoffset {         &lt;&lt;Offset from floatVector&gt;&gt;     }     SARAntennaPosition --&gt; floatVector     floatVector --&gt; x     floatVector --&gt; y     floatVector --&gt; z     floatVector --&gt; DRAoffset     </pre>																		
type	extension of <a href="#">floatVector</a>																		
attributes	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">Name</td><td>Name</td> <td>Type</td><td>derived</td> <td>Use</td><td>required</td> <td>Default</td> <td>Fixed</td> <td>Annotation</td> </tr> <tr> <td></td><td>DRAoffset</td> <td>by:</td><td>xs:NMTOKENS</td> <td></td><td></td> <td></td> <td></td> <td></td> </tr> </table>	Name	Name	Type	derived	Use	required	Default	Fixed	Annotation		DRAoffset	by:	xs:NMTOKENS					
Name	Name	Type	derived	Use	required	Default	Fixed	Annotation											
	DRAoffset	by:	xs:NMTOKENS																
annotation	documentation Coordinates of phase center of SAR antennae in body fixed satellite system																		

#### element level1Product/platform/referenceData/GPSAntennaPosition

diagram	 <pre> classDiagram     class GPSAntennaPosition {         &lt;&lt;1..4 Coordinates of phase center of the GPS antenna used for the orbit file in body fixed satellite system&gt;&gt;     }     class floatVector {         &lt;&lt;3D vector type&gt;&gt;         &lt;&lt;x, y, z components&gt;&gt;     }     class GPSreceiver {         &lt;&lt;GPS receiver information&gt;&gt;     }     class unit {         &lt;&lt;Main, Redundant&gt;&gt;     }     GPSAntennaPosition --&gt; floatVector     floatVector --&gt; x     floatVector --&gt; y     floatVector --&gt; z     floatVector --&gt; GPSreceiver     floatVector --&gt; unit     </pre>																											
type	extension of <a href="#">floatVector</a>																											
attributes	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">Name</td><td>Name</td> <td>Type</td><td>derived</td> <td>Use</td><td>required</td> <td>Default</td> <td>Fixed</td> <td>Annotation</td> </tr> <tr> <td></td><td>GPSreceiver</td> <td>by:</td><td>xs:NMTOKEN</td> <td></td><td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>unit</td><td></td> <td>derived</td><td>by: xs:NMTOKEN</td> <td>required</td><td></td><td></td> <td></td> <td>documentation Main, Redundant</td> </tr> </table>	Name	Name	Type	derived	Use	required	Default	Fixed	Annotation		GPSreceiver	by:	xs:NMTOKEN						unit		derived	by: xs:NMTOKEN	required				documentation Main, Redundant
Name	Name	Type	derived	Use	required	Default	Fixed	Annotation																				
	GPSreceiver	by:	xs:NMTOKEN																									
unit		derived	by: xs:NMTOKEN	required				documentation Main, Redundant																				
annotation	documentation Coordinates of phase center of the GPS antenna used for the orbit file in body fixed satellite system																											

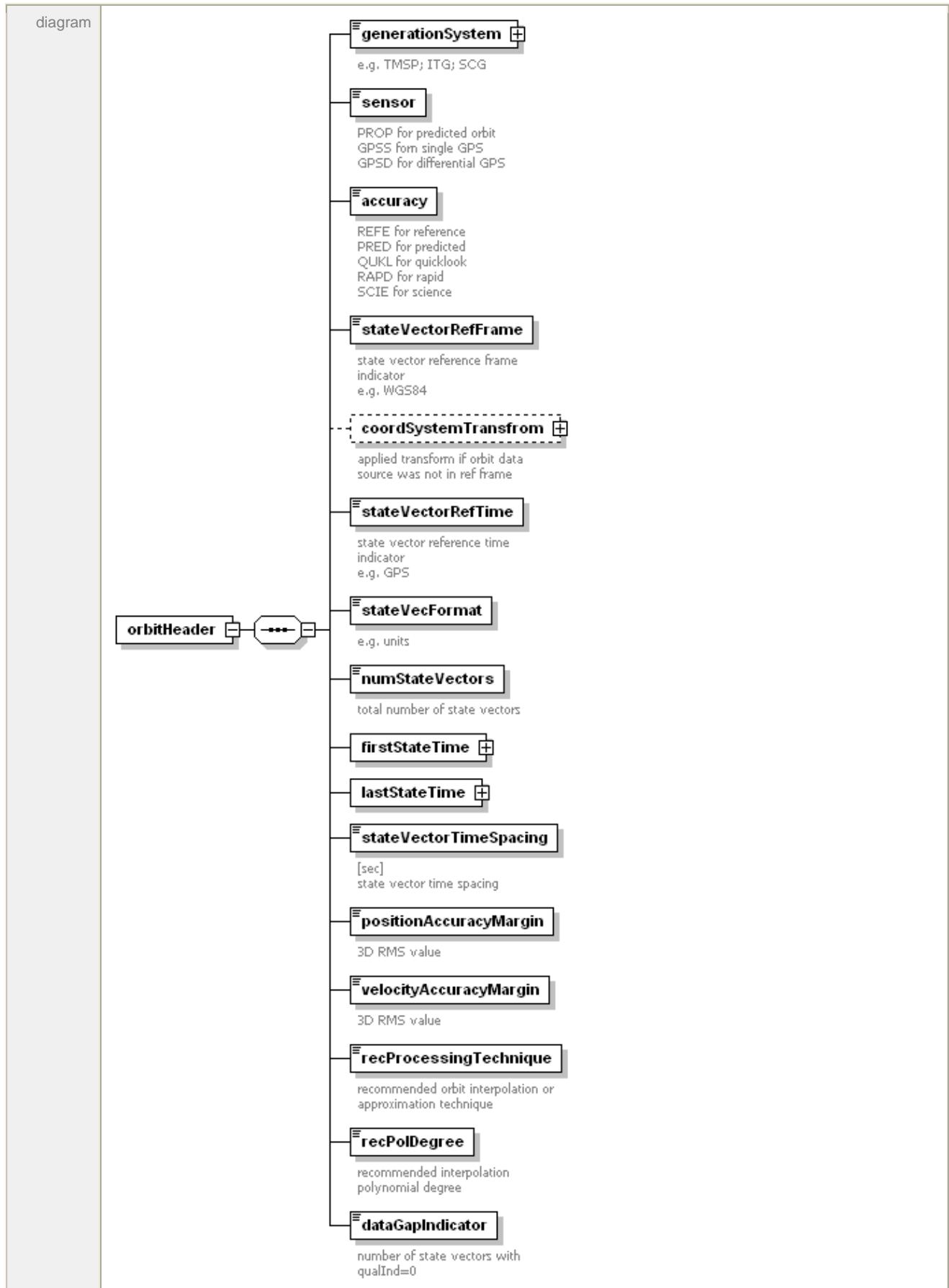
#### element level1Product/platform/orbit

diagram	
annotation	documentation mainly relevant segment cut out of the orbit file

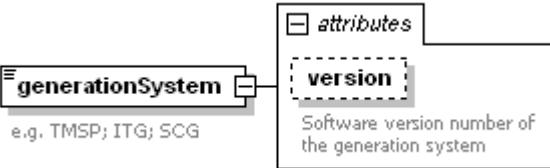
element **level1Product/platform/orbit/orbitHeader**



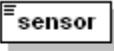
Public



### element level1Product/platform/orbit/orbitHeader/generationSystem

diagram	 <pre> classDiagram     class generationSystem {         &lt;&lt;e.g. TMSP; ITG; SCG&gt;&gt;         &lt;&lt;version&gt;&gt;         &lt;&lt;Software version number of the generation system&gt;&gt;     }     generationSystem &lt; -- attributes     attributes &lt; -- version   </pre>									
type	extension of <u>string255</u>									
facets	maxLength 255									
attributes	<table> <tr> <td>Name</td><td>version</td> <td>Type</td><td><u>string80</u></td> <td>Use</td><td>Default</td><td>Fixed</td> <td>Annotation documentation</td> <td>Software version number of the generation system</td> </tr> </table>	Name	version	Type	<u>string80</u>	Use	Default	Fixed	Annotation documentation	Software version number of the generation system
Name	version	Type	<u>string80</u>	Use	Default	Fixed	Annotation documentation	Software version number of the generation system		
annotation	documentation e.g. TMSP; ITG; SCG									

### element level1Product/platform/orbit/orbitHeader/sensor

diagram	 <pre> classDiagram     class sensor {         &lt;&lt;PROP for predicted orbit         GPSS form single GPS         GPSD for differential GPS&gt;&gt;     }   </pre>
type	restriction of xs:NMTOKEN
facets	enumeration PROP enumeration GPSS enumeration GPSD
annotation	documentation PROP for predicted orbit GPSS form single GPS GPSD for differential GPS

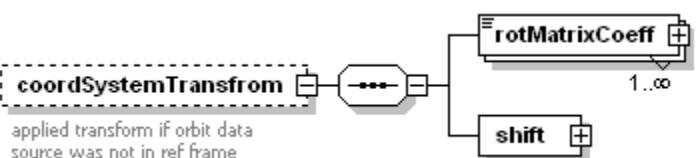
### element level1Product/platform/orbit/orbitHeader/accuracy

diagram	 <pre> classDiagram     class accuracy {         &lt;&lt;REFE for reference         PRED for predicted         QUKL for quicklook         RAPD for rapid         SCIE for science&gt;&gt;     }   </pre>
type	restriction of xs:NMTOKEN
facets	enumeration REFE enumeration PRED enumeration QUKL enumeration RAPD enumeration SCIE
annotation	documentation REFE for reference PRED for predicted QUKL for quicklook RAPD for rapid SCIE for science

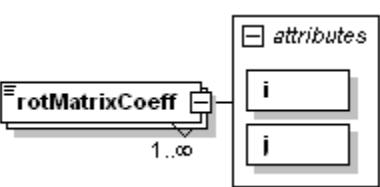
### element level1Product/platform/orbit/orbitHeader/stateVectorRefFrame

diagram	 <p>state vector reference frame indicator e.g. WGS84</p>
type	<u>string80</u>
facets	maxLength 80
annotation	documentation state vector reference frame indicator e.g. WGS84

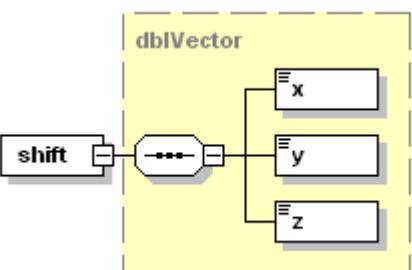
#### element level1Product/platform/orbit/orbitHeader/coordSystemTransfrom

diagram	 <p>applied transform if orbit data source was not in ref frame</p>
annotation	documentation applied transform if orbit data source was not in ref frame

#### element level1Product/platform/orbit/orbitHeader/coordSystemTransfrom/rotMatrixCoeff

diagram	 <p>attributes i j</p>																		
type	extension of <b>xs:double</b>																		
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>i</td> <td><b>xs:int</b></td> <td>required</td> <td></td> <td></td> <td></td> </tr> <tr> <td>j</td> <td><b>xs:int</b></td> <td>required</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Name	Type	Use	Default	Fixed	Annotation	i	<b>xs:int</b>	required				j	<b>xs:int</b>	required			
Name	Type	Use	Default	Fixed	Annotation														
i	<b>xs:int</b>	required																	
j	<b>xs:int</b>	required																	

#### element level1Product/platform/orbit/orbitHeader/coordSystemTransfrom/shift

diagram	 <p>dblVector x y z</p>
type	<b>dblVector</b>

#### element level1Product/platform/orbit/orbitHeader/stateVectorRefTime

diagram	 <p>state vector reference time indicator e.g. GPS</p>
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type	<b>string20</b>
facets	maxLength 20
annotation	documentation state vector reference time indicator e.g. GPS

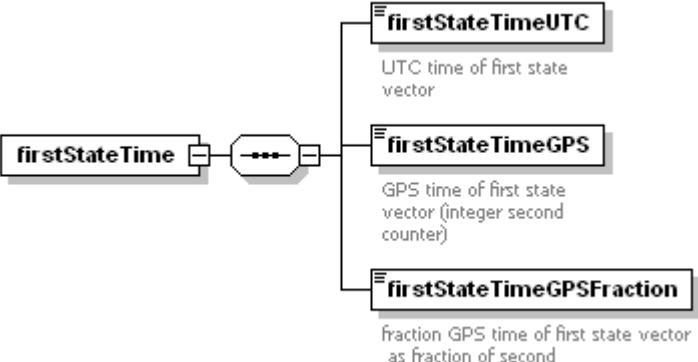
**element level1Product/platform/orbit/orbitHeader/stateVecFormat**

diagram	 e.g. units
type	<b>string255</b>
facets	maxLength 255
annotation	documentation e.g. units

**element level1Product/platform/orbit/orbitHeader/numStateVectors**

diagram	 total number of state vectors
type	<b>xs:unsignedLong</b>
annotation	documentation total number of state vectors

**element level1Product/platform/orbit/orbitHeader/firstStateTime**

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

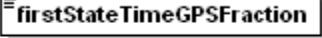
**element level1Product/platform/orbit/orbitHeader/firstStateTime/firstStateTimeUTC**

diagram	 UTC time of first state vector
type	<b>xs:dateTime</b>
annotation	documentation UTC time of first state vector

**element level1Product/platform/orbit/orbitHeader/firstStateTime/firstStateTimeGPS**

diagram	 <p>GPS time of first state vector (integer second counter)</p>
type	<b>xs:unsignedInt</b>
annotation	documentation GPS time of first state vector (integer second counter)

#### element level1Product/platform/orbit/orbitHeader/firstStateTime/firstStateTimeGPSFraction

diagram	 <p>Fraction GPS time of first state vector as fraction of second</p>
type	<b>xs:double</b>
annotation	documentation fraction GPS time of first state vector as fraction of second

#### element level1Product/platform/orbit/orbitHeader/lastStateTime

diagram	  <p>UTC time of last state vector</p>  <p>GPS time of first state vector (integer second counter)</p>  <p>Fraction GPS time of first state vector as fraction of second</p>
---------	---

#### element level1Product/platform/orbit/orbitHeader/lastStateTime/lastStateTimeUTC

diagram	 <p>UTC time of last state vector</p>
type	<b>xs:dateTime</b>
annotation	documentation UTC time of last state vector

#### element level1Product/platform/orbit/orbitHeader/lastStateTime/lastStateTimeGPS

diagram	 <p>GPS time of first state vector (integer second counter)</p>
type	<b>xs:unsignedInt</b>
annotation	documentation GPS time of first state vector (integer second counter)

#### element level1Product/platform/orbit/orbitHeader/lastStateTime/lastStateTimeGPSFraction

diagram	 <b>lastStateTimeGPSFraction</b>
	fraction GPS time of first state vector as fraction of second
type	<b>xs:double</b>
annotation	documentation fraction GPS time of first state vector as fraction of second

**element level1Product/platform/orbit/orbitHeader/stateVectorTimeSpacing**

diagram	 <b>stateVectorTimeSpacing</b>
	[sec] state vector time spacing
type	<b>xs:double</b>
annotation	documentation [sec] state vector time spacing

**element level1Product/platform/orbit/orbitHeader/positionAccuracyMargin**

diagram	 <b>positionAccuracyMargin</b>
	3D RMS value
type	<b>xs:float</b>
annotation	documentation 3D RMS value

**element level1Product/platform/orbit/orbitHeader/velocityAccuracyMargin**

diagram	 <b>velocityAccuracyMargin</b>
	3D RMS value
type	<b>xs:float</b>
annotation	documentation 3D RMS value

**element level1Product/platform/orbit/orbitHeader/recProcessingTechnique**

diagram	 <b>recProcessingTechnique</b>
	recommended orbit interpolation or approximation technique
type	<b>string255</b>
facets	maxLength 255
annotation	documentation recommended orbit interpolation or approximation technique

**element level1Product/platform/orbit/orbitHeader/recPolDegree**

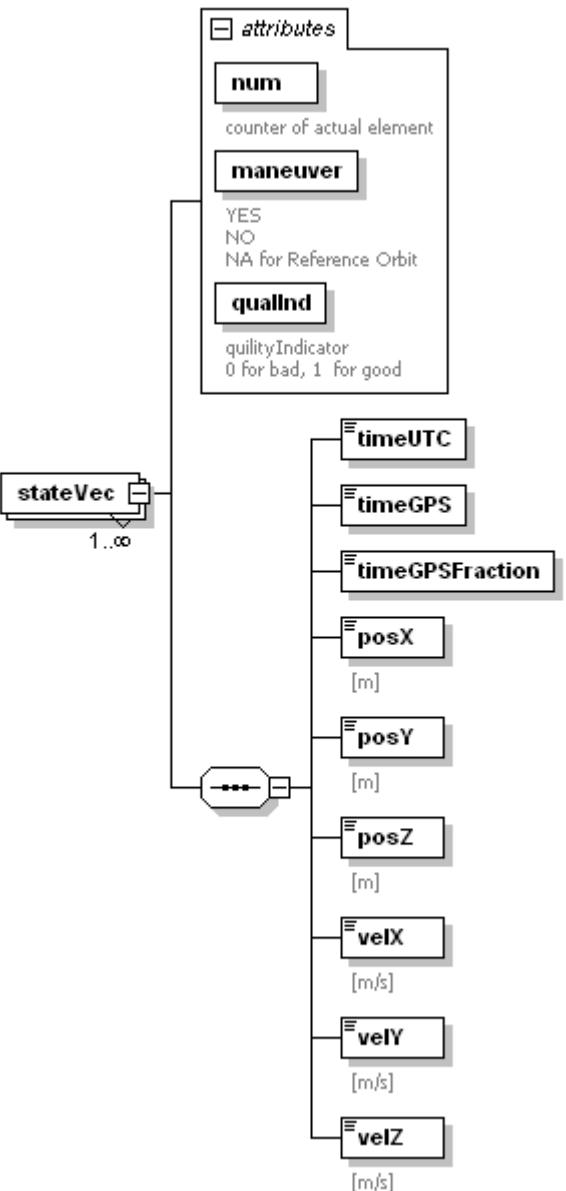
diagram	 <b>recPolDegree</b>
	recommended interpolation polynomial degree
type	restriction of <b>xs:int</b>

facets	minInclusive 1 maxInclusive 20
annotation	documentation recommended interpolation polynomial degree

**element level1Product/platform/orbit/orbitHeader/dataGapIndicator**

diagram	 number of state vectors with qualInd=0
type	<b>xs:int</b>
annotation	documentation number of state vectors with qualInd=0

**element level1Product/platform/orbit/stateVec**

diagram							
attributes	<table> <thead> <tr> <th>Name</th> <th>Type</th> <th>Use</th> <th>Default</th> <th>Fixed</th> <th>Annotation</th> </tr> </thead> </table>	Name	Type	Use	Default	Fixed	Annotation
Name	Type	Use	Default	Fixed	Annotation		

	num	<b>derived by:</b> xs:unsignedLong	required	documentation counter of actual element
	maneuver	<b>derived by:</b> xs:NMTOKEN	required	documentation YES NO NA for Reference Orbit
	qualInd	<b>derived by:</b> xs:unsignedByte	required	documentation qualityIndicator 0 for bad, 1 for good

**element level1Product/platform/orbit/stateVec/timeUTC**

diagram	
type	xs:dateTime

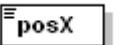
**element level1Product/platform/orbit/stateVec/timeGPS**

diagram	
type	xs:unsignedLong

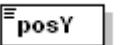
**element level1Product/platform/orbit/stateVec/timeGPSSFraction**

diagram	
type	xs:double

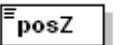
**element level1Product/platform/orbit/stateVec/posX**

diagram	 [m]
type	xs:double
annotation	documentation [m]

**element level1Product/platform/orbit/stateVec/posY**

diagram	 [m]
type	xs:double
annotation	documentation [m]

**element level1Product/platform/orbit/stateVec/posZ**

diagram	 [m]
type	xs:double
annotation	documentation [m]

**element level1Product/platform/orbit/stateVec/velX**

diagram	 <b>velX</b> [m/s]
type	<b>xs:double</b>
annotation	documentation [m/s]

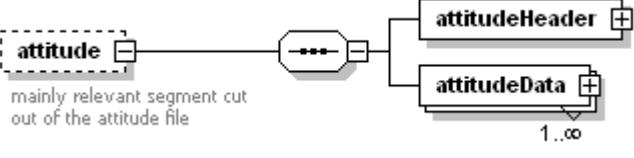
**element level1Product/platform/orbit/stateVec/velY**

diagram	 <b>velY</b> [m/s]
type	<b>xs:double</b>
annotation	documentation [m/s]

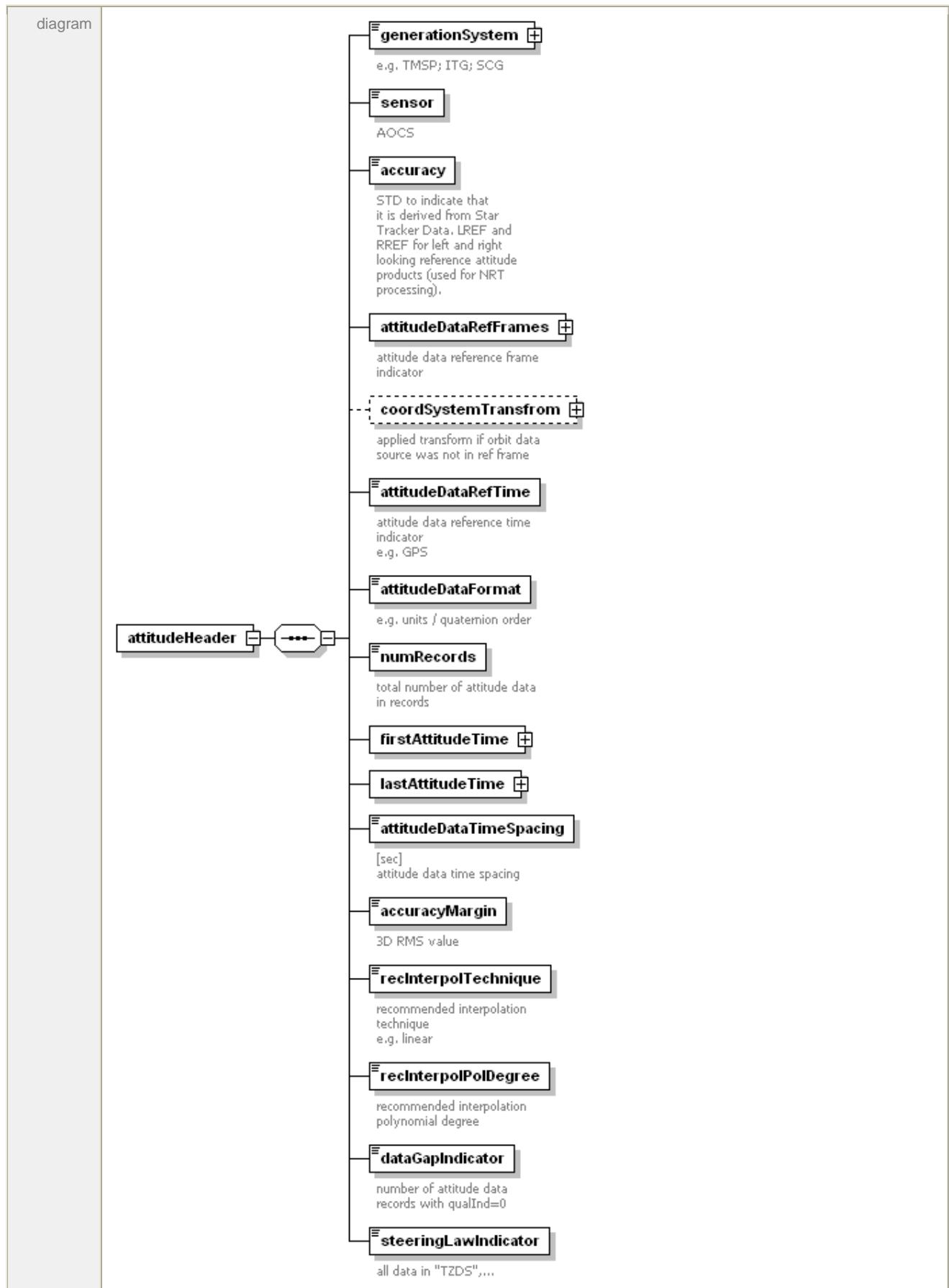
**element level1Product/platform/orbit/stateVec/velZ**

diagram	 <b>velZ</b> [m/s]
type	<b>xs:double</b>
annotation	documentation [m/s]

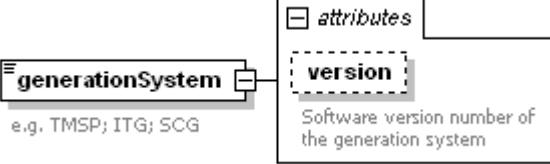
**element level1Product/platform/attitude**

diagram	 <b>attitude</b> ---> <b>attitudeHeader</b> + <b>attitude</b> ---> <b>attitudeData</b> + <small>mainly relevant segment cut out of the attitude file</small>
annotation	documentation mainly relevant segment cut out of the attitude file

**element level1Product/platform/attitude/attitudeHeader**



**element level1Product/platform/attitude/attitudeHeader/generationSystem**

diagram	 <p>The diagram shows the <b>generationSystem</b> element with a dashed line pointing to its <b>version</b> attribute. A callout box defines the <b>version</b> attribute as "Software version number of the generation system". Below the element is the note "e.g. TMSP; ITG; SCG".</p>												
type	extension of <b>string255</b>												
facets	maxLength 255												
attributes	<table> <thead> <tr> <th>Name</th> <th>Type</th> <th>Use</th> <th>Default</th> <th>Fixed</th> <th>Annotation documentation</th> </tr> </thead> <tbody> <tr> <td>version</td> <td><b>string80</b></td> <td></td> <td></td> <td></td> <td>Software version number of the generation system</td> </tr> </tbody> </table>	Name	Type	Use	Default	Fixed	Annotation documentation	version	<b>string80</b>				Software version number of the generation system
Name	Type	Use	Default	Fixed	Annotation documentation								
version	<b>string80</b>				Software version number of the generation system								
annotation	documentation e.g. TMSP; ITG; SCG												

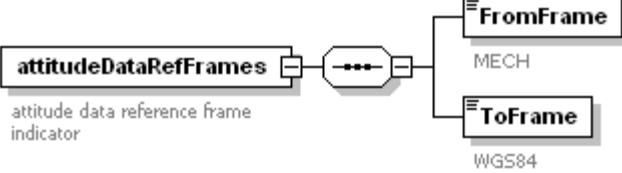
**element level1Product/platform/attitude/attitudeHeader/sensor**

diagram	 <p>The diagram shows the <b>sensor</b> element.</p>
type	restriction of <b>xs:NMTOKEN</b>
facets	enumeration AOCS
annotation	documentation AOCS

**element level1Product/platform/attitude/attitudeHeader/accuracy**

diagram	 <p>The diagram shows the <b>accuracy</b> element.</p>
	STD to indicate that it is derived from Star Tracker Data. LREF and RREF for left and right looking reference attitude products (used for NRT processing).
type	restriction of <b>xs:NMTOKEN</b>
facets	enumeration STD enumeration RREF enumeration LREF enumeration REFE enumeration UNDEFINED
annotation	documentation STD to indicate that it is derived from Star Tracker Data. LREF and RREF for left and right looking reference attitude products (used for NRT processing).

**element level1Product/platform/attitude/attitudeHeader/attitudeDataRefFrames**

diagram	
annotation	documentation attitude data reference frame indicator

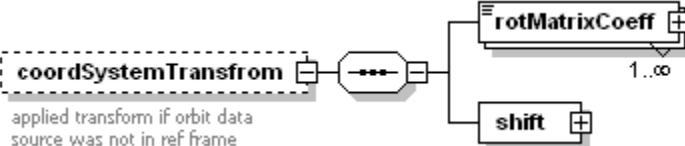
**element level1Product/platform/attitude/attitudeHeader/attitudeDataRefFrames/FromFrame**

diagram	
type	<b>string20</b>
facets	maxLength 20
annotation	documentation MECH

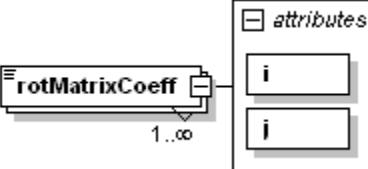
**element level1Product/platform/attitude/attitudeHeader/attitudeDataRefFrames/ToFrame**

diagram	
type	<b>string20</b>
facets	maxLength 20
annotation	documentation WGS84

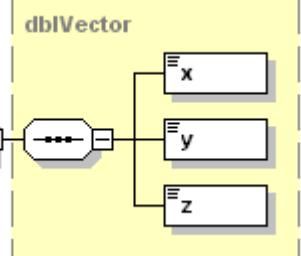
**element level1Product/platform/attitude/attitudeHeader/coordSystemTransfrom**

diagram	
annotation	documentation applied transform if orbit data source was not in ref frame

**element level1Product/platform/attitude/attitudeHeader/coordSystemTransfrom/rotMatrixCoeff**

diagram																			
type	extension of <b>xs:double</b>																		
attributes	<table border="1"> <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>i</td> <td><b>xs:int</b></td> <td>required</td> <td></td> <td></td> <td></td> </tr> <tr> <td>j</td> <td><b>xs:int</b></td> <td>required</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Name	Type	Use	Default	Fixed	Annotation	i	<b>xs:int</b>	required				j	<b>xs:int</b>	required			
Name	Type	Use	Default	Fixed	Annotation														
i	<b>xs:int</b>	required																	
j	<b>xs:int</b>	required																	

**element level1Product/platform/attitude/attitudeHeader/coordSystemTransfrom/shift**

diagram	 <pre> graph LR     shift((shift)) --&gt; join((---))     join --- x[x]     join --- y[y]     join --- z[z] </pre>
type	<u><a href="#">dblVector</a></u>

#### element **level1Product/platform/attitude/attitudeHeader/attitudeDataRefTime**

diagram	 <p>attitude data reference time indicator e.g. GPS</p>
type	<u><a href="#">string20</a></u>
facets	maxLength 20
annotation	documentation attitude data reference time indicator e.g. GPS

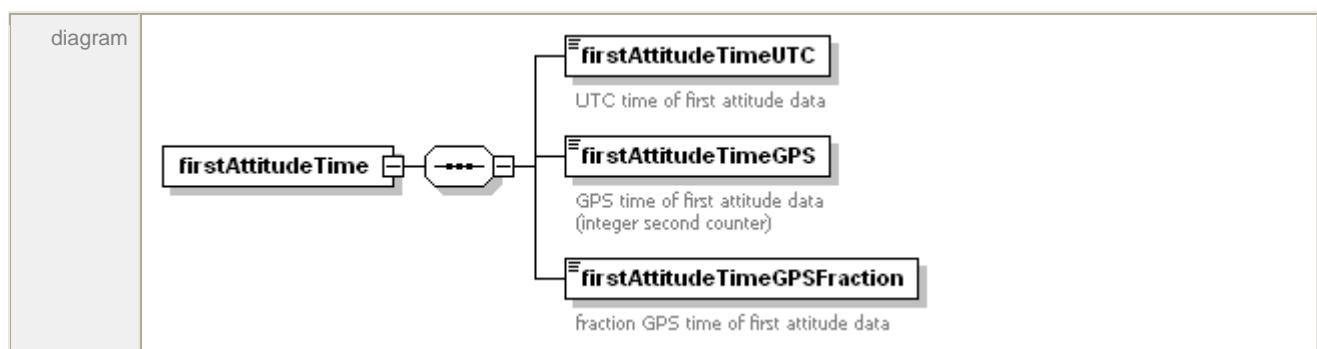
#### element **level1Product/platform/attitude/attitudeHeader/attitudeDataFormat**

diagram	 <p>e.g. units / quaternion order</p>
type	<u><a href="#">string255</a></u>
facets	maxLength 255
annotation	documentation e.g. units / quaternion order

#### element **level1Product/platform/attitude/attitudeHeader/numRecords**

diagram	 <p>total number of attitude data in records</p>
type	<u><a href="#">xs:unsignedLong</a></u>
annotation	documentation total number of attitude data in records

#### element **level1Product/platform/attitude/attitudeHeader/firstAttitudeTime**



**element level1Product/platform/attitude/attitudeHeader/firstAttitudeTime/firstAttitudeTimeUTC**

diagram	 <p>firstAttitudeTimeUTC</p> <p>UTC time of first attitude data</p>
type	<b>xs:dateTime</b>
annotation	documentation UTC time of first attitude data

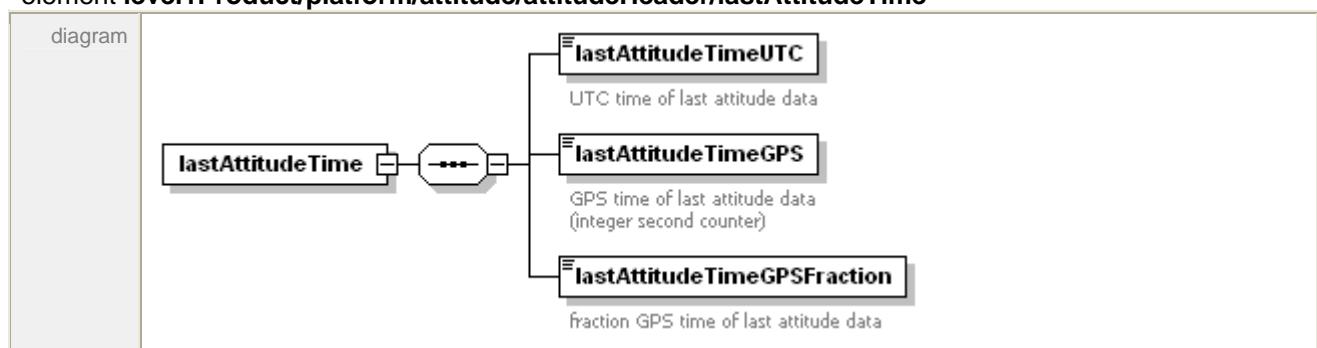
**element level1Product/platform/attitude/attitudeHeader/firstAttitudeTime/firstAttitudeTimeGPS**

diagram	 <p>firstAttitudeTimeGPS</p> <p>GPS time of first attitude data (integer second counter)</p>
type	<b>xs:unsignedInt</b>
annotation	documentation GPS time of first attitude data (integer second counter)

**element level1Product/platform/attitude/attitudeHeader/firstAttitudeTime/firstAttitudeTimeGPSFraction**

diagram	 <p>firstAttitudeTimeGPSFraction</p> <p>fraction GPS time of first attitude data</p>
type	<b>xs:double</b>
annotation	documentation fraction GPS time of first attitude data

**element level1Product/platform/attitude/attitudeHeader/lastAttitudeTime**



**element level1Product/platform/attitude/attitudeHeader/lastAttitudeTime/lastAttitudeTimeUTC**

diagram	 <b>lastAttitudeTimeUTC</b>
UTC time of last attitude data	
type	<b>xs:dateTime</b>
annotation	documentation UTC time of last attitude data

**element level1Product/platform/attitude/attitudeHeader/lastAttitudeTime/lastAttitudeTimeGPS**

diagram	 <b>lastAttitudeTimeGPS</b>
GPS time of last attitude data (integer second counter)	
type	<b>xs:unsignedInt</b>
annotation	documentation GPS time of last attitude data (integer second counter)

**element level1Product/platform/attitude/attitudeHeader/lastAttitudeTime/lastAttitudeTimeGPSFraction**

diagram	 <b>lastAttitudeTimeGPSFraction</b>
fraction GPS time of last attitude data	
type	<b>xs:double</b>
annotation	documentation fraction GPS time of last attitude data

**element level1Product/platform/attitude/attitudeHeader/attitudeDataTimeSpacing**

diagram	 <b>attitudeDataTimeSpacing</b>
[sec] attitude data time spacing	
type	<b>xs:double</b>
annotation	documentation [sec] attitude data time spacing

**element level1Product/platform/attitude/attitudeHeader/accuracyMargin**

diagram	 <b>accuracyMargin</b>
3D RMS value	
type	<b>xs:float</b>
annotation	documentation 3D RMS value

**element level1Product/platform/attitude/attitudeHeader/recInterpolTechnique**

diagram	 <b>recInterpolTechnique</b>
recommended interpolation technique e.g. linear	
type	<b>string255</b>
facets	maxLength 255

annotation	documentation recommended interpolation technique e.g. linear
------------	--

**element level1Product/platform/attitude/attitudeHeader/recInterpolPolDegree**

diagram	 <b>recInterpolPolDegree</b>  recommended interpolation polynomial degree
type	restriction of <b>xs:int</b>
facets	minInclusive 1 maxInclusive 20
annotation	documentation recommended interpolation polynomial degree

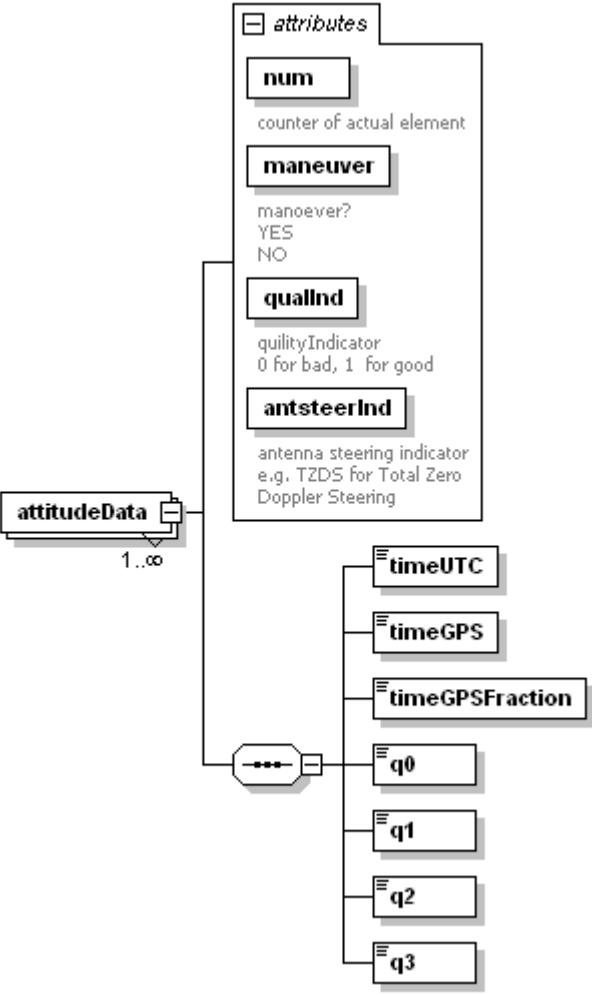
**element level1Product/platform/attitude/attitudeHeader/dataGapIndicator**

diagram	 <b>dataGapIndicator</b>  number of attitude data records with qualInd=0
type	<b>xs:int</b>
annotation	documentation number of attitude data records with qualInd=0

**element level1Product/platform/attitude/attitudeHeader/steeringLawIndicator**

diagram	 <b>steeringLawIndicator</b>  all data in "TZDS",...
type	<b>string1024</b>
facets	maxLength 1024
annotation	documentation all data in "TZDS",...

**element level1Product/platform/attitude/attitudeData**

diagram	 <pre> classDiagram     class attitudeData {         num         maneuver         qualInd         antsteerInd     }     attitudeData "1..∞" --&gt; timeUTC     attitudeData "1..∞" --&gt; timeGPS     attitudeData "1..∞" --&gt; timeGPSFraction     attitudeData "1..∞" --&gt; q0     attitudeData "1..∞" --&gt; q1     attitudeData "1..∞" --&gt; q2     attitudeData "1..∞" --&gt; q3     </pre>																																								
attributes	<table border="1"> <tr> <td>Name</td><td>num</td><td>Type</td><td>derived by: xs:unsignedLong</td><td>Use</td><td>Default</td><td>Fixed</td><td>Annotation</td></tr> <tr> <td></td><td></td><td></td><td></td><td>required</td><td></td><td></td><td>documentation counter of actual element</td></tr> <tr> <td></td><td>maneuver</td><td></td><td>derived by: xs:NMTOKEN</td><td>required</td><td></td><td></td><td>documentation manoever? YES NO</td></tr> <tr> <td></td><td>qualInd</td><td></td><td>derived by: xs:unsignedByte</td><td>required</td><td></td><td></td><td>documentation qualityIndicator 0 for bad, 1 for good</td></tr> <tr> <td></td><td>antsteerInd</td><td></td><td>string20</td><td>required</td><td></td><td></td><td>documentation antenna steering indicator e.g. TZDS for Total Zero Doppler Steering</td></tr> </table>	Name	num	Type	derived by: xs:unsignedLong	Use	Default	Fixed	Annotation					required			documentation counter of actual element		maneuver		derived by: xs:NMTOKEN	required			documentation manoever? YES NO		qualInd		derived by: xs:unsignedByte	required			documentation qualityIndicator 0 for bad, 1 for good		antsteerInd		string20	required			documentation antenna steering indicator e.g. TZDS for Total Zero Doppler Steering
Name	num	Type	derived by: xs:unsignedLong	Use	Default	Fixed	Annotation																																		
				required			documentation counter of actual element																																		
	maneuver		derived by: xs:NMTOKEN	required			documentation manoever? YES NO																																		
	qualInd		derived by: xs:unsignedByte	required			documentation qualityIndicator 0 for bad, 1 for good																																		
	antsteerInd		string20	required			documentation antenna steering indicator e.g. TZDS for Total Zero Doppler Steering																																		

#### element level1Product/platform/attitude/attitudeData/timeUTC

diagram	
type	xs:dateTime

#### element level1Product/platform/attitude/attitudeData/timeGPS

diagram	
type	xs:unsignedLong

**element level1Product/platform/attitude/attitudeData/timeGPSFraction**

diagram	
type	<b>xs:double</b>

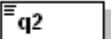
**element level1Product/platform/attitude/attitudeData/q0**

diagram	
type	<b>xs:double</b>

**element level1Product/platform/attitude/attitudeData/q1**

diagram	
type	<b>xs:double</b>

**element level1Product/platform/attitude/attitudeData/q2**

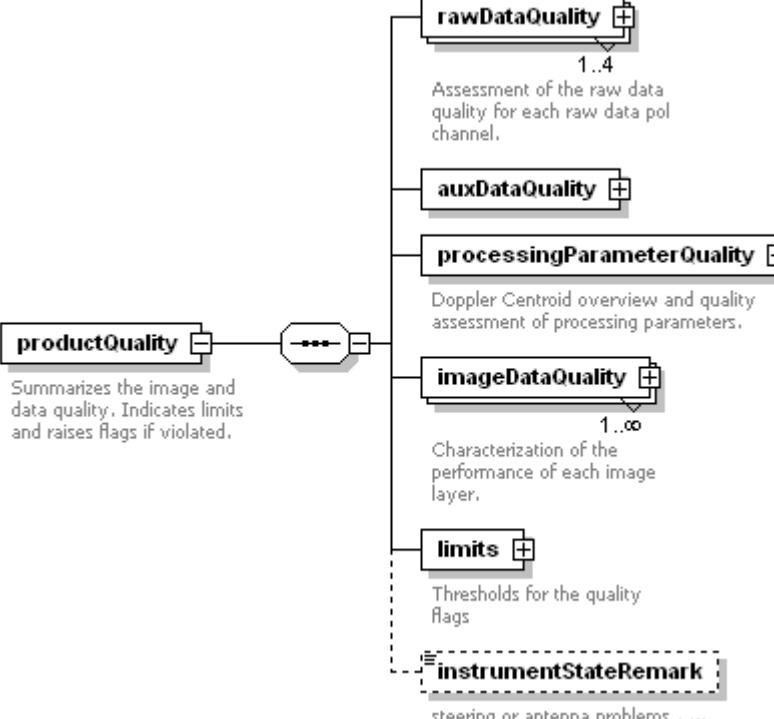
diagram	
type	<b>xs:double</b>

**element level1Product/platform/attitude/attitudeData/q3**

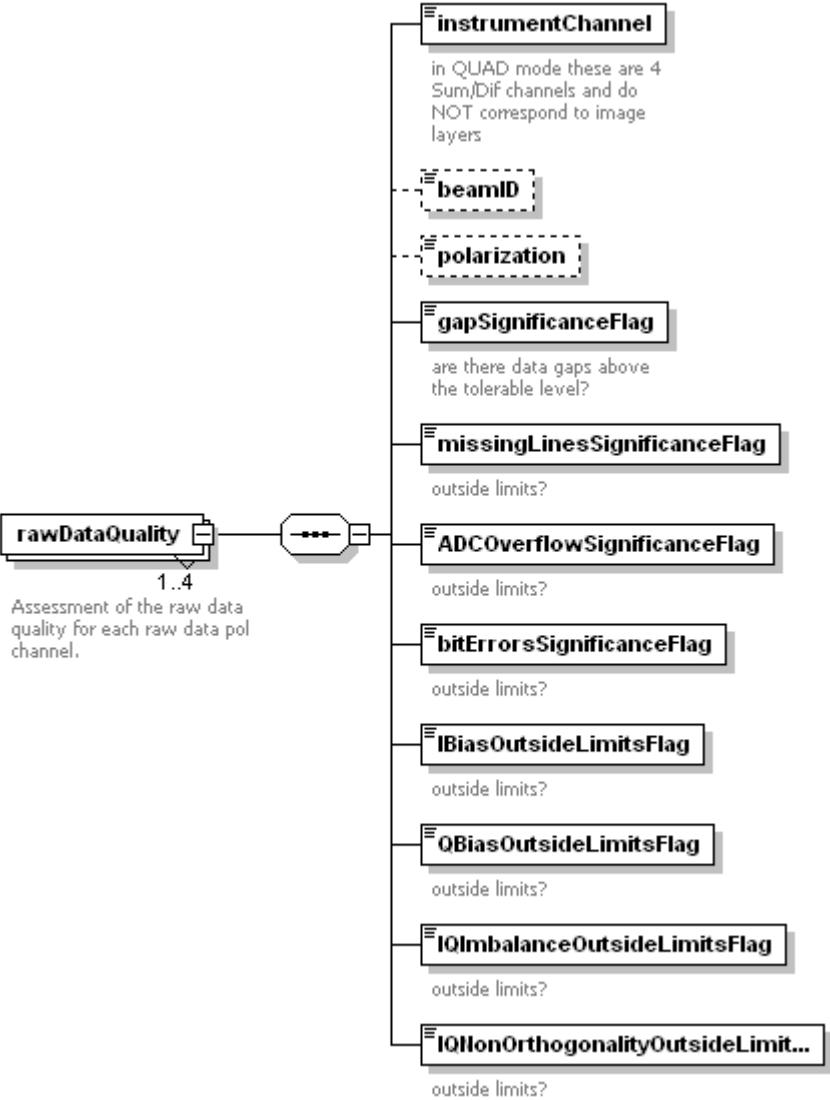
diagram	
type	<b>xs:double</b>

### 6.1.10 Product Quality

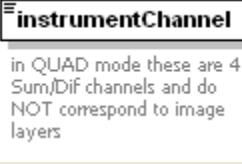
#### element **level1Product/productQuality**

diagram	 <pre> classDiagram     class productQuality     class rawDataQuality     class auxDataQuality     class processingParameterQuality     class imageDataQuality     class limits     class instrumentStateRemark      productQuality --&gt; rawDataQuality     productQuality --&gt; auxDataQuality     productQuality --&gt; processingParameterQuality     productQuality --&gt; imageDataQuality     processingParameterQuality --&gt; limits     processingParameterQuality --&gt; instrumentStateRemark   </pre>
annotation	documentation Summarizes the image and data quality. Indicates limits and raises flags if violated.

#### element **level1Product/productQuality/rawDataQuality**

diagram	 <pre> classDiagram     rawDataQuality "1..4" --o instrumentChannel     instrumentChannel --o beamID     instrumentChannel --o polarization     instrumentChannel --o gapSignificanceFlag     instrumentChannel --o missingLinesSignificanceFlag     instrumentChannel --o ADCOverflowSignificanceFlag     instrumentChannel --o bitErrorsSignificanceFlag     instrumentChannel --o IBiasOutsideLimitsFlag     instrumentChannel --o OBiasOutsideLimitsFlag     instrumentChannel --o IQImbalanceOutsideLimitsFlag     instrumentChannel --o IQNonOrthogonalityOutsideLimitsFlag   </pre> <p>Assessment of the raw data quality for each raw data pol channel.</p>
annotation	documentation Assessment of the raw data quality for each raw data pol channel.

#### element **level1Product/productQuality/rawDataQuality/instrumentChannel**

diagram	 <p>in QUAD mode these are 4 Sum/Dif channels and do NOT correspond to image layers</p>
type	<b>xs:string</b>
annotation	documentation in QUAD mode these are 4 Sum/Dif channels and do NOT correspond to image layers

#### element **level1Product/productQuality/rawDataQuality/beamID**

diagram	
type	<b>string20</b>

facets	maxLength 20
--------	--------------

**element level1Product/productQuality/rawDataQuality/polarization**

diagram	 <b>polarization</b>
type	<b>string20</b>
facets	maxLength 20

**element level1Product/productQuality/rawDataQuality/gapSignificanceFlag**

diagram	 <b>gapSignificanceFlag</b>  are there data gaps above the tolerable level?
type	<b>xs:boolean</b>
annotation	documentation are there data gaps above the tolerable level?

**element level1Product/productQuality/rawDataQuality/missingLinesSignificanceFlag**

diagram	 <b>missingLinesSignificanceFlag</b>  outside limits?
type	<b>xs:boolean</b>
annotation	documentation outside limits?

**element level1Product/productQuality/rawDataQuality/ADCOOverflowSignificanceFlag**

diagram	 <b>ADCOOverflowSignificanceFlag</b>  outside limits?
type	<b>xs:boolean</b>
annotation	documentation outside limits?

**element level1Product/productQuality/rawDataQuality/bitErrorsSignificanceFlag**

diagram	 <b>bitErrorsSignificanceFlag</b>  outside limits?
type	<b>xs:boolean</b>
annotation	documentation outside limits?

**element level1Product/productQuality/rawDataQuality/IBiasOutsideLimitsFlag**

diagram	 <b>IBiasOutsideLimitsFlag</b>  outside limits?
type	<b>xs:boolean</b>
annotation	documentation outside limits?

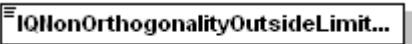
**element level1Product/productQuality/rawDataQuality/QBiasOutsideLimitsFlag**

diagram	 outside limits?
type	<b>xs:boolean</b>
annotation	documentation outside limits?

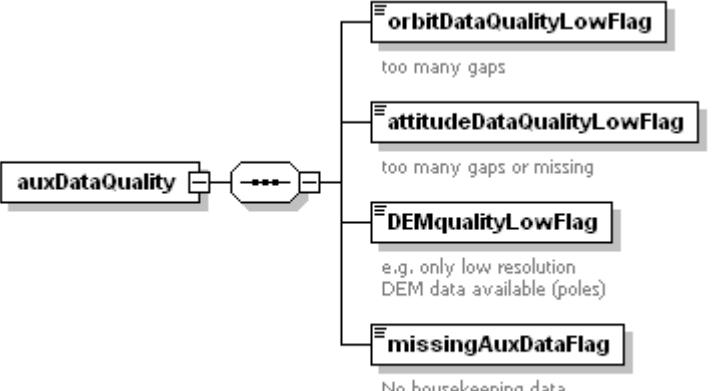
**element level1Product/productQuality/rawDataQuality/IQImbalanceOutsideLimitsFlag**

diagram	 outside limits?
type	<b>xs:boolean</b>
annotation	documentation outside limits?

**element level1Product/productQuality/rawDataQuality/IQNonOrthogonalityOutsideLimitsFlag**

diagram	 outside limits?
type	<b>xs:boolean</b>
annotation	documentation outside limits?

**element level1Product/productQuality/auxDataQuality**

diagram	 too many gaps too many gaps or missing e.g., only low resolution DEM data available (poles) No housekeeping data available, undefined values encountered, ...
---------	--

**element level1Product/productQuality/auxDataQuality/orbitDataQualityLowFlag**

diagram	 too many gaps
type	<b>xs:boolean</b>
annotation	documentation too many gaps

**element level1Product/productQuality/auxDataQuality/attitudeDataQualityLowFlag**

diagram	 <b>attitudeDataQualityLowFlag</b>
	too many gaps or missing
type	<b>xs:boolean</b>
annotation	documentation too many gaps or missing

**element level1Product/productQuality/auxDataQuality/DEMqualityLowFlag**

diagram	 <b>DEMqualityLowFlag</b>
	e.g. only low resolution DEM data available (poles)
type	<b>xs:boolean</b>
annotation	documentation e.g. only low resolution DEM data available (poles)

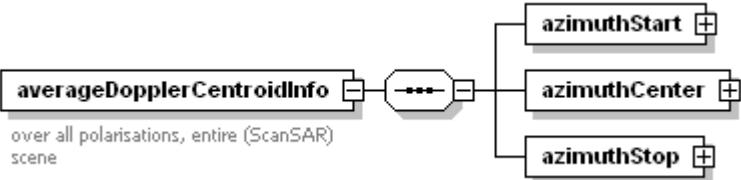
**element level1Product/productQuality/auxDataQuality/missingAuxDataFlag**

diagram	 <b>missingAuxDataFlag</b>
	No housekeeping data available, undefined values encountered, ...
type	<b>xs:boolean</b>
annotation	documentation No housekeeping data available, undefined values encountered, ...

**element level1Product/productQuality/processingParameterQuality**

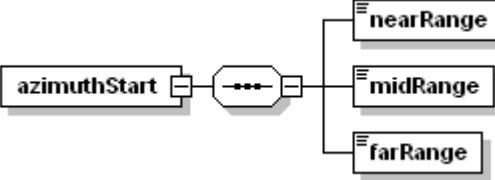
diagram	 <b>processingParameterQuality</b> <ul style="list-style-type: none"> <li>- - -</li> <li>- - -</li> </ul> <p>Doppler Centroid overview and quality assessment of processing parameters.</p>	 <b>averageDopplerCentroidInfo</b> <ul style="list-style-type: none"> <li>- - -</li> </ul> <p>over all polarisations, entire (ScanSAR) scene</p> <ul style="list-style-type: none"> <li>- - -</li> <li>- - -</li> </ul>  <b>dopplerAmbiguityHotZeroFlag</b> <ul style="list-style-type: none"> <li>- - -</li> </ul>  <b>dopplerInconsistencyFlag</b> <ul style="list-style-type: none"> <li>- - -</li> </ul> <p>baseband differs systematically from geometric estimate</p>  <b>dopplerOutsideLimitsFlags</b> <ul style="list-style-type: none"> <li>- - -</li> </ul>  <b>dopplerDriftOutsideLimitsFlags</b> <ul style="list-style-type: none"> <li>- - -</li> </ul>  <b>chirpQualityLowFlag</b> <ul style="list-style-type: none"> <li>- - -</li> </ul> <p>unable to reconstruct chirp from cal data</p>  <b>geolocationQualityLowFlag</b> <ul style="list-style-type: none"> <li>- - -</li> </ul> <p>orbit / attitude / DEM / Doppler quality problems</p>
annotation	documentation Doppler Centroid overview and quality assessment of processing parameters.	

**element level1Product/productQuality/processingParameterQuality/averageDopplerCentroidInfo**

diagram	 <p>averageDopplerCentroidInfo</p> <p>over all polarisations, entire (ScanSAR) scene</p>
annotation	documentation over all polarisations, entire (ScanSAR) scene

element

**level1Product/productQuality/processingParameterQuality/averageDopplerCentroidInfo/azimuthStart**

diagram	 <p>azimuthStart</p>
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element

**level1Product/productQuality/processingParameterQuality/averageDopplerCentroidInfo/azimuthStart/nearRange**

diagram	 <p>=nearRange</p>
type	xs:double

element

**level1Product/productQuality/processingParameterQuality/averageDopplerCentroidInfo/azimuthStart/midRange**

diagram	 <p>=midRange</p>
type	xs:double

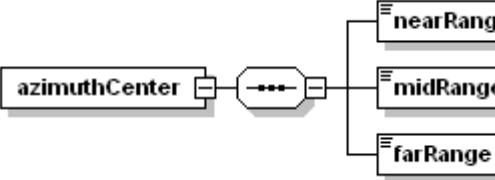
element

**level1Product/productQuality/processingParameterQuality/averageDopplerCentroidInfo/azimuthStart/farRange**

diagram	 <p>=farRange</p>
type	xs:double

element

**level1Product/productQuality/processingParameterQuality/averageDopplerCentroidInfo/azimuthCenter**

diagram	 <p>azimuthCenter</p>
---------	--

element  
**level1Product/productQuality/processingParameterQuality/averageDopplerCentroidInfo/azimuthCenter/nearRange**

diagram	
type	xs:double

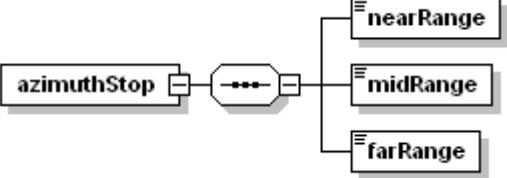
element  
**level1Product/productQuality/processingParameterQuality/averageDopplerCentroidInfo/azimuthCenter/midRange**

diagram	
type	xs:double

element  
**level1Product/productQuality/processingParameterQuality/averageDopplerCentroidInfo/azimuthCenter/farRange**

diagram	
type	xs:double

element  
**level1Product/productQuality/processingParameterQuality/averageDopplerCentroidInfo/azimuthStop**

diagram	
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element  
**level1Product/productQuality/processingParameterQuality/averageDopplerCentroidInfo/azimuthStop/nearRange**

diagram	
type	xs:double

element  
**level1Product/productQuality/processingParameterQuality/averageDopplerCentroidInfo/azimuthStop/midRange**

diagram	
type	xs:double

element

**level1Product/productQuality/processingParameterQuality/averageDopplerCentroidInfo/azimuthStop/farRange**

diagram	 <b>farRange</b>
type	<b>xs:double</b>

**element level1Product/productQuality/processingParameterQuality/dopplerAmbiguityNotZeroFlag**

diagram	 <b>dopplerAmbiguityNotZeroFlag</b>
type	<b>xs:boolean</b>

**element level1Product/productQuality/processingParameterQuality/dopplerInconsistencyFlag**

diagram	 <b>dopplerInconsistencyFlag</b>  baseband differs systematically from geometric estimate
type	<b>xs:boolean</b>
annotation	documentation baseband differs systematically from geometric estimate

**element level1Product/productQuality/processingParameterQuality/dopplerOutsideLimitsFlags**

diagram	 <b>dopplerOutsideLimitsFlags</b>
type	<b>xs:boolean</b>

**element level1Product/productQuality/processingParameterQuality/dopplerDriftOutsideLimitsFlags**

diagram	 <b>dopplerDriftOutsideLimitsFlags</b>
type	<b>xs:boolean</b>

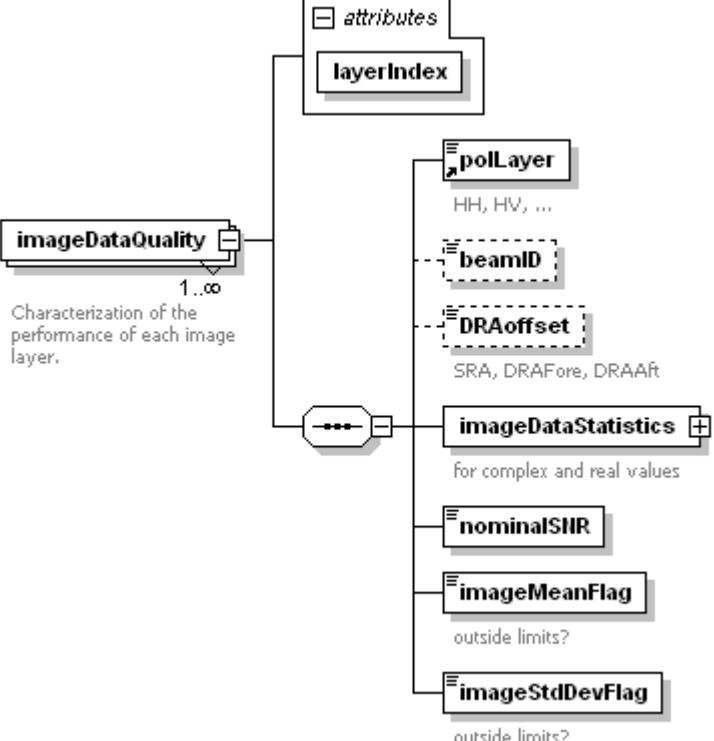
**element level1Product/productQuality/processingParameterQuality/chirpQualityLowFlag**

diagram	 <b>chirpQualityLowFlag</b>  unable to reconstruct chirp from cal data
type	<b>xs:boolean</b>
annotation	documentation unable to reconstruct chirp from cal data

**element level1Product/productQuality/processingParameterQuality/geolocationQualityLowFlag**

diagram	 <b>geolocationQualityLowFlag</b>  orbit / attitude / DEM / Doppler quality problems
type	<b>xs:boolean</b>
annotation	documentation orbit / attitude / DEM / Doppler quality problems

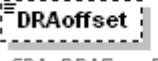
**element level1Product/productQuality/imageDataQuality**

diagram	 <pre> classDiagram     class imageDataQuality {         &lt;&lt;Characterization of the performance of each image layer.&gt;&gt;         &lt;&lt;1..&gt;&gt;         attributes         layerIndex         polLayer     }     class imageStatistics {         &lt;&lt;for complex and real values&gt;&gt;     }     class beamID     class DRAoffset {         &lt;&lt;SRA, DRAFore, DRAAft&gt;&gt;     }     class nominalSNR     class imageMeanFlag {         &lt;&lt;outside limits?&gt;&gt;     }     class imageStdDevFlag {         &lt;&lt;outside limits?&gt;&gt;     }      imageDataQuality "1..&gt;" --&gt; imageStatistics : attributes     imageDataQuality "1..&gt;" --&gt; beamID : polLayer     imageDataQuality "1..&gt;" --&gt; DRAoffset : polLayer     imageDataQuality "1..&gt;" --&gt; nominalSNR : polLayer     imageDataQuality "1..&gt;" --&gt; imageMeanFlag : polLayer     imageDataQuality "1..&gt;" --&gt; imageStdDevFlag : polLayer   </pre>												
attributes	<table border="1" style="width: 100%; border-collapse: collapse;"> <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><b>xs:int</b></td><td>required</td><td></td><td></td><td></td></tr> </tbody> </table>	Name	Type	Use	Default	Fixed	Annotation	layerIndex	<b>xs:int</b>	required			
Name	Type	Use	Default	Fixed	Annotation								
layerIndex	<b>xs:int</b>	required											
annotation	documentation Characterization of the performance of each image layer.												

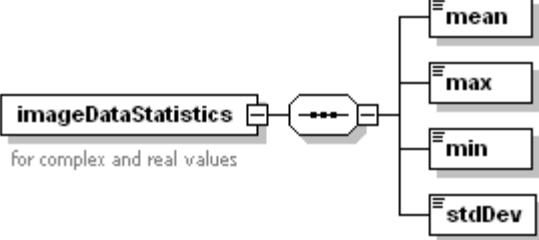
**element level1Product/productQuality/imageDataQuality/beamID**

diagram	
type	<b>string20</b>
facets	maxLength 20

**element level1Product/productQuality/imageDataQuality/DRAoffset**

diagram	 <p>SRA, DRAFore, DRAAft</p>
type	restriction of <b>xs:NMTOKENS</b>
facets	enumeration SRA enumeration DRAFore enumeration DRAAft
annotation	documentation SRA, DRAFore, DRAAft

**element level1Product/productQuality/imageDataQuality/imageDataStatistics**

diagram	 <p>for complex and real values</p>
annotation	documentation for complex and real values

**element level1Product/productQuality/imageDataQuality/imageDataStatistics/mean**

diagram	
type	<b>xs:double</b>

**element level1Product/productQuality/imageDataQuality/imageDataStatistics/max**

diagram	
type	<b>xs:double</b>

**element level1Product/productQuality/imageDataQuality/imageDataStatistics/min**

diagram	
type	<b>xs:double</b>

**element level1Product/productQuality/imageDataQuality/imageDataStatistics/stdDev**

diagram	
type	<b>xs:double</b>

**element level1Product/productQuality/imageDataQuality/nominalSNR**

diagram	
type	<b>xs:float</b>

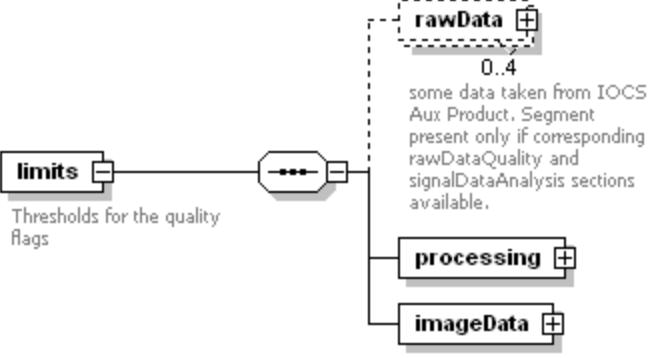
**element level1Product/productQuality/imageDataQuality/imageMeanFlag**

diagram	 <p>outside limits?</p>
type	<b>xs:boolean</b>
annotation	documentation outside limits?

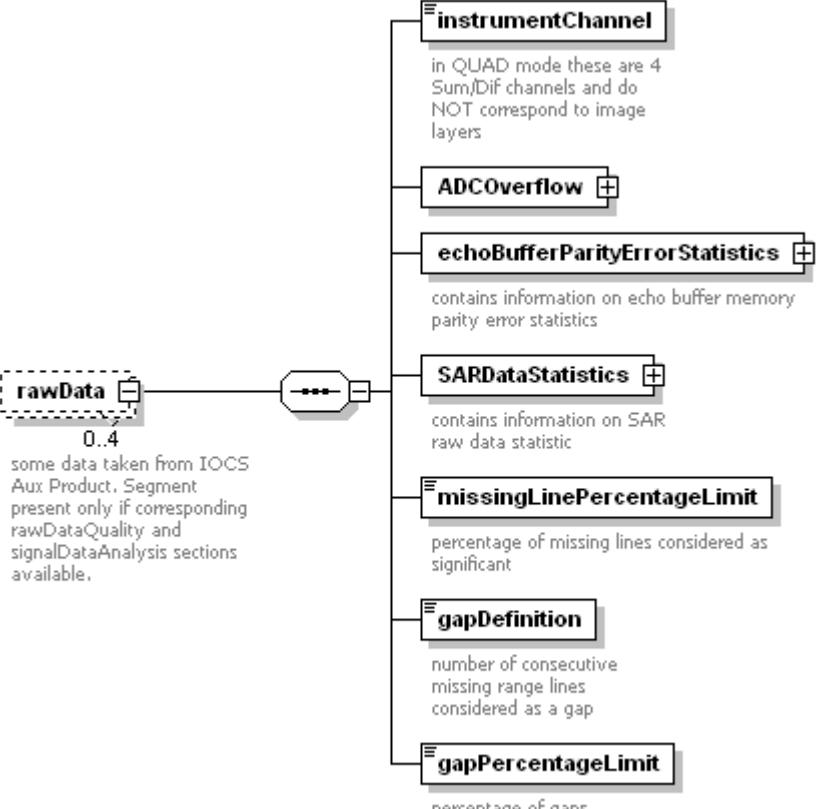
**element level1Product/productQuality/imageDataQuality/imageStdDevFlag**

diagram	 outside limits?
type	<b>xs:boolean</b>
annotation	documentation outside limits?

#### element level1Product/productQuality/limits

diagram	 Thresholds for the quality flags
annotation	documentation Thresholds for the quality flags

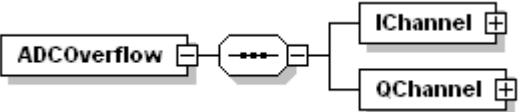
#### element level1Product/productQuality/limits/rawData

diagram	 some data taken from IOCS Aux Product. Segment present only if corresponding rawDataQuality and signalDataAnalysis sections available.
annotation	documentation some data taken from IOCS Aux Product. Segment present only if corresponding rawDataQuality and signalDataAnalysis sections available.

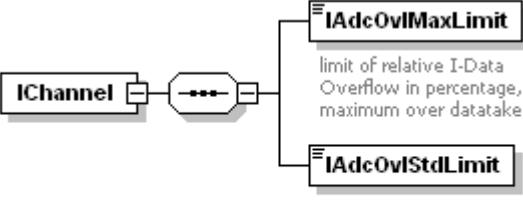
**element level1Product/productQuality/limits/rawData/instrumentChannel**

diagram	 <p>in QUAD mode these are 4 Sum/Dif channels and do NOT correspond to image layers</p>
type	<b>xs:string</b>
annotation	documentation in QUAD mode these are 4 Sum/Dif channels and do NOT correspond to image layers

**element level1Product/productQuality/limits/rawData/ADCOverflow**

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

**element level1Product/productQuality/limits/rawData/ADCOverflow/IChannel**

diagram	 <p>IAdcOvlMaxLimit limit of relative I-Data Overflow in percentage, maximum over datatake</p> <p>IAdcOvlStdLimit limit of relative I-Data Overflow in percentage, standard deviation over datatake</p>
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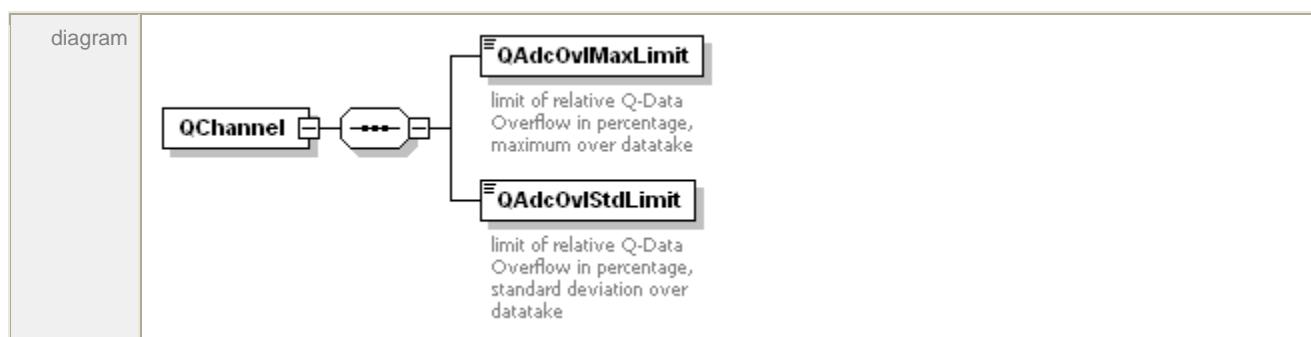
**element level1Product/productQuality/limits/rawData/ADCOverflow/IChannel/IAdcOvlMaxLimit**

diagram	 <p>limit of relative I-Data Overflow in percentage, maximum over datatake</p>
type	<b>xs:float</b>
annotation	documentation limit of relative I-Data Overflow in percentage, maximum over datatake

**element level1Product/productQuality/limits/rawData/ADCOverflow/IChannel/IAdcOvlStdLimit**

diagram	 <p>limit of relative I-Data Overflow in percentage, standard deviation over datatake</p>
type	<b>xs:float</b>
annotation	documentation limit of relative I-Data Overflow in percentage, standard deviation over datatake

**element level1Product/productQuality/limits/rawData/ADCOverflow/QChannel**



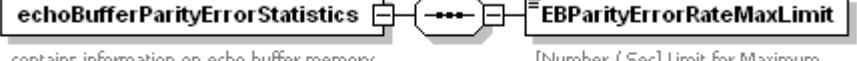
**element level1Product/productQuality/limits/rawData/ADCOverflow/QChannel/QAdcOvlMaxLimit**

diagram	 <p>limit of relative Q-Data Overflow in percentage, maximum over datatake</p>
type	<b>xs:float</b>
annotation	documentation limit of relative Q-Data Overflow in percentage, maximum over datatake

**element level1Product/productQuality/limits/rawData/ADCOverflow/QChannel/QAdcOvlStdLimit**

diagram	 <p>limit of relative Q-Data Overflow in percentage, standard deviation over datatake</p>
type	<b>xs:float</b>
annotation	documentation limit of relative Q-Data Overflow in percentage, standard deviation over datatake

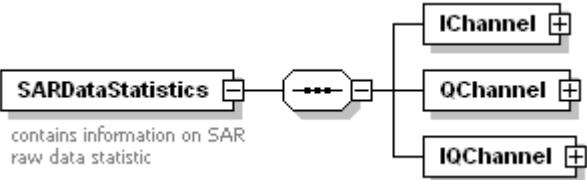
**element level1Product/productQuality/limits/rawData/echoBufferParityErrorStatistics**

diagram	 <p>The diagram shows a class named <b>echoBufferParityErrorStatistics</b> connected to another class via association lines. The associated class is labeled <b>EBParityErrorRateMaxLimit</b>. A callout box provides documentation: "[Number / Sec] Limit for Maximum Parity Error Rate within this DataTake".</p>
annotation	documentation contains information on echo buffer memory parity error statistics

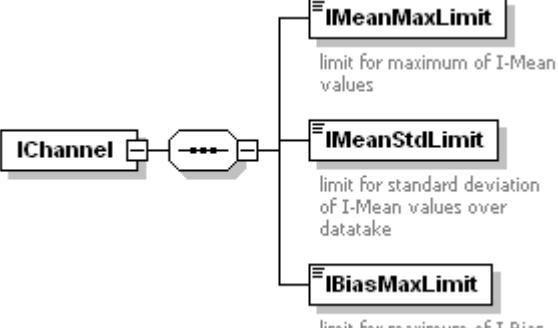
**element level1Product/productQuality/limits/rawData/echoBufferParityErrorStatistics/EBParityErrorRateMaxLimit**

diagram	 <p>[Number / Sec] Limit for Maximum Parity Error Rate within this DataTake</p>
type	extension of <b>xs:float</b>
annotation	documentation [Number / Sec] Limit for Maximum Parity Error Rate within this DataTake

**element level1Product/productQuality/limits/rawData/SARDATAStatistics**

diagram	 <p>SARDataStatistics contains information on SAR raw data statistic</p>
annotation	documentation contains information on SAR raw data statistic

**element level1Product/productQuality/limits/rawData/SARDataStatistics/IChannel**

diagram	 <p>IChannel</p> <ul style="list-style-type: none"> <li>— IMeanMaxLimit limit for maximum of I-Mean values</li> <li>— IMeanStdLimit limit for standard deviation of I-Mean values over datatake</li> <li>— IBiasMaxLimit limit for maximum of I-Bias</li> </ul>
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**element level1Product/productQuality/limits/rawData/SARDataStatistics/IChannel/IMeanMaxLimit**

diagram	 <p>IMeanMaxLimit limit for maximum of I-Mean values</p>
type	<b>xs:float</b>
annotation	documentation limit for maximum of I-Mean values

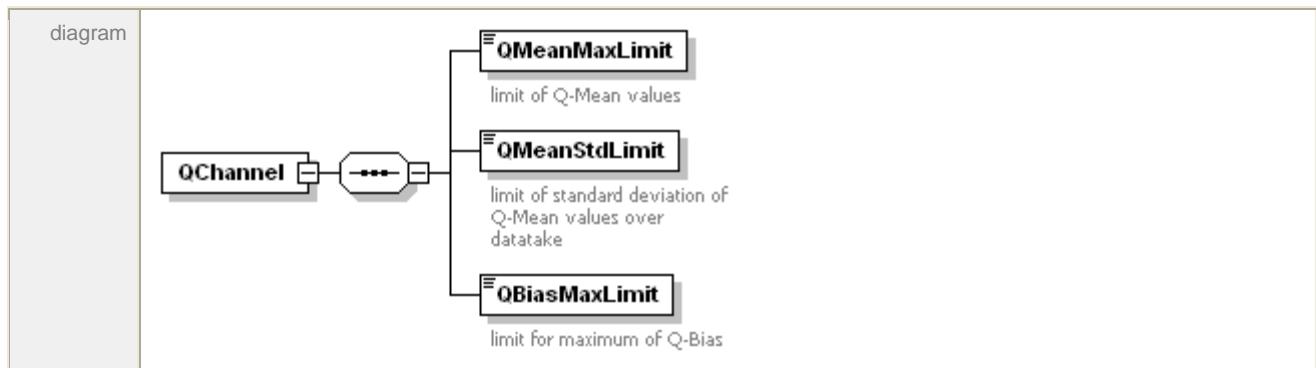
**element level1Product/productQuality/limits/rawData/SARDataStatistics/IChannel/IMeanStdLimit**

diagram	 <p>IMeanStdLimit limit for standard deviation of I-Mean values over datatake</p>
type	<b>xs:float</b>
annotation	documentation limit for standard deviation of I-Mean values over datatake

**element level1Product/productQuality/limits/rawData/SARDataStatistics/IChannel/IBiasMaxLimit**

diagram	 <p>IBiasMaxLimit limit for maximum of I-Bias</p>
type	<b>xs:float</b>
annotation	documentation limit for maximum of I-Bias

**element level1Product/productQuality/limits/rawData/SARDataStatistics/QChannel**



**element level1Product/productQuality/limits/rawData/SARDataStatistics/QChannel/QMeanMaxLimit**

diagram	 <p>limit of Q-Mean values</p>
type	<b>xs:float</b>
annotation	documentation limit of Q-Mean values

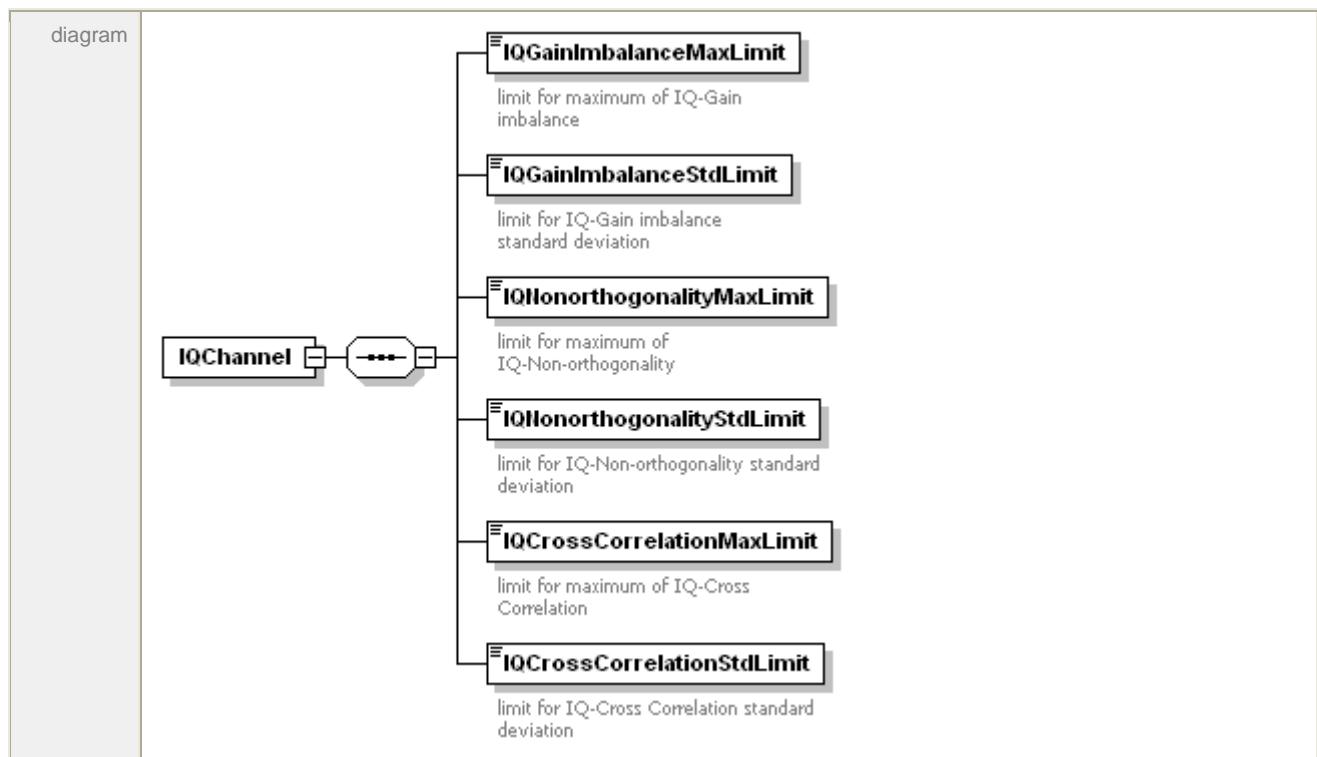
**element level1Product/productQuality/limits/rawData/SARDataStatistics/QChannel/QMeanStdLimit**

diagram	 <p>limit of standard deviation of Q-Mean values over datatake</p>
type	<b>xs:float</b>
annotation	documentation limit of standard deviation of Q-Mean values over datatake

**element level1Product/productQuality/limits/rawData/SARDataStatistics/QChannel/QBiasMaxLimit**

diagram	 <p>limit for maximum of Q-Bias</p>
type	<b>xs:float</b>
annotation	documentation limit for maximum of Q-Bias

**element level1Product/productQuality/limits/rawData/SARDataStatistics/IQChannel**



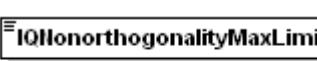
element  
**level1Product/productQuality/limits/rawData/SARDataStatistics/IQChannel/IQGainImbalanceMaxLimit**

diagram	 <p>limit for maximum of IQ-Gain imbalance</p>
type	<b>xs:float</b>
annotation	documentation limit for maximum of IQ-Gain imbalance

element  
**level1Product/productQuality/limits/rawData/SARDataStatistics/IQChannel/IQGainImbalanceStdLimit**

diagram	 <p>limit for IQ-Gain imbalance standard deviation</p>
type	<b>xs:float</b>
annotation	documentation limit for IQ-Gain imbalance standard deviation

element  
**level1Product/productQuality/limits/rawData/SARDataStatistics/IQChannel/IQNonorthogonalityMaxLimit**

diagram	 <p>limit for maximum of IQ-Non-orthogonality</p>
type	<b>xs:float</b>

annotation	documentation limit for maximum of IQ-Non-orthogonality
------------	---

element

**level1Product/productQuality/limits/rawData/SARDataStatistics/IQChannel/IQNonorthogonalityStdLimit**

diagram	 <b>IQNonorthogonalityStdLimit</b> <small>limit for IQ-Non-orthogonality standard deviation</small>
type	<b>xs:float</b>
annotation	documentation limit for IQ-Non-orthogonality standard deviation

element

**level1Product/productQuality/limits/rawData/SARDataStatistics/IQChannel/IQCrossCorrelationMaxLimit**

diagram	 <b>IQCrossCorrelationMaxLimit</b> <small>limit for maximum of IQ-Cross Correlation</small>
type	<b>xs:float</b>
annotation	documentation limit for maximum of IQ-Cross Correlation

element

**level1Product/productQuality/limits/rawData/SARDataStatistics/IQChannel/IQCrossCorrelationStdLimit**

diagram	 <b>IQCrossCorrelationStdLimit</b> <small>limit for IQ-Cross Correlation standard deviation</small>
type	<b>xs:float</b>
annotation	documentation limit for IQ-Cross Correlation standard deviation

element **level1Product/productQuality/limits/rawData/missingLinePercentageLimit**

diagram	 <b>missingLinePercentageLimit</b> <small>percentage of missing lines considered as significant</small>
type	<b>xs:float</b>
annotation	documentation percentage of missing lines considered as significant

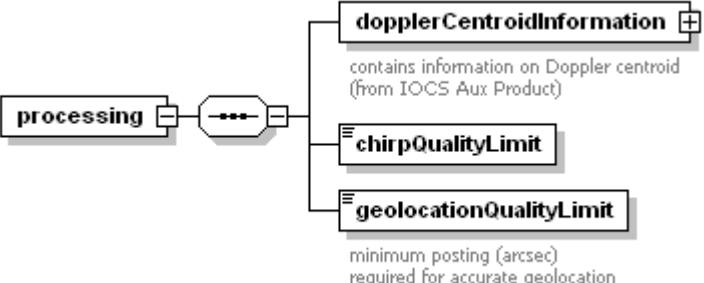
element **level1Product/productQuality/limits/rawData/gapDefinition**

diagram	 <b>gapDefinition</b> <small>number of consecutive missing range lines considered as a gap</small>
type	<b>xs:int</b>
annotation	documentation number of consecutive missing range lines considered as a gap

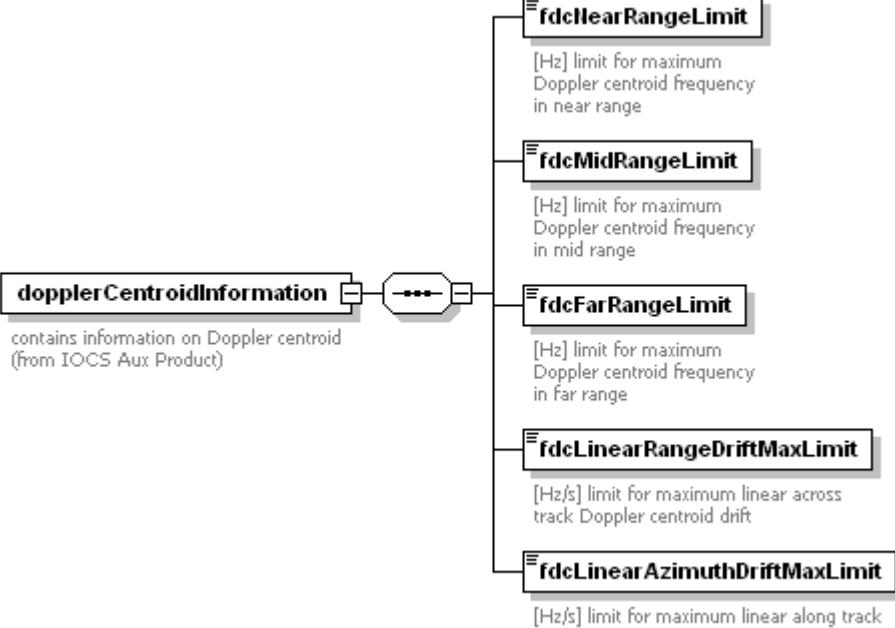
**element level1Product/productQuality/limits/rawData/gapPercentageLimit**

diagram	 <p>percentage of gaps considered as significant</p>
type	<b>xs:float</b>
annotation	documentation percentage of gaps considered as significant

**element level1Product/productQuality/limits/processing**

diagram	 <p>contains information on Doppler centroid (from IOCS Aux Product)</p> <p>minimum posting (arcsec) required for accurate geolocation (e.g. 10 arcsec reference DEM)</p>
---------	---

**element level1Product/productQuality/limits/processing/dopplerCentroidInformation**

diagram	 <p>contains information on Doppler centroid (from IOCS Aux Product)</p>
annotation	documentation contains information on Doppler centroid (from IOCS Aux Product)

**element level1Product/productQuality/limits/processing/dopplerCentroidInformation/fdcNearRangeLimit**

diagram	 <b>fdcNearRangeLimit</b> <small>[Hz] limit for maximum Doppler centroid frequency in near range</small>
type	<b>xs:float</b>
annotation	documentation [Hz] limit for maximum Doppler centroid frequency in near range

element

#### **level1Product/productQuality/limits/processing/dopplerCentroidInformation/fdcMidRangeLimit**

diagram	 <b>fdcMidRangeLimit</b> <small>[Hz] limit for maximum Doppler centroid frequency in mid range</small>
type	<b>xs:float</b>
annotation	documentation [Hz] limit for maximum Doppler centroid frequency in mid range

element

#### **level1Product/productQuality/limits/processing/dopplerCentroidInformation/fdcFarRangeLimit**

diagram	 <b>fdcFarRangeLimit</b> <small>[Hz] limit for maximum Doppler centroid frequency in far range</small>
type	<b>xs:float</b>
annotation	documentation [Hz] limit for maximum Doppler centroid frequency in far range

element

#### **level1Product/productQuality/limits/processing/dopplerCentroidInformation/fdcLinearRangeDriftMaxLimit**

diagram	 <b>fdcLinearRangeDriftMaxLimit</b> <small>[Hz/s] limit for maximum linear across track Doppler centroid drift</small>
type	<b>xs:float</b>
annotation	documentation [Hz/s] limit for maximum linear across track Doppler centroid drift

element

#### **level1Product/productQuality/limits/processing/dopplerCentroidInformation/fdcLinearAzimuthDriftMaxLimit**

diagram	 <b>fdcLinearAzimuthDriftMaxLimit</b> <small>[Hz/s] limit for maximum linear along track Doppler centroid drift</small>
type	<b>xs:float</b>
annotation	documentation [Hz/s] limit for maximum linear along track Doppler centroid drift

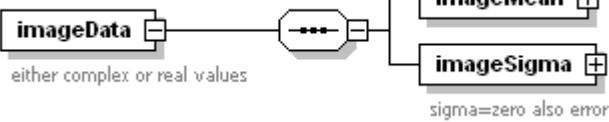
element **level1Product/productQuality/limits/processing/chirpQualityLimit**

diagram	
type	<b>xs:float</b>

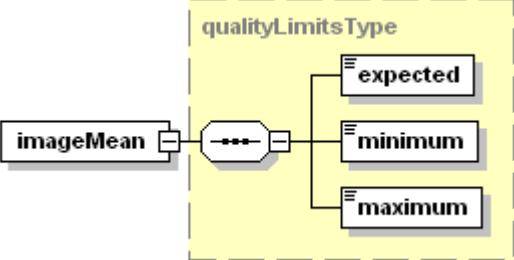
**element level1Product/productQuality/limits/processing/geolocationQualityLimit**

diagram	
	minimum posting (arcsec) required for accurate geolocation (e.g. 10 arcsec reference DEM)
type	<b>xs:float</b>
annotation	documentation minimum posting (arcsec) required for accurate geolocation (e.g. 10 arcsec reference DEM)

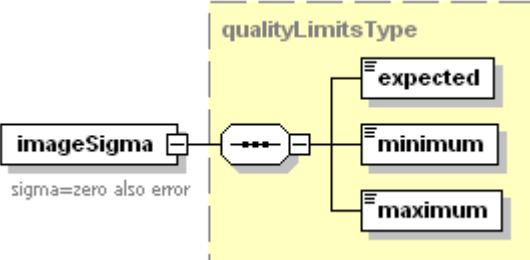
**element level1Product/productQuality/limits/imageData**

diagram	
	either complex or real values
annotation	documentation either complex or real values

**element level1Product/productQuality/limits/imageData/imageMean**

diagram	
type	<b>qualityLimitsType</b>

**element level1Product/productQuality/limits/imageData/imageSigma**

diagram	
type	<b>qualityLimitsType</b>
annotation	documentation sigma=zero also error

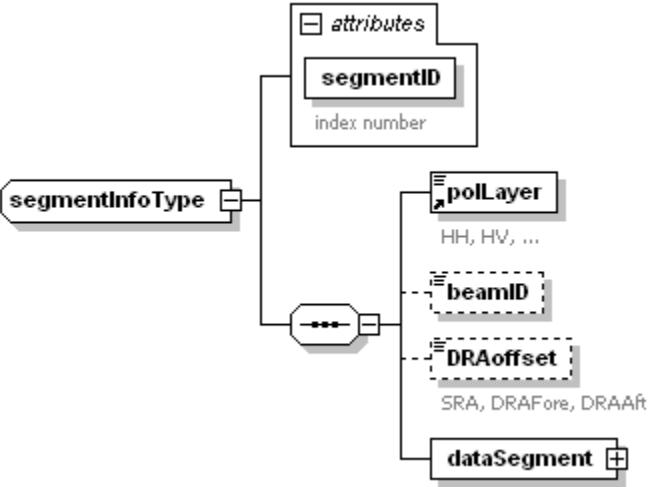
**element level1Product/productQuality/instrumentStateRemark**



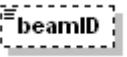
diagram	<b>InstrumentStateRemark</b> steering or antenna problems , ...
type	<b><u>string1024</u></b>
facets	maxLength 1024
annotation	documentation steering or antenna problems , ...

### 6.1.11 General Header and Data Type Definitions

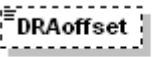
#### complexType **segmentInfoType**

diagram	 <pre> classDiagram     class segmentInfoType {         attribute segmentID         attribute polLayer         attribute beamID         attribute DRAoffset         attribute dataSegment     }     segmentInfoType &lt; --&gt; attributes     segmentInfoType &lt; --&gt; segmentID     segmentInfoType &lt; --&gt; polLayer     segmentInfoType &lt; --&gt; beamID     segmentInfoType &lt; --&gt; DRAoffset     segmentInfoType &lt; --&gt; dataSegment     segmentID &lt; --&gt; indexNumber     polLayer &lt; --&gt; HH, HV, ...     beamID &lt; --&gt; SRA, DRAFore, DRAAft     DRAoffset &lt; --&gt; SRA, DRAFore, DRAAft   </pre>																			
attributes	<table> <tr> <td>Name</td><td>segmentID</td> <td>Type</td><td><b>xs:int</b></td> <td>Use</td><td>Default</td><td>Fixed</td> </tr> <tr> <td></td><td></td><td></td><td></td><td>required</td><td></td><td></td> </tr> </table>	Name	segmentID	Type	<b>xs:int</b>	Use	Default	Fixed					required			Annotation documentation	index number			
Name	segmentID	Type	<b>xs:int</b>	Use	Default	Fixed														
				required																

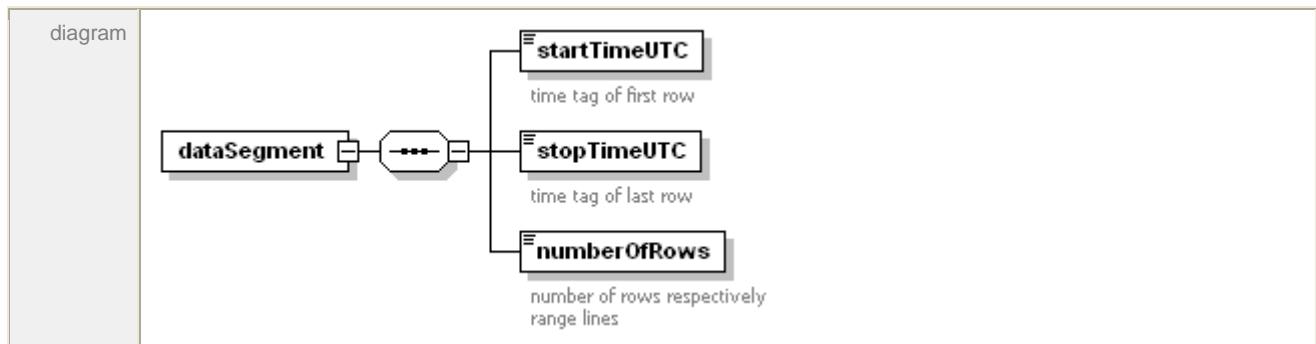
#### element **segmentInfoType/beamID**

diagram	
type	<u>string20</u>
facets	maxLength 20

#### element **segmentInfoType/DRAoffset**

diagram	
	SRA, DRAFore, DRAAft
type	restriction of <b>xs:NMTOKENS</b>
facets	enumeration SRA enumeration DRAFore enumeration DRAAft
annotation	documentation SRA, DRAFore, DRAAft

#### element **segmentInfoType/dataSegment**



#### element **segmentInfoType/dataSegment/startTimeUTC**

diagram	 <p>time tag of first row</p>
type	<b>xs:dateTime</b>
annotation	documentation time tag of first row

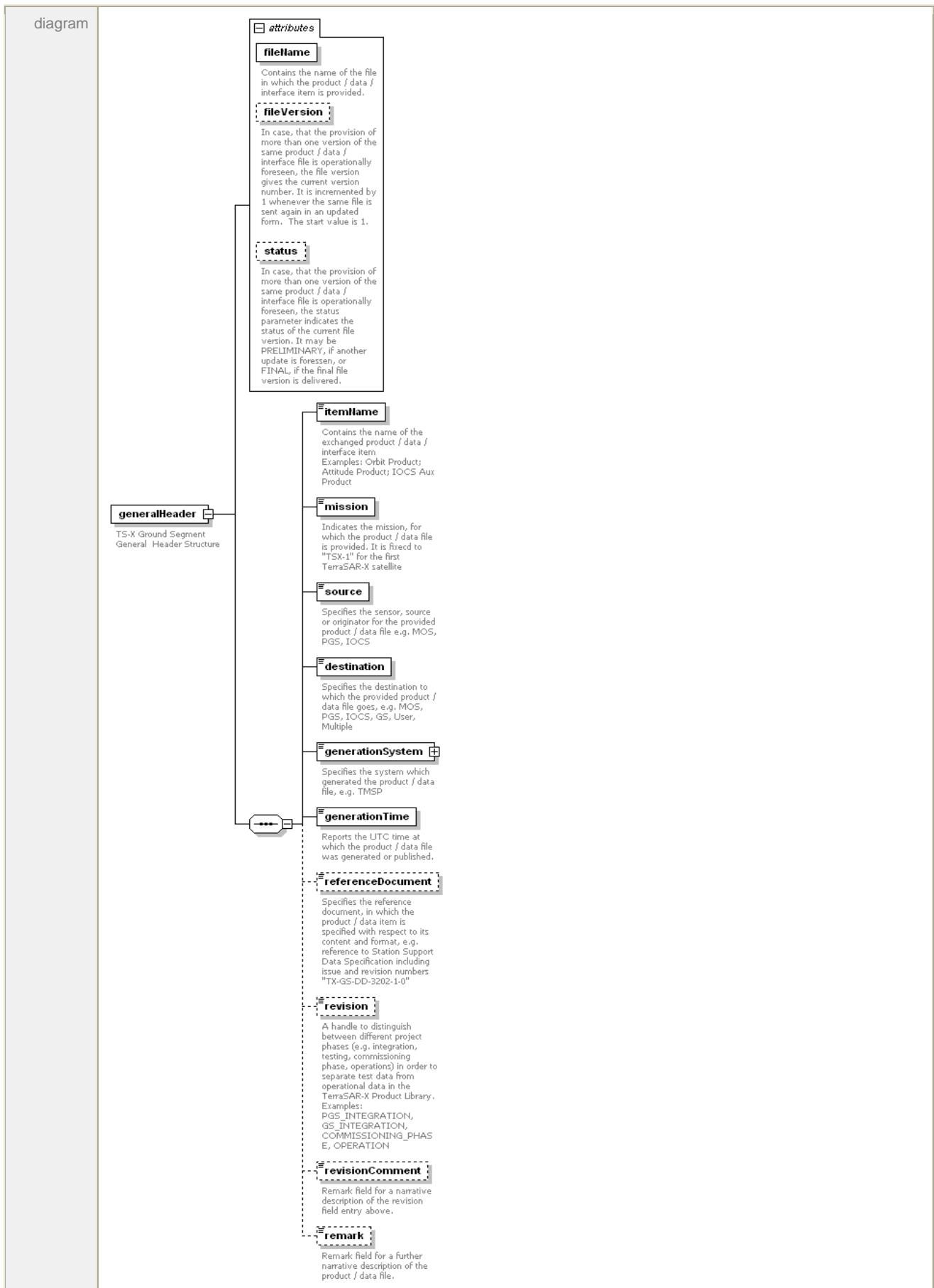
#### element **segmentInfoType/dataSegment/stopTimeUTC**

diagram	 <p>time tag of last row</p>
type	<b>xs:dateTime</b>
annotation	documentation time tag of last row

#### element **segmentInfoType/dataSegment/numberOfRows**

diagram	 <p>number of rows respectively range lines</p>
type	<b>xs:int</b>
annotation	documentation number of rows respectively range lines

#### element **generalHeader**



attributes	fileName	Type <b><u>string128</u></b>	Use required	Default Fixed	Annotation documentation	Contains the name of the file in which the product / data / interface item is provided.
	fileVersion	Type <b><u>string20</u></b>	optional		documentation	In case, that 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	Type <b><u>string20</u></b>	optional		documentation	In case, that 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 foreseen, or FINAL, if the final file version is delivered.
annotation	documentation TS-X Ground Segment General Header Structure					

#### element generalHeader/itemName

diagram	 <b>itemName</b>	Contains the name of the exchanged product / data / interface item Examples: Orbit Product; Attitude Product; IOCS Aux Product
type	<b><u>string80</u></b>	
facets	maxLength 80	
annotation	documentation	Contains the name of the exchanged product / data / interface item Examples: Orbit Product; Attitude Product; IOCS Aux Product

#### element generalHeader/mission

diagram	 <b>mission</b>	Indicates the mission, for which the product / data file is provided. It is fixed to "TSX-1" for the first TerraSAR-X satellite
type	<b><u>string20</u></b>	
facets	maxLength 20	
annotation	documentation	Indicates the mission, for which the product / data file is provided. It is fixed to "TSX-1" for the first TerraSAR-X satellite

#### element generalHeader/source

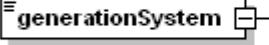
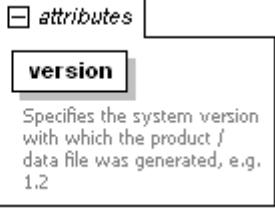
diagram	 <b>source</b>	Specifies the sensor, source or originator for the provided product / data file e.g. MOS, PGS, IOCS
type	<b><u>string20</u></b>	

facets	maxLength 20
annotation	documentation Specifies the sensor, source or originator for the provided product / data file e.g. MOS, PGS, IOCS

#### element generalHeader/destination

diagram	 <p>Specifies the destination to which the provided product / data file goes, e.g. MOS, PGS, IOCS, GS, User, Multiple</p>
type	<b>string20</b>
facets	maxLength 20
annotation	documentation Specifies the destination to which the provided product / data file goes, e.g. MOS, PGS, IOCS, GS, User, Multiple

#### element generalHeader/generationSystem

diagram	 <p>Specifies the system which generated the product / data file, e.g. TMSP</p> <div style="border: 1px solid black; padding: 5px;">  <p>Attributes: attributes Version: version</p> <p>Specifies the system version with which the product / data file was generated, e.g. 1.2</p> </div>												
type	extension of <b>string80</b>												
facets	maxLength 80												
attributes	<table style="width: 100%; border-collapse: collapse;"> <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>version</td> <td><b>string20</b></td> <td>required</td> <td></td> <td></td> <td>documentation Specifies the system version with which the product / data file was generated, e.g. 1.2</td> </tr> </tbody> </table>	Name	Type	Use	Default	Fixed	Annotation	version	<b>string20</b>	required			documentation Specifies the system version with which the product / data file was generated, e.g. 1.2
Name	Type	Use	Default	Fixed	Annotation								
version	<b>string20</b>	required			documentation Specifies the system version with which the product / data file was generated, e.g. 1.2								
annotation	documentation Specifies the system which generated the product / data file, e.g. TMSP												

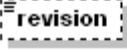
#### element generalHeader/generationTime

diagram	 <p>Reports the UTC time at which the product / data file was generated or published.</p>
type	<b>xs:dateTime</b>
annotation	documentation Reports the UTC time at which the product / data file was generated or published.

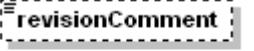
#### element generalHeader/referenceDocument

diagram	 <p>Specifies the reference document, in which the product / data item is specified with respect to its content and format, e.g. reference to Station Support Data Specification including issue and revision numbers "TX-GS-DD-3202-1-0"</p>
type	<u>string255</u>
facets	maxLength 255
annotation	documentation Specifies the reference document, in which the product / data item is specified with respect to its content and format, e.g. reference to Station Support Data Specification including issue and revision numbers "TX-GS-DD-3202-1-0"

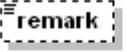
#### element generalHeader/revision

diagram	 <p>A handle to distinguish between different project phases (e.g. integration, testing, commissioning phase, operations) in order to separate test data from operational data in the TerraSAR-X Product Library.          Examples:          PGS_INTEGRATION,          GS_INTEGRATION,          COMMISSIONING_PHASE,          OPERATION</p>
type	<u>string20</u>
facets	maxLength 20

#### element generalHeader/revisionComment

diagram	 <p>Remark field for a narrative description of the revision field entry above.</p>
type	<u>string1024</u>
facets	maxLength 1024
annotation	documentation Remark field for a narrative description of the revision field entry above.

#### element generalHeader/remark

diagram	 <p>Remark field for a further narrative description of the product / data file.</p>
---------	---

type	<b>string1024</b>
facets	maxLength 1024
annotation	documentation Remark field for a further narrative description of the product / data file.

#### simpleType **string1024**

type	restriction of <b>xs:string</b>
facets	maxLength 1024

#### simpleType **string128**

type	restriction of <b>xs:string</b>
facets	maxLength 128

#### simpleType **string20**

type	restriction of <b>xs:string</b>
facets	maxLength 20

#### simpleType **string255**

type	restriction of <b>xs:string</b>
facets	maxLength 255

#### simpleType **string80**

type	restriction of <b>xs:string</b>
facets	maxLength 80

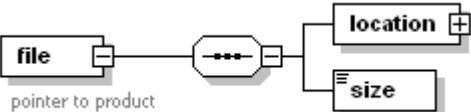
#### element **antennaReceiveConfiguration**

diagram	 <b>antennaReceiveConfiguration</b> SRA   DRA
type	restriction of <b>xs:NMTOKENS</b>
facets	enumeration SRA enumeration DRA enumeration UNDEFINED
annotation	documentation SRA   DRA

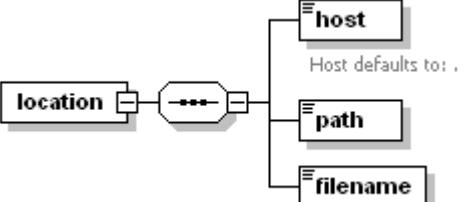
#### element **chirpSlope**

diagram	 <b>chirpSlope</b> [Up/Down/UpDown] chirp slope
type	restriction of <b>xs:NMTOKEN</b>
facets	enumeration UP enumeration DOWN enumeration UPDOWN
annotation	documentation [Up/Down/UpDown] chirp slope

### element file

diagram	 <small>pointer to product components</small>
annotation	documentation pointer to product components

### element file/location

diagram	 <small>Host defaults to: .</small>
---------	---

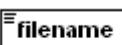
### element file/location/host

diagram	 <small>Host defaults to: .</small>
type	<b>xs:string</b>
annotation	documentation Host defaults to: .

### element file/location/path

diagram	
type	<b>xs:string</b>

### element file/location/filename

diagram	
type	<b>xs:string</b>

### element file/size

diagram	
type	<b>xs:long</b>

### element imagingMode

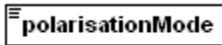
diagram	 <small>SM, SC, HS, SL</small>
type	restriction of <b>xs:NMTOKENS</b>

facets	enumeration SM enumeration SL enumeration SC enumeration HS enumeration UNDEFINED
annotation	documentation SM, SC, HS, SL

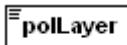
### element **lookDirection**

diagram	 left   right
type	restriction of xs:NMTOKEN
facets	enumeration LEFT enumeration RIGHT enumeration UNDEFINED
annotation	documentation left   right

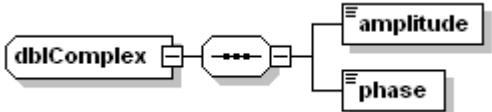
### element **polarisationMode**

diagram	 single   dual   twin   quad
type	restriction of xs:NMTOKENS
facets	enumeration SINGLE enumeration DUAL enumeration TWIN enumeration QUAD
annotation	documentation single   dual   twin   quad

### element **polLayer**

diagram	 HH, HV, ...
type	restriction of xs:string
facets	enumeration HH enumeration HV enumeration VH enumeration VV enumeration UNDEFINED
annotation	documentation HH, HV, ...

### complexType **dblComplex**

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

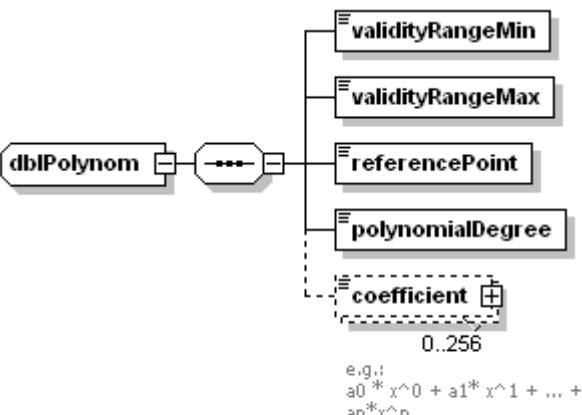
### element **dblComplex/amplitude**

diagram	 <b>amplitude</b>
type	<b>xs:double</b>

#### element dblComplex/phase

diagram	 <b>phase</b>
type	<b>xs:double</b>

#### complexType dblPolynom

diagram	 <p>Diagram illustrating the structure of dblPolynom:</p> <ul style="list-style-type: none"> <li>dblPolynom (represented by a rectangle)</li> <li>validityRangeMin (represented by a rectangle)</li> <li>validityRangeMax (represented by a rectangle)</li> <li>referencePoint (represented by a rectangle)</li> <li>polynomialDegree (represented by a rectangle)</li> <li>coefficient (represented by a rectangle with a plus sign)</li> </ul> <p>Below the diagram, an example polynomial is given:</p> <p>e.g.:  <math>a_0 * x^0 + a_1 * x^1 + \dots + a_n * x^n</math>  <math>a_0, a_1, \dots, a_n = \text{coefficient}</math>  <math>0, 1, \dots, n = \text{exponent}</math>  <math>n = \text{polynomialDegree}</math></p>
---------	--

#### element dblPolynom/validityRangeMin

diagram	 <b>validityRangeMin</b>
type	<b>xs:double</b>

#### element dblPolynom/validityRangeMax

diagram	 <b>validityRangeMax</b>
type	<b>xs:double</b>

#### element dblPolynom/referencePoint

diagram	 <b>referencePoint</b>
type	<b>xs:double</b>

#### element dblPolynom/polynomialDegree

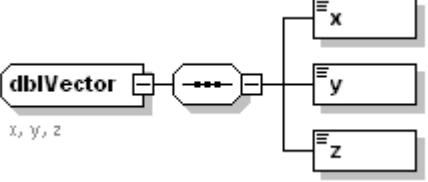
diagram	 <b>polynomialDegree</b>
---------	---

type	<b>xs:unsignedInt</b>
------	-----------------------

#### element dblPolynom/coefficient

diagram	 <pre> graph LR     coefficient[coefficient] --- exponent[exponent]     coefficient -- "0.256" --&gt; exponent     </pre> <p>e.g.:  <math>a_0 * x^0 + a_1 * x^1 + \dots + a_n * x^n</math>  <math>a_0, a_1, \dots, a_n = \text{coefficient}</math>  <math>0, 1, \dots, n = \text{attribute exponent}</math>  <math>n = \text{polynomialDegree}</math></p>												
type	extension of <b>xs:double</b>												
attributes	<table border="1" style="width: 100%; border-collapse: collapse;"> <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>exponent</td> <td><b>xs:unsignedInt</b></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Name	Type	Use	Default	Fixed	Annotation	exponent	<b>xs:unsignedInt</b>				
Name	Type	Use	Default	Fixed	Annotation								
exponent	<b>xs:unsignedInt</b>												
annotation	<p>documentation e.g.:</p> $a_0 * x^0 + a_1 * x^1 + \dots + a_n * x^n$ $a_0, a_1, \dots, a_n = \text{coefficient}$ $0, 1, \dots, n = \text{attribute exponent}$ $n = \text{polynomialDegree}$												

#### complexType dblVector

diagram	 <pre> graph LR     dblVector[dblVector] --- x[x]     dblVector --- y[y]     dblVector --- z[z]     </pre> <p>x, y, z</p>
annotation	documentation x, y, z

#### element dblVector/x

diagram	
type	<b>xs:double</b>

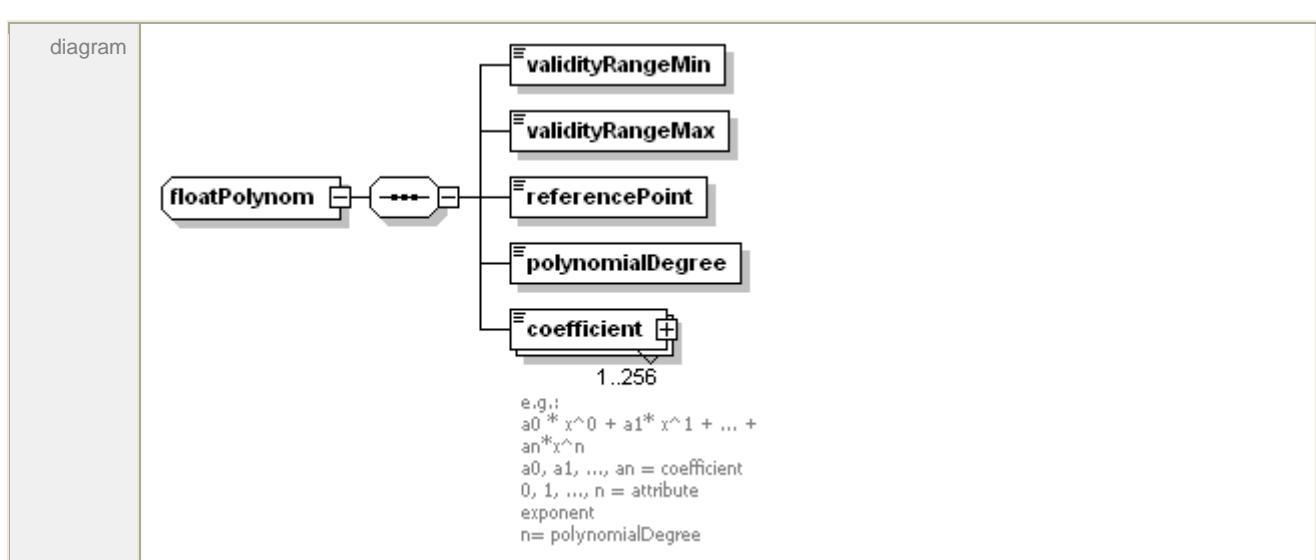
#### element dblVector/y

diagram	
type	<b>xs:double</b>

#### element dblVector/z

diagram	
type	<b>xs:double</b>

#### complexType floatPolynom



#### element floatPolynom/validityRangeMin

diagram	
type	<code>xs:float</code>

#### element floatPolynom/validityRangeMax

diagram	
type	<code>xs:float</code>

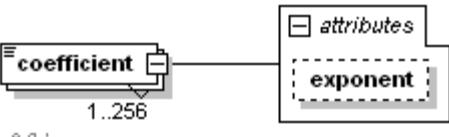
#### element floatPolynom/referencePoint

diagram	
type	<code>xs:float</code>

#### element floatPolynom/polynomialDegree

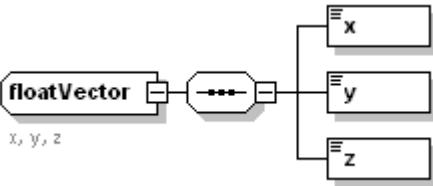
diagram	
type	<code>xs:unsignedInt</code>

#### element floatPolynom/coefficient

diagram	 <p>e.g.:  <math>a_0 * x^0 + a_1 * x^1 + \dots + a_n * x^n</math>  <math>a_0, a_1, \dots, a_n = \text{coefficient}</math>  <math>0, 1, \dots, n = \text{attribute exponent}</math>  <math>n = \text{polynomialDegree}</math></p>
---------	---

type	extension of <b>xs:float</b>					
attributes	Name exponent	Type <b>xs:unsignedInt</b>	Use	Default	Fixed	Annotation
annotation	documentation e.g.: $a_0 * x^0 + a_1 * x^1 + \dots + a_n * x^n$ $a_0, a_1, \dots, a_n = \text{coefficient}$ $0, 1, \dots, n = \text{attribute exponent}$ $n = \text{polynomialDegree}$					

#### complexType floatVector

diagram	
annotation	documentation x, y, z

#### element floatVector/x

diagram	
type	<b>xs:float</b>

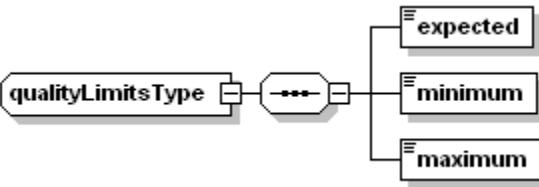
#### element floatVector/y

diagram	
type	<b>xs:float</b>

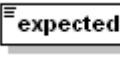
#### element floatVector/z

diagram	
type	<b>xs:float</b>

#### complexType qualityLimitsType

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

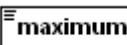
#### element qualityLimitsType/expected

diagram	
type	<b>xs:float</b>

**element qualityLimitsType/minimum**

diagram	 <b>minimum</b>
type	<b>xs:float</b>

**element qualityLimitsType/maximum**

diagram	 <b>maximum</b>
type	<b>xs:float</b>

**simpleType latitudeDegType**

type	restriction of <b>xs:float</b>
facets	minInclusive -90 maxInclusive 90

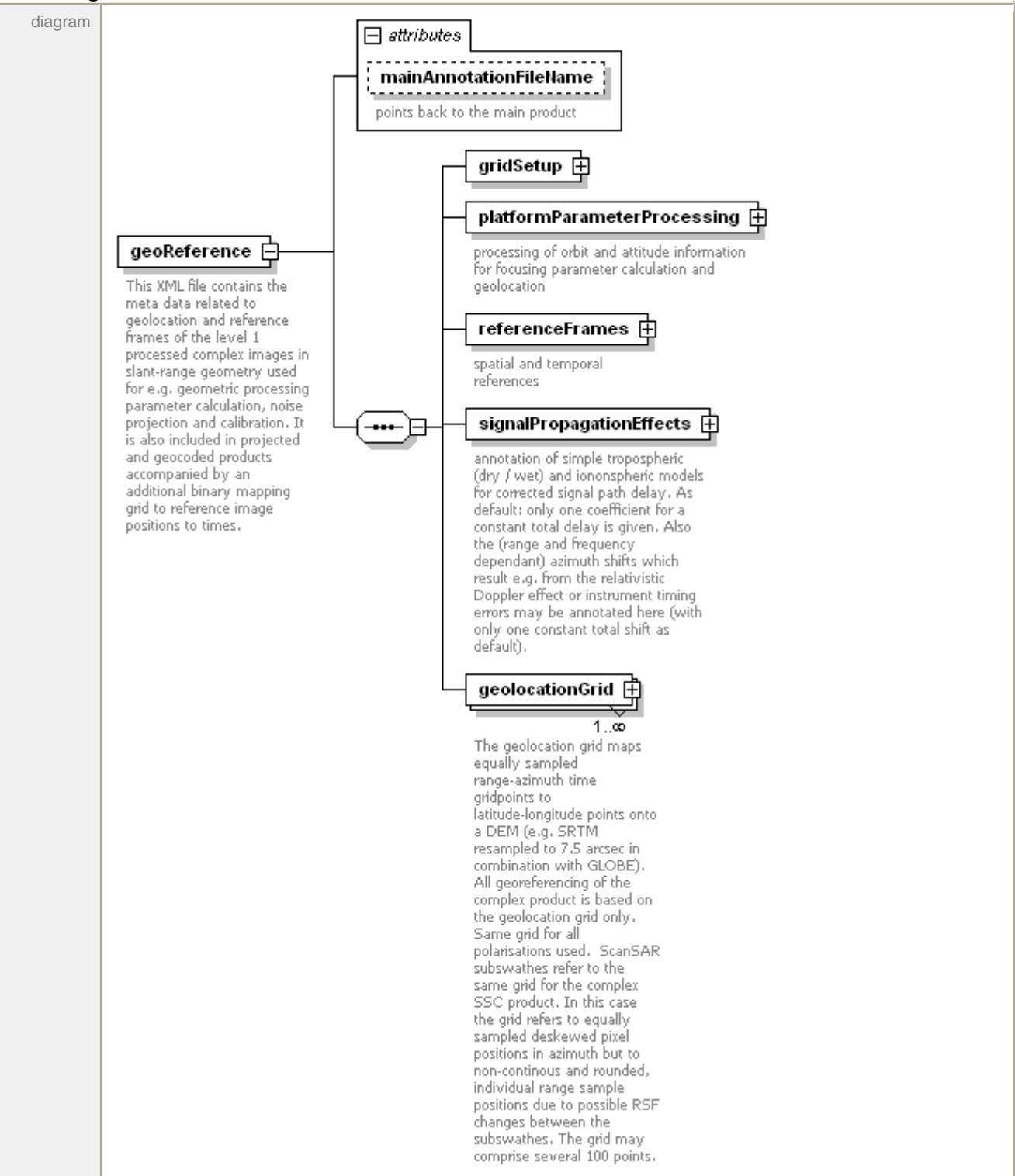
**simpleType longitudeDegType**

type	restriction of <b>xs:float</b>
facets	minInclusive -180 maxInclusive 180

## 6.2 Georeferencing Annotation Component

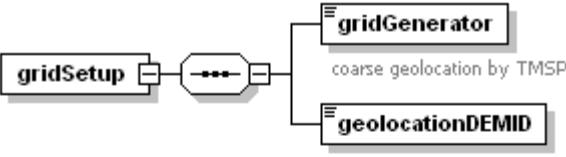
This is an external annotation component in order to facilitate data handling. The geolocation grid contained within may comprise a large number (100s) of grid points.

### element geoReference

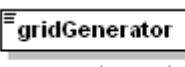


attributes	Name	Type	Use	Default	Fixed	Annotation
	mainAnnotationFileName	<u>string1024</u>				documentation points back to the main product
annotation	documentation This XML file contains the meta data related to geolocation and reference frames of the level 1 processed complex images in slant-range 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	 <pre> classDiagram     class gridSetup     class gridGenerator     class geolocationDEMID      gridSetup --&gt; gridGenerator : coarse geolocation by TMSP     gridSetup --&gt; geolocationDEMID :          &lt;&lt;Globe, SRTM7.5, ...&gt;&gt;         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.     </pre>
---------	--

#### element geoReference/gridSetup/gridGenerator

diagram	 <pre> classDiagram     class gridGenerator </pre>
	coarse geolocation by TMSP
type	<u>string80</u>
facets	maxLength 80
annotation	documentation coarse geolocation by TMSP

#### element geoReference/gridSetup/geolocationDEMID

diagram	<p><b>geolocationDEMID</b></p> <p>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.</p>
type	<u>string255</u>
facets	maxLength 255
annotation	<p>documentation</p> <p>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.</p>

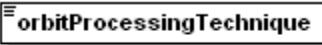
#### element **geoReference/platformParameterProcessing**

diagram	 <pre> classDiagram     class platformParameterProcessing {         &lt;&lt;processing of orbit and attitude information for focusing parameter calculation and geolocation&gt;&gt;     }     class orbitAccuracy     class orbitProcessingTechnique {         &lt;&lt;useded interpolation or approximation technique&gt;&gt;     }     class orbitPolDegree {         &lt;&lt;useded interpolation polynomial degree&gt;&gt;     }     class orbitDataQualityIndicator {         &lt;&lt;gap ratio 0...1&gt;&gt;     }     class attitudeAccuracy     class attitudeProcessingTechnique {         &lt;&lt;useded interpolation technique&gt;&gt;     }     class attitudePolDegree {         &lt;&lt;useded interpolation polynomial degree&gt;&gt;     }     class attitudeDataQualityIndicator {         &lt;&lt;nominal or gaps...&gt;&gt;     }      platformParameterProcessing &lt;--&gt; orbitAccuracy     platformParameterProcessing &lt;--&gt; orbitProcessingTechnique     platformParameterProcessing &lt;--&gt; orbitPolDegree     platformParameterProcessing &lt;--&gt; orbitDataQualityIndicator     platformParameterProcessing &lt;--&gt; attitudeAccuracy     platformParameterProcessing &lt;--&gt; attitudeProcessingTechnique     platformParameterProcessing &lt;--&gt; attitudePolDegree     platformParameterProcessing &lt;--&gt; attitudeDataQualityIndicator   </pre>
annotation	documentation processing of orbit and attitude information for focusing parameter calculation and geolocation

#### element geoReference/platformParameterProcessing/orbitAccuracy

diagram	
type	<u>string20</u>
facets	maxLength 20

#### element geoReference/platformParameterProcessing/orbitProcessingTechnique

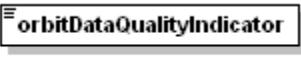
diagram	
	useded interpolation or approximation technique
type	<u>string255</u>
facets	maxLength 255
annotation	documentation useded interpolation or approximation technique

#### element geoReference/platformParameterProcessing/orbitPolDegree

diagram	
	useded interpolation polynomial degree
type	restriction of xs:int

facets	minInclusive 1 maxInclusive 20
annotation	documentation useded interpolation polynomial degree

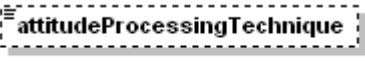
**element geoReference/platformParameterProcessing/orbitDataQualityIndicator**

diagram	 gap ratio 0...1
type	<b>xs:float</b>
annotation	documentation gap ratio 0...1

**element geoReference/platformParameterProcessing/attitudeAccuracy**

diagram	
type	<b>string20</b>
facets	maxLength 20

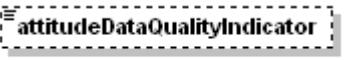
**element geoReference/platformParameterProcessing/attitudeProcessingTechnique**

diagram	 useded interpolation technique
type	<b>string255</b>
facets	maxLength 255
annotation	documentation useded interpolation technique

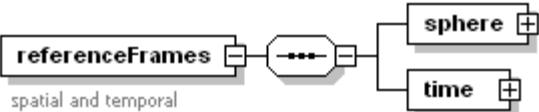
**element geoReference/platformParameterProcessing/attitudePolDegree**

diagram	 useded interpolation polynomial degree
type	restriction of <b>xs:int</b>
facets	minInclusive 1 maxInclusive 20
annotation	documentation useded interpolation polynomial degree

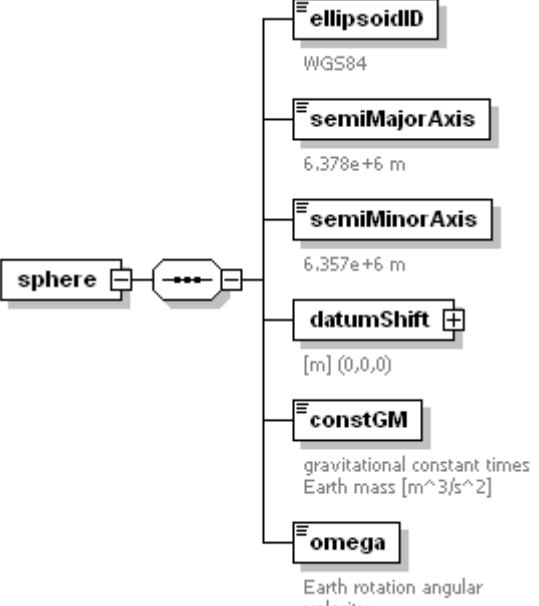
**element geoReference/platformParameterProcessing/attitudeDataQualityIndicator**

diagram	 nominal or gaps...
type	<b>xs:float</b>
annotation	documentation nominal or gaps...

**element geoReference/referenceFrames**

diagram	 <p>spatial and temporal references</p>
annotation	documentation spatial and temporal references

#### element geoReference/referenceFrames/sphere

diagram	 <p>WG84</p> <p>6.378e+6 m</p> <p>6.357e+6 m</p> <p>[m] (0,0,0)</p> <p>gravitational constant times Earth mass [m^3/s^2]</p> <p>Earth rotation angular velocity</p>
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#### element geoReference/referenceFrames/sphere/ellipsoidID

diagram	 <p>WG84</p>
type	<u>string20</u>
facets	maxLength 20
annotation	documentation WGS84

#### element geoReference/referenceFrames/sphere/semiMajorAxis

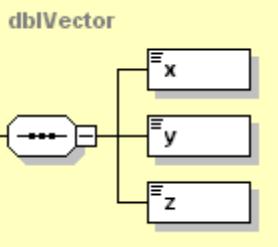
diagram	 <p>6.378e+6 m</p>
type	<u>xs:double</u>
annotation	documentation 6.378e+6 m

#### element geoReference/referenceFrames/sphere/semiMinorAxis

diagram	 <p>6.357e+6 m</p>
---------	---

type	<b>xs:double</b>
annotation	documentation 6.357e+6 m

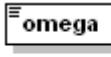
**element geoReference/referenceFrames/sphere/datumShift**

diagram	 <pre> graph LR     datumShift[datumShift] --- dblVector((dblVector))     dblVector --- x[x]     dblVector --- y[y]     dblVector --- z[z]     </pre>
type	<b>dblVector</b>
annotation	documentation [m] (0,0,0)

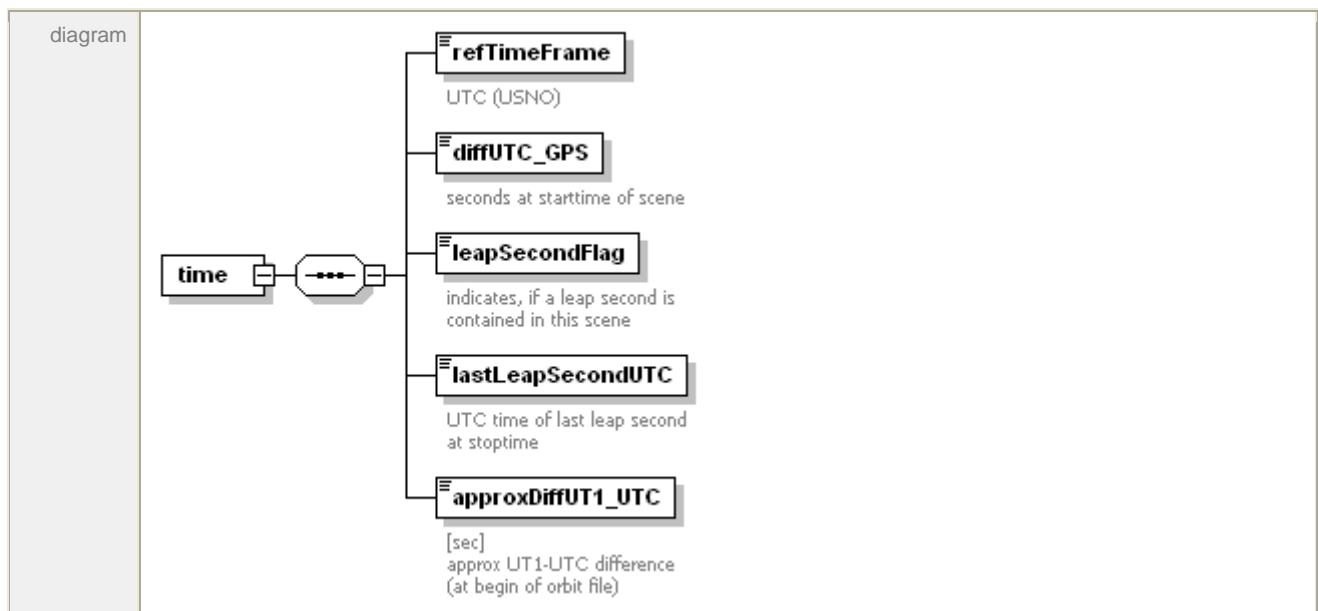
**element geoReference/referenceFrames/sphere/constGM**

diagram	 <p>gravitational constant times Earth mass [m^3/s^2]</p>
type	<b>xs:double</b>
annotation	documentation gravitational constant times Earth mass [m^3/s^2]

**element geoReference/referenceFrames/sphere/omega**

diagram	 <p>Earth rotation angular velocity</p>
type	<b>xs:double</b>
annotation	documentation Earth rotation angular velocity

**element geoReference/referenceFrames/time**



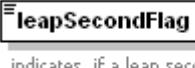
#### element geoReference/referenceFrames/time/refTimeFrame

diagram	 <p>UTC (USNO)</p>
type	<b>string20</b>
facets	maxLength 20
annotation	documentation UTC (USNO)

#### element geoReference/referenceFrames/time/diffUTC\_GPS

diagram	 <p>seconds at starttime of scene</p>
type	<b>xs:float</b>
annotation	documentation seconds at starttime of scene

#### element geoReference/referenceFrames/time/leapSecondFlag

diagram	 <p>indicates, if a leap second is contained in this scene</p>
type	restriction of <b>xs:int</b>
facets	minInclusive -1 maxInclusive 1
annotation	documentation indicates, if a leap second is contained in this scene

#### element geoReference/referenceFrames/time/lastLeapSecondUTC

diagram	 <b>lastLeapSecondUTC</b>
	UTC time of last leap second at stoptime
type	<b>xs:dateTime</b>
annotation	documentation UTC time of last leap second at stoptime

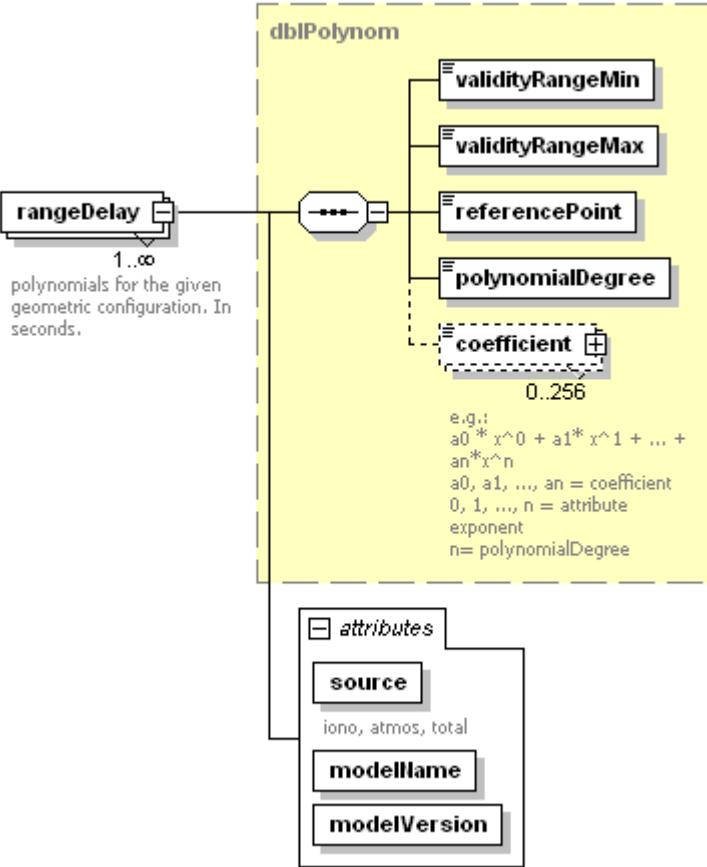
#### element geoReference/referenceFrames/time/approxDiffUT1\_UTC

diagram	 <b>approxDiffUT1_UTC</b>
	[sec] approx UT1-UTC difference (at begin of orbit file)
type	<b>xs:float</b>
annotation	documentation [sec] approx UT1-UTC difference (at begin of orbit file)

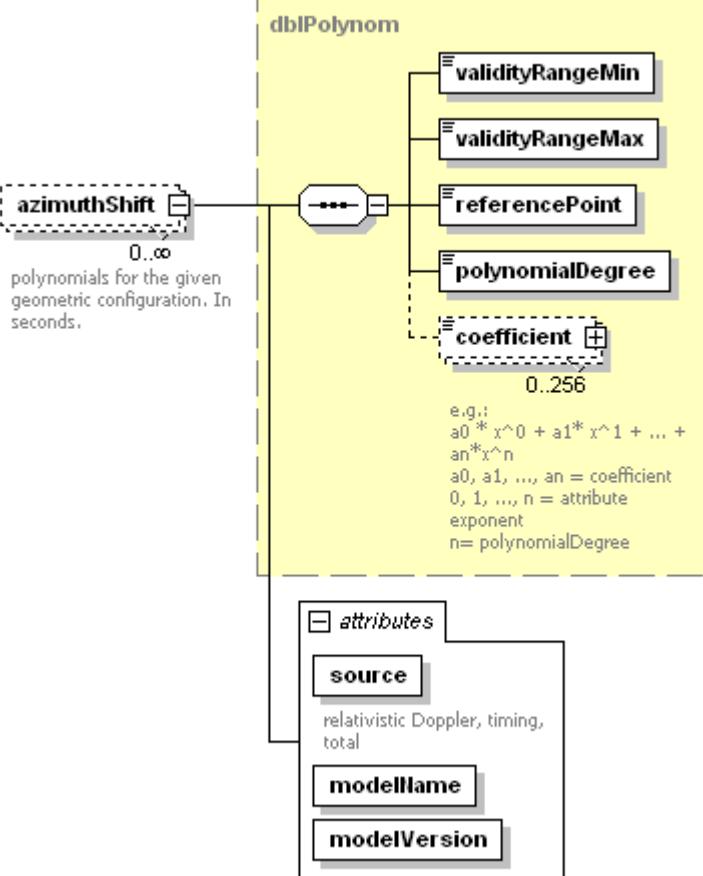
#### element geoReference/signalPropagationEffects

diagram	 <b>signalPropagationEffects</b>
	<p>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).</p>
annotation	documentation 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).

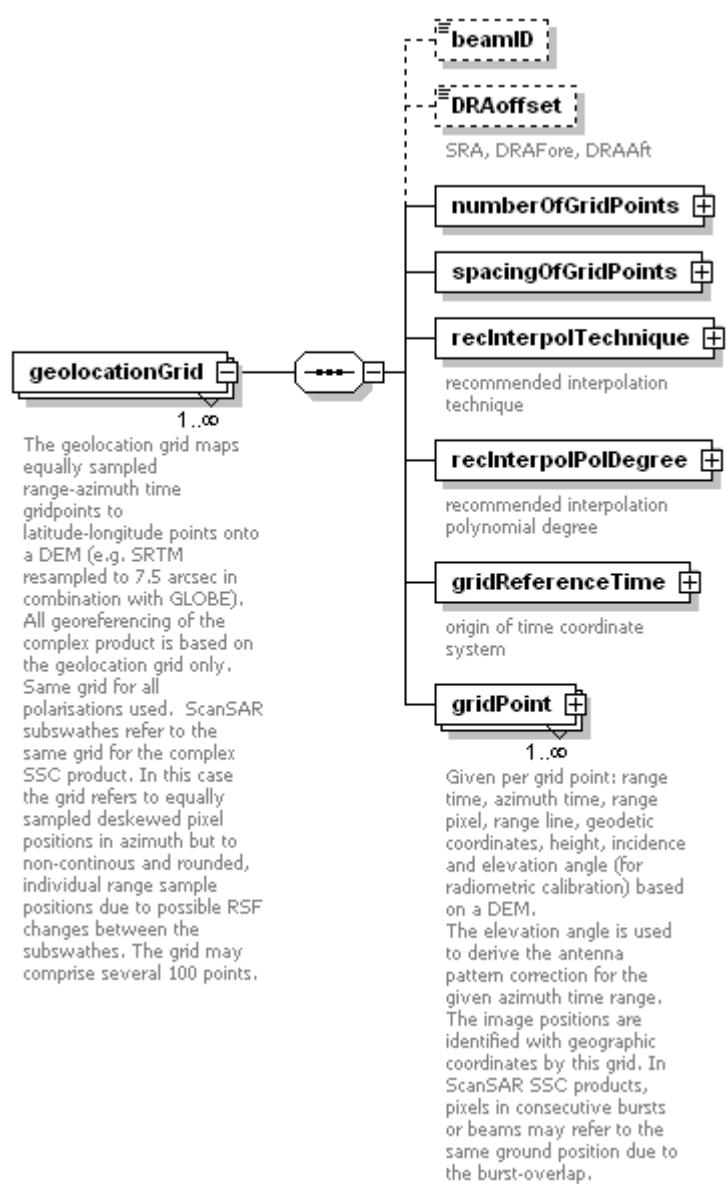
#### element geoReference/signalPropagationEffects/rangeDelay

diagram	 <pre> classDiagram     class dblPolynom {         &lt;&lt;validityRangeMin&gt;&gt;         &lt;&lt;validityRangeMax&gt;&gt;         &lt;&lt;referencePoint&gt;&gt;         &lt;&lt;polynomialDegree&gt;&gt;         &lt;&lt;coefficient&gt;&gt; + 0.256         &lt;&lt;e.g.:&gt;&gt;         &lt;&lt;a0 * x^0 + a1* x^1 + ... + an*x^n&gt;&gt;         &lt;&lt;a0, a1, ..., an = coefficient&gt;&gt;         &lt;&lt;0, 1, ..., n = attribute exponent&gt;&gt;         &lt;&lt;n = polynomialDegree&gt;&gt;     }     class dblPolynom {         &lt;&lt;rangeDelay&gt;&gt; 1..∞         &lt;&lt;polynomials for the given geometric configuration. In seconds.&gt;&gt;     }     dblPolynom &lt; -- dblPolynom     dblPolynom &lt; -- attributes     dblPolynom &lt; -- source     dblPolynom &lt; -- modelName     dblPolynom &lt; -- modelVersion   </pre>																											
type	extension of <u><a href="#">dblPolynom</a></u>																											
attributes	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>Name</td><td><u>source</u></td><td>Type</td><td><u>derived by: xs:NMTOKENS</u></td><td>Use</td><td>required</td><td>Default</td><td>Fixed</td><td>Annotation documentation <u>iono, atmos, total</u></td></tr> <tr> <td>modelName</td><td></td><td><u>string255</u></td><td></td><td>required</td><td></td><td></td><td></td><td></td></tr> <tr> <td>modelVersion</td><td></td><td><u>string80</u></td><td></td><td>required</td><td></td><td></td><td></td><td></td></tr> </table>	Name	<u>source</u>	Type	<u>derived by: xs:NMTOKENS</u>	Use	required	Default	Fixed	Annotation documentation <u>iono, atmos, total</u>	modelName		<u>string255</u>		required					modelVersion		<u>string80</u>		required				
Name	<u>source</u>	Type	<u>derived by: xs:NMTOKENS</u>	Use	required	Default	Fixed	Annotation documentation <u>iono, atmos, total</u>																				
modelName		<u>string255</u>		required																								
modelVersion		<u>string80</u>		required																								
annotation	documentation polynomials for the given geometric configuration. In seconds.																											

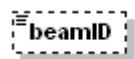
element **geoReference/signalPropagationEffects/azimuthShift**

diagram	 <pre> classDiagram     class dblPolynom {         &lt;&lt;azimuthShift 0..&gt;&gt;         &lt;&lt;validityRangeMin&gt;&gt;         &lt;&lt;validityRangeMax&gt;&gt;         &lt;&lt;referencePoint&gt;&gt;         &lt;&lt;polynomialDegree&gt;&gt;         &lt;&lt;coefficient 0.256&gt;&gt;         &lt;&lt;attributes&gt;&gt;         &lt;&lt;source relativistic Doppler, timing, total&gt;&gt;         &lt;&lt;modelName string255&gt;&gt;         &lt;&lt;modelVersion string80&gt;&gt;     }     azimuthShift --&gt; dblPolynom     dblPolynom &lt;&lt;validityRangeMin&gt;&gt;     dblPolynom &lt;&lt;validityRangeMax&gt;&gt;     dblPolynom &lt;&lt;referencePoint&gt;&gt;     dblPolynom &lt;&lt;polynomialDegree&gt;&gt;     dblPolynom &lt;&lt;coefficient 0.256&gt;&gt;     dblPolynom &lt;&lt;attributes&gt;&gt;     dblPolynom &lt;&lt;source relativistic Doppler, timing, total&gt;&gt;     dblPolynom &lt;&lt;modelName string255&gt;&gt;     dblPolynom &lt;&lt;modelVersion string80&gt;&gt;   </pre> <p>The diagram shows the UML class <b>dblPolynom</b>. It has attributes: <b>azimuthShift</b> (type <code>xs:float</code>, multiplicity <code>0..∞</code>), <b>validityRangeMin</b>, <b>validityRangeMax</b>, <b>referencePoint</b>, <b>polynomialDegree</b>, <b>coefficient</b> (type <code>xs:double</code>, value <code>0.256</code>), <b>attributes</b>, <b>source</b> (type <code>xs:string</code>, documentation: "relativistic Doppler, timing, total"), <b>modelName</b> (type <code>xs:string</code>, length <code>255</code>), and <b>modelVersion</b> (type <code>xs:string</code>, length <code>80</code>). A dashed line connects <b>azimuthShift</b> to the class boundary.</p>																								
type	extension of <b>dblPolynom</b>																								
attributes	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">Name</td><td style="width: 10%;">Type</td><td style="width: 10%;">Use</td><td style="width: 10%;">Default</td><td style="width: 10%;">Fixed</td><td style="width: 10%;">Annotation</td></tr> <tr> <td>source</td><td><b>derived by:</b> xs:NMTOKENS</td><td>required</td><td></td><td></td><td>documentation relativistic Doppler, timing, total</td></tr> <tr> <td>modelName</td><td><b>string255</b></td><td>required</td><td></td><td></td><td></td></tr> <tr> <td>modelVersion</td><td><b>string80</b></td><td>required</td><td></td><td></td><td></td></tr> </table>	Name	Type	Use	Default	Fixed	Annotation	source	<b>derived by:</b> xs:NMTOKENS	required			documentation relativistic Doppler, timing, total	modelName	<b>string255</b>	required				modelVersion	<b>string80</b>	required			
Name	Type	Use	Default	Fixed	Annotation																				
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modelName	<b>string255</b>	required																							
modelVersion	<b>string80</b>	required																							
annotation	documentation polynomials for the given geometric configuration. In seconds.																								

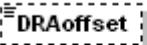
### element **geoReference/geolocationGrid**

diagram	 <p>The geolocation grid maps equally sampled range-azimuth time gridpoints to latitude-longitude points onto a DEM (e.g. SRTM resampled to 7.5 arcsec in combination with GLOBE). All georeferencing of the complex product is based on the geolocation grid only. Same grid for all polarisations used. ScanSAR subswathes refer to the same grid for the complex SSC product. In this case the grid refers to equally sampled 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.</p>
annotation	<p>documentation The geolocation grid maps equally sampled range-azimuth time gridpoints to latitude-longitude points onto a DEM (e.g. SRTM resampled to 7.5 arcsec in combination with GLOBE). All georeferencing of the complex product is based on the geolocation grid only. Same grid for all polarisations used. ScanSAR subswathes refer to the same grid for the complex SSC product. In this case the grid refers to equally sampled 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.</p>

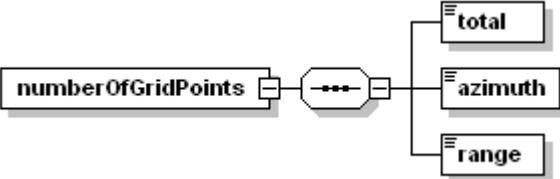
#### element geoReference/geolocationGrid/beamID

diagram	
type	<u>string20</u>
facets	maxLength 20

#### element geoReference/geolocationGrid/DRAoffset

diagram	
	SRA, DRAFore, DRAAft
type	restriction of xs:NMTOKENS
facets	enumeration SRA enumeration DRAFore enumeration DRAAft
annotation	documentation SRA, DRAFore, DRAAft

#### element geoReference/geolocationGrid/numberOfGridPoints

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

#### element geoReference/geolocationGrid/numberOfGridPoints/total

diagram	
type	xs:int

#### element geoReference/geolocationGrid/numberOfGridPoints/azimuth

diagram	
type	xs:int

#### element geoReference/geolocationGrid/numberOfGridPoints/range

diagram	
type	xs:int

#### element geoReference/geolocationGrid/spacingOfGridPoints

diagram	  
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#### element geoReference/geolocationGrid/spacingOfGridPoints/azimuth

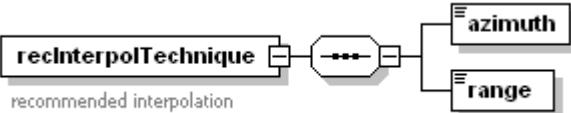
diagram	  [s]
type	xs:float

annotation	documentation [s]
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**element geoReference/geolocationGrid/spacingOfGridPoints/range**

diagram	 [s]
type	<b>xs:float</b>
annotation	documentation [s]

**element geoReference/geolocationGrid/recInterpolTechnique**

diagram	 recommended interpolation technique
annotation	documentation recommended interpolation technique

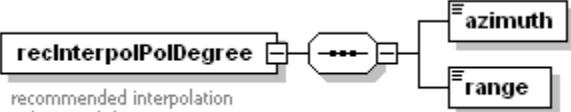
**element geoReference/geolocationGrid/recInterpolTechnique/azimuth**

diagram	
type	<b>string255</b>
facets	maxLength 255

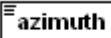
**element geoReference/geolocationGrid/recInterpolTechnique/range**

diagram	
type	<b>string255</b>
facets	maxLength 255

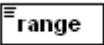
**element geoReference/geolocationGrid/recInterpolPolDegree**

diagram	 recommended interpolation polynomial degree
annotation	documentation recommended interpolation polynomial degree

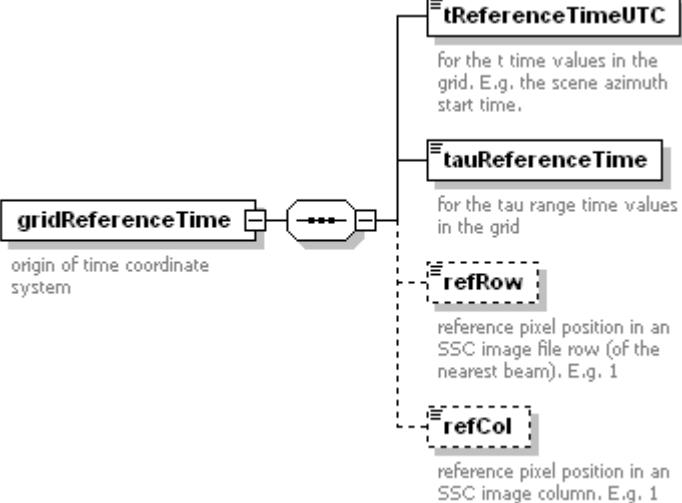
**element geoReference/geolocationGrid/recInterpolPolDegree/azimuth**

diagram	
type	<b>xs:int</b>

**element geoReference/geolocationGrid/recInterpolPolDegree/range**

diagram	
type	<code>xs:int</code>

#### element `geoReference/geolocationGrid/gridReferenceTime`

diagram	 <p>origin of time coordinate system</p>
annotation	documentation origin of time coordinate system

#### element `geoReference/geolocationGrid/gridReferenceTime/tReferenceTimeUTC`

diagram	
	for the t time values in the grid. E.g. the scene azimuth start time.
type	<code>xs:dateTime</code>
annotation	documentation for the t time values in the grid. E.g. the scene azimuth start time.

#### element `geoReference/geolocationGrid/gridReferenceTime/tauReferenceTime`

diagram	
	for the tau range time values in the grid
type	<code>xs:double</code>
annotation	documentation for the tau range time values in the grid

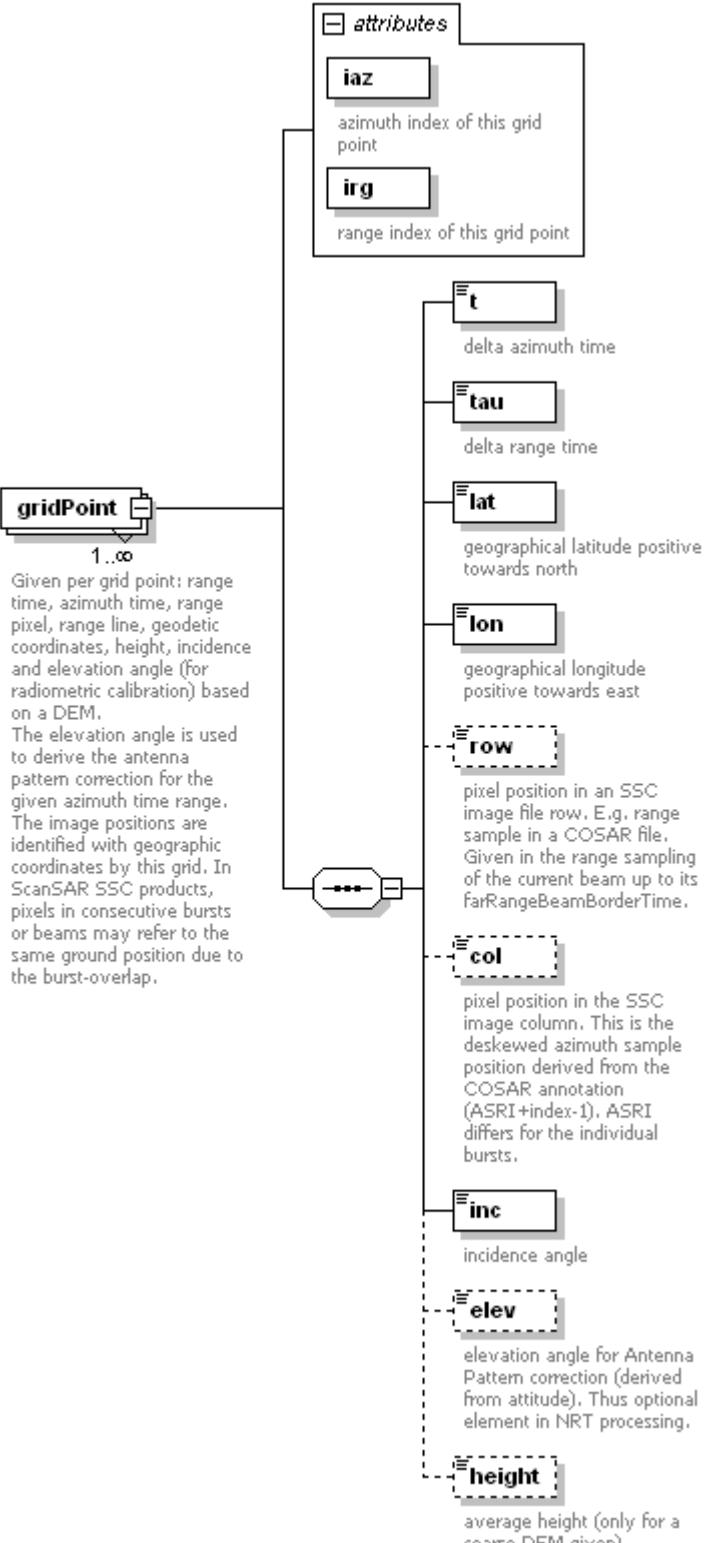
#### element `geoReference/geolocationGrid/gridReferenceTime/refRow`

diagram	
	reference pixel position in an SSC image file row (of the nearest beam). E.g. 1
type	<code>xs:long</code>
annotation	documentation reference pixel position in an SSC image file row (of the nearest beam). E.g. 1

**element geoReference/geolocationGrid/gridReferenceTime/refCol**

diagram	
	reference pixel position in an SSC image column. E.g. 1
type	<b>xs:long</b>
annotation	documentation reference pixel position in an SSC image column. E.g. 1

**element geoReference/geolocationGrid/gridPoint**

diagram	 <p><b>gridPoint</b></p> <p>1 ..oo      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.</p>																		
attributes	<table border="1"> <thead> <tr> <th>Name</th><th>Type</th><th>Use</th><th>Default</th><th>Fixed</th><th>Annotation documentation</th> </tr> </thead> <tbody> <tr> <td>iaz</td><td>xs:int</td><td>required</td><td></td><td></td><td>azimuth index of this grid point</td></tr> <tr> <td>irg</td><td>xs:int</td><td>required</td><td></td><td></td><td>range index of this grid point</td></tr> </tbody> </table>	Name	Type	Use	Default	Fixed	Annotation documentation	iaz	xs:int	required			azimuth index of this grid point	irg	xs:int	required			range index of this grid point
Name	Type	Use	Default	Fixed	Annotation documentation														
iaz	xs:int	required			azimuth index of this grid point														
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annotation	documentation 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	<b>xs:double</b>
annotation	documentation delta azimuth time

#### element geoReference/geolocationGrid/gridPoint/tau

diagram	 delta range time
type	<b>xs:double</b>
annotation	documentation delta range time

#### element geoReference/geolocationGrid/gridPoint/lat

diagram	 geographical latitude positive towards north
type	<b>latitudeDegType</b>
facets	minInclusive -90 maxInclusive 90
annotation	documentation geographical latitude positive towards north

#### element geoReference/geolocationGrid/gridPoint/lon

diagram	 geographical longitude positive towards east
type	<b>longitudeDegType</b>
facets	minInclusive -180 maxInclusive 180
annotation	documentation geographical longitude positive towards east

#### element geoReference/geolocationGrid/gridPoint/row

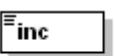
diagram	 pixel position in an SSC image file row. E.g. range sample in a COSAR file. Given in the range sampling of the current beam up to its farRangeBeamBorderTime.
---------	--

type	<b>xs:long</b>
annotation	documentation 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.

**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	<b>xs:long</b>
annotation	documentation 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.

**element geoReference/geolocationGrid/gridPoint/inc**

diagram	 incidence angle
type	<b>xs:double</b>
annotation	documentation incidence angle

**element geoReference/geolocationGrid/gridPoint/elev**

diagram	 elevation angle for Antenna Pattern correction (derived from attitude). Thus optional element in NRT processing.
type	<b>xs:double</b>
annotation	documentation elevation angle for Antenna Pattern correction (derived from attitude). Thus optional element in NRT processing.

**element geoReference/geolocationGrid/gridPoint/height**

diagram	 average height (only for a coarse DEM given)
type	<b>xs:double</b>
annotation	documentation average height (only for a coarse DEM given)

## ANNEX A) Acronyms and Abbreviations

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
ISLR	Integrated Sidelobe Ratio
IRF	Impulse Response Function
L0	Level 0 Product
L1b	Level 1b Product
MGD	Multi Look Ground Range Detected
PRF	Pulse Repetition Frequency
PSLR	Peak Sidelobe Ratio
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
TMSP	TerraSAR Multi Mode SAR Processor
UPS	Universal Polar Stereographic
UTM	Universal Transverse Mercator
V	Vertical Polarization
XML	Extensible Markup Language

## ANNEX B) 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**.

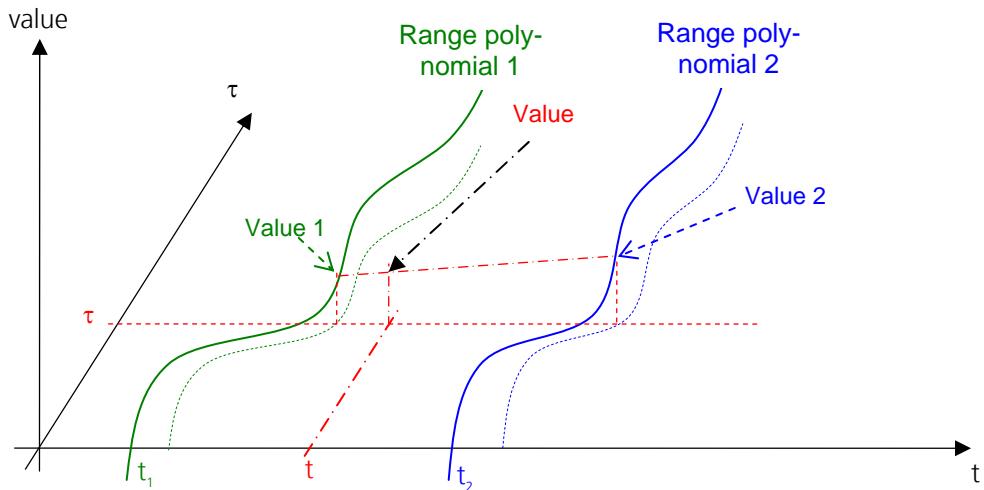
The mathematical formulation is:

$$R = \sum_{i=0}^{\deg} \text{coeff}_i (\tau - \tau_{\text{ref}})^i, \tau \in [\tau_{\min}; \tau_{\max}]$$

where:

- **deg** is **polynomialDegree**
- **coeff<sub>i</sub>** is **coefficient exponent="i"**
- **$\tau_{\text{ref}}$**  is **referencePoint**
- **$\tau_{\min}$**  is **validityRangeMin**
- **$\tau_{\max}$**  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  $\tau$  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:

$$\begin{aligned} \text{idx\_row}_{\text{GEC/EEC}} &= (\text{image UpperLeft northing} - \text{northing}) / \text{MG Row Spacing} + \text{MG ref row} \\ \text{idx\_col}_{\text{GEC/EEC}} &= (\text{easting} - \text{image UpperLeft easting}) / \text{MG Col Spacing} + \text{MG ref col} \end{aligned}$$

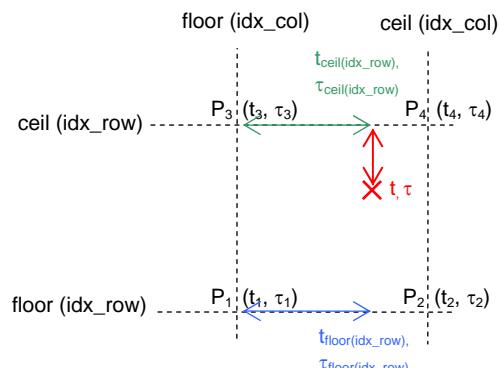
NB: Since MG is in binary format, it is easier to read the whole grid and to store it in a matrix before looking for any indexes.

To obtain the instrument times ( $t$  and  $\tau$ ), 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 row (floor(idx\_row) and ceil(idx\_row)):

$$\begin{aligned} t_{\text{floor}(idx\_row)} &= (t_2 - t_1) * \\ &\quad (\text{idx\_col} - \text{floor}(\text{idx\_col})) + t_1 \\ \tau_{\text{floor}(idx\_row)} &= (\tau_2 - \tau_1) * \\ &\quad (\text{idx\_col} - \text{floor}(\text{idx\_col})) + \tau_1 \\ t_{\text{ceil}(idx\_row)} &= (t_4 - t_3) * \\ &\quad (\text{idx\_col} - \text{floor}(\text{idx\_col})) + t_3 \\ \tau_{\text{ceil}(idx\_row)} &= (\tau_4 - \tau_3) * \\ &\quad (\text{idx\_col} - \text{floor}(\text{idx\_col})) + \tau_3 \end{aligned}$$



Then interpolation is done between these two interpolated values to obtain the wanted times:

$$\begin{aligned} t &= (t_{\text{ceil}(idx\_row)} - t_{\text{floor}(idx\_row)}) * (\text{idx\_row} - \text{floor}(\text{idx\_row})) + t_{\text{floor}(idx\_row)} \\ \tau &= (\tau_{\text{ceil}(idx\_row)} - \tau_{\text{floor}(idx\_row)}) * (\text{idx\_row} - \text{floor}(\text{idx\_row})) + \tau_{\text{floor}(idx\_row)} \end{aligned}$$

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).

$$\begin{aligned} \text{idx\_row} &= t / \text{GG azimuth Spacing} + \text{GG ref row} \\ \text{idx\_col} &= \tau / \text{GG range Spacing} + \text{GG ref col} \end{aligned}$$

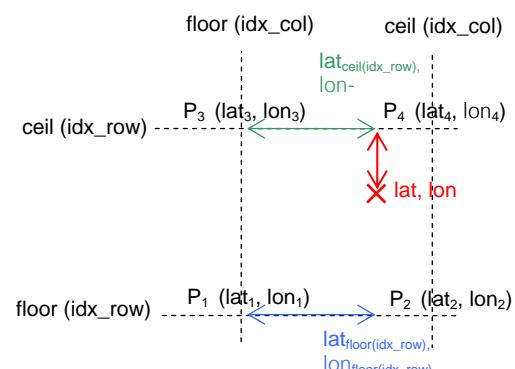
The interpolation way is exactly the same as for Mapping Grid (linear interpolation is also sufficient):

Point 1: $P_1$ ( $\text{floor}(idx\_row)$ , $\text{floor}(idx\_col)$ )	$\rightarrow$ lat <sub>1</sub> & lon <sub>1</sub>
Point 2: $P_2$ ( $\text{floor}(idx\_row)$ , $\text{ceil}(idx\_col)$ )	$\rightarrow$ lat <sub>2</sub> & lon <sub>2</sub>
Point 3: $P_3$ ( $\text{ceil}(idx\_row)$ , $\text{floor}(idx\_col)$ )	$\rightarrow$ lat <sub>3</sub> & lon <sub>3</sub>
Point 4: $P_4$ ( $\text{ceil}(idx\_row)$ , $\text{ceil}(idx\_col)$ )	$\rightarrow$ lat <sub>4</sub> & lon <sub>4</sub>

First interpolation can take place for a constant row (floor(idx\_row) and ceil(idx\_row)):

$$\begin{aligned} \text{lat}_{\text{floor}(idx\_row)} &= (\text{lat}_2 - \text{lat}_1) * \\ &\quad (\text{idx\_col} - \text{floor}(\text{idx\_col})) + \text{lat}_1 \\ \text{lon}_{\text{floor}(idx\_row)} &= (\text{lon}_2 - \text{lon}_1) * \\ &\quad (\text{idx\_col} - \text{floor}(\text{idx\_col})) + \text{lon}_1 \\ \text{lat}_{\text{ceil}(idx\_row)} &= (\text{lat}_4 - \text{lat}_3) * \\ &\quad (\text{idx\_col} - \text{floor}(\text{idx\_col})) + \text{lat}_3 \\ \text{lon}_{\text{ceil}(idx\_row)} &= (\text{lon}_4 - \text{lon}_3) * \\ &\quad (\text{idx\_col} - \text{floor}(\text{idx\_col})) + \text{lon}_3 \end{aligned}$$

Then interpolation is done between these two interpo-



lated 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 TerraSAR-X 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  $t_{\text{start}}$  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>4.7295548859725000E-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  
 $f_{\text{dc}}(t) = \text{coefficient exponent= »0 »} + \text{coefficient exponent= »1 »} * (t - \text{referencePoint})$

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

$$t_{SSC} = t_{RAW} + \frac{f_{DC}(t_{RAW})}{FM}$$