TITLE: ENVISAT-1 PRODUCTS SPECIFICATIONS

VOLUME 3: PRODUCT TERMS AND DEFINITIONS

WRITTEN BY: I. McLeod   _____

                                      (signature / date)

CHECKED BY: R. Dale   _____

APPROVED BY: B. Robertson   _____

AUTHORISED BY: J. McArdle   _____

DOCUMENT CATEGORY: [7] Approval   [ ] Review   [ ] Information

THOMSON-CSF
APPROVAL:

SUMMARY: This document specifies the ENVISAT-1 products.

                 DRL 3-3 of contract 27/11/95-761.

Company internal reference: 50-7316   Proposition:

THIS PAGE INTENTIONALLY LEFT BLANK

CHANGE RECORD

ISSUE	REVISION	DATE	CHANGE STATUS	ORIGIN
1	A	12/01/96	Issue 1	
1	B	16/02/96	SCR #16, CR #16 Issue 1, Revision B Reason for Change: Updated to reflect information in PO-TN-ESA-GS-0381 and to address RIDs of Feb. 2/96 pertaining to the Level 0 structure. MPH, SPH, DSD, and DSR structures modified. Table added showing generalized Level 0 product structure. RIDs Addressed: ESA/0001:　FEP header defined ESA/0002:　PF-Host time stamp clarified ESA/0004:　Processing PCD added ESA/0006:　AF PCD ADS and DSD added ESA/0007:　page A-3 updated ESA/0008:　page B-3 updated ESA/0009:　Table 8.1.1 modified ESA/0011:　TBD changed to Range/Doppler ESA/0013:　FEP header defined ESA/0014:　Table 8.4.7.4-2 corrected CSF/1:　filename in MPH corrected CSF/2:　page A-3 updated	

ISSUE	REVISION	DATE	CHANGE STATUS	ORIGIN
			CSF/3: MPH PCD information updated	
			CSF/5: DSD added to Level 0 SPH	
			CSF/6: Section on AATSR updated and re-issued	
			CSF/8: AATSR_O Summary Sheet updated	
1	C	04/04/96	SCR #38, CR #38 Issue 1, Revision C Reason for Change: Updated Sections 1-6, 17 and Annex A to reflect changes discussed at the Products Review Meeting #1, March 5-8, 1996, as per action item "AI MDA 6 April 96" from PO-MN-ESA-00416, Pg. 35.	Products Review Meeting #1
2	A	20/05/96	SCR #71, CR #71 Issue 2 Separate volume created. Minor updates added.	
2	B	02/09/96	SCR #102, CR #102 Issue 2, Revision B Reason for Change: Removed Inventory description. Minor updates.	Products Review Meeting #2

ISSUE	REVISION	DATE	CHANGE STATUS	ORIGIN
3	A	10/02/97	SCR #133, CR #133 Issue 3 Reason for Change: Updated for ESA RIDs received 06/01/97 (fax DPD/JMJ/ENV, 0021/97).	ESA RIDs

THIS PAGE INTENTIONALLY LEFT BLANK

REGISTER OF CHANGES

Affected pages:

3-1, 3-5, 3-8

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

THIS PAGE INTENTIONALLY LEFT BLANK

LIST OF FIGURES

THIS PAGE INTENTIONALLY LEFT BLANK

3   PRODUCT TERMS AND DEFINITIONS

3.1   PRODUCT GENERATION TIMES

Product Generation may fall into two major classes. These are:

- **Systematic:** Products are generated automatically for all received data.
- **On Request**: Products are not generated unless specifically requested by a user.

In addition, the systematic products may be sub-divided into two categories based on the production time:

- **Near Real Time**: There are 2 types of Near Real Time (NRT) products, those to be produced within 3 hours and those to be produced within 1 day.
- **Off-line:** Some products will be processed off-line. The availability time depends on the complexity of the processing and the availability of auxiliary data. Delivery time ranges from 2 business days to 4 weeks.

3.2   PRODUCT STRUCTURE

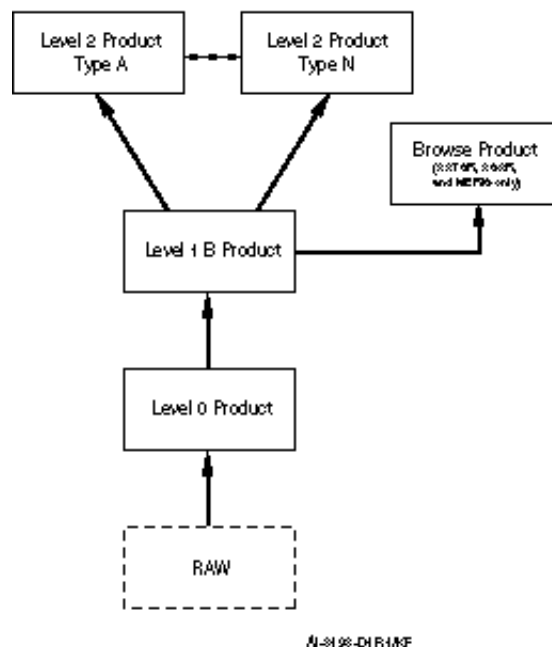All products will follow the same basic structure. This structure consists of the following parts.

1. The Main Product Header (MPH). The MPH is in ASCII format and contains information which is common to all ENVISAT instruments.

2. A Specific Product Header (SPH). The SPH is in ASCII format and contains information which describes the specific product as a whole. It will vary between instruments and between different products for each instrument. The SPH also contains Data Set Descriptors (DSDs). DSDs are used to point to and describe the various Data Sets which make up a product.

3. One or more Data Sets (DSs). Data Sets are in mixed-binary format and each consist of one or more Data Set Records (DSRs).

More details regarding the product structures are given in Volume 5.

3.3   PRODUCT CLASSES

Products are developed from the raw instrument data in several stages. The four major stages are termed Raw, Level 0, Level 1B, and Level 2. The evolution of the products is shown in the product tree of Figure 3.3-1. In addition, a Browse product is also defined for imaging sensors. The general qualities of each product type is explained briefly in the following subsections.

Figure 3.3-1   The Generalized Product Tree

3.3.1 Raw Data

Raw data is recorded from the X and Ka band demodulator output interfaces and stored on High-Density Data Tapes (HDDTs). The Raw Data is not considered a product, and its structure is not defined in this document.

3.3.2 Level 0

The Level 0 product is the lowest level product in the ENVISAT PDS. A comprehensive description of the Level 0 products is provided in Volume 6.

3.3.3 Level 1B

Level 1B products are geolocated engineering foundation products in which data has been converted to engineering units, auxiliary data has been separated from measurements, and selected calibrations have been applied to the data. These products are the foundation from which higher level products are derived.

The Level 0 product is transformed into a Level 1B Product by application of algorithms and calibration data to form a baseline "engineering product". The Level 1B product may be based on the whole of the source Level 0 product, or only a selected set of instrument packets from within the Level 0 product, based on a time range or other selection criteria.

The Level 1B product may have different levels of consolidation, from Unconsolidated to fully Consolidated.

3.3.3.1 Unconsolidated

This is the Level 1B produced in NRT using available NRT auxiliary data (i.e. may not be most precise orbit vectors or calibration information)

3.3.3.2 Fully Consolidated

This product has been produced off-line using the most precise auxiliary information available. It contains no overlapping data or data gaps except where the instrument has been turned off. It is compiled to respect the defined product

boundaries (e.g., ascending node to ascending node at the equator for full orbit products).

3.3.3.3 Partially Consolidated

A partially consolidated product is one that has been consolidated in all ways except that it does not use the most precise auxiliary data possible to perform processing. Since several different levels of accuracy exist for auxiliary data (e.g., 5 possible orbit state vector sources) varying levels of consolidation may exist for a product.

3.3.4 Level 2

The Level 2 product is a geolocated geophysical product.

The Level 1B product is transformed into one or more Level 2 Products through higher-level processing to convert engineering units into geophysical quantities and to form a more directly interpretable and useful measurement data set.

The general rule for product structure will be that NRT and off-line versions of Level 2 products will share the same structure, the only difference will be that the off-line product will be of better quality due to the fact that it may use more accurate (fully consolidated) data during production than for the NRT product, and that the start and stop times of the data may be different to reflect consolidation of the data to standardized portions of the orbit. Level 2 products may be processed systematically or upon user request. They may be unconsolidated, partially consolidated or fully consolidated in the same manner as for Level 1B products.

3.3.5 Browse

Browse products are produced for AATSR, ASAR and MERIS. They are severely decimated images which can be ordered from the ENVISAT inventory. These products are very small to support electronic transmission while querying the catalogues. They may be further reduced in size through the use of standardized data compression algorithms.

Browse products will be generated systematically for MERIS, AATSR and ASAR. A browse product will contain image lines derived from a data segment (up to a full orbit of data).

The user will view the browse product to assist in ordering the required products by displaying scenes starting anywhere in the browse product.

3.4   GLOBAL AND REGIONAL COVERAGE

Depending upon the instrument and operating mode, ENVISAT products may be either Global or Regional. A global product contains coverage for the entire length of an orbit. A regional product may only cover a specific segment of an orbit.

3.5   AUXILIARY DATA

Auxiliary data is defined as all other data required for the processing of a product which is not part of the primary measurement data received from the instrument while in the nominal measurement mode. Auxiliary data may come from the satellite itself, sources external to the PDS, or be created by instrument processing facilities within the PDS.

3.6   GEOLOCATION AND GEOCODING

Geolocation information is provided in the product header in the form of latitude and longitude information that allow the user to determine the area covered by the data from a simple inspection of the header. For image data, a geolocation grid may also be provided as an attachment to the product to allow for precise pixel geolocation.

Some image products may also be *geocoded*, which is the process of resampling the data to conform to a standard map projection with known coordinates.

3.7   PRODUCT CONFIDENCE DATA

Product Confidence Data provides an evaluation of the overall quality of the product. As such, it is an *evaluation* of the product statistics as reported by various equipment and processors in the processing chain. Product confidence data is thus best represented by evaluating product statistics against predetermined thresholds to

determine if the product meets the minimum quality requirements defined by the thresholds. If a product does not measure up to the predefined quality level, the error threshold is exceeded and a flag is set.

PCD data is designed to demonstrate whether the product has met certain minimum quality standards. As such it should be differentiated from mere processing statistics. For example, a processing statistic might be the percentage of pixels in an image which are corrupted. A PCD flag would only be set if the number of bad pixels exceeded a pre-defined threshold (e.g., 10%).

Product Confidence Data may be located in the MPH, the SPH, and/or within a specific Annotation Data Set attached to a product. A signed character is used at the start of each MDSR in a Data Set to indicate the quality of the DSR (for Level 1B and Level 2 products only, if needed). The value of -1 is reserved to indicate that the DSR is blank.

The thresholds used when evaluating PCD information are stored in the processor configuration files for each processor which generates products.

3.8   CALIBRATION

Calibration data is classified as auxiliary data within the PDS.

Internal calibration data, contained within the instrument source packet, is used during the product generation process. The internal calibration information is generated by the instrument itself during the nominal measurement mode, or as part of a dedicated calibration mode.

External calibration data, generated by on-ground or orbit calibration activities, is also used during the product generation process. The external calibration data are measured, on ground, before launch, or in orbit during the commissioning phase or during periodic calibration activities.

3.9   PRODUCT EXTRACTION

The PDS user will have the ability to extract "child" products from a larger "parent" product (usually a full orbit). The child product, when extracted, will follow the same data format as the parent product.

Child products must be extracted as an integer number of "granules." A granule is defined as the smallest subset into which a product may be divided. The size of granules will be product and instrument specific.

3.9.1 User Access

Users will query the Inventory data base for availability of products based on time window and geographic location constraints.

Users may order:

- Any of the currently archived product files in total,

- Or, a portion of product segment, extracted from one or more archived products, starting at user defined location and including a segment size (in increments of the smallest defined product size) up to the maximum defined product size,

- Or, a new product requiring processing of data from level 0.

3.9.2 Floating Scene Concept

The floating scene concept is intended to provide a high level of flexibility to the user in selecting desired image data segments. It applies to both global and regional products of AATSR, ASAR, and MERIS:

- For products processed systematically in a single strip (stripline processing), the user can select the position of a scene anywhere along the acquired data segment. The scene width is the instrument swath. The along track length of a scene is sensor dependent. This selected scene is extracted from a parent product already processed and archived. This applies to the following products: ASA_GM1_1P, ASA_IMM_1P, ASA_APM_1P, ASA_WSM_1P, MERIS Reduced Resolution, and AATSR products.

- ASAR Image Mode and Alternating Polarization Mode precision products are processed on request on a floating scene basis. The width of the scene is determined by the swath width (between 56 and 100 km), and the along track length is 100 km. The user may select the location of scene within an acquired data segment without any framing constraints like in ERS by specifying a start time or geographic position of the scene.

- MERIS full resolution products are processed on request on a floating scene basis. The user may select the position of the scene (nominally 575 by 575 km or 287.5 x 287.5 km) within the swath (nominally 1150 km) by entering the requested image center coordinates.

3.10   PROCESSED PRODUCT SIZES AND COVERAGE

The Maximum Size of any product will be the smallest of:

- Data from a full orbit (100 minutes + potentially 10%, depending on OBR tape dump and specific acquisition downlink timing),

- Or, data from maximum continuous processed instrument/mode on-time (e.g. ASAR-stripline (IM, AP, and WS modes) = 10 minutes),

- Or, the amount of data to fill a 2 Gbyte file, (in order to use standard UNIX file system capabilities. This limitation may be adjusted or removed as extended file sizes are fully supported). If the amount of data is greater than 2 GBytes, the product is contained in multiple files, each no larger than 2 GB and each having its own MPH and SPH.

The Minimum Coverage of any product will be[1]:

- The size of scene specified by ESA for selected imagery sensors (nominal sizes specified):

    - ASAR IM/AP   100 km   *   56 km[2],
    - ASAR WS or GM   400 km   *   400 km,
    - MERIS FR   575 km   *   575 km or
                                287.5 km *   287.5 km
    - MERIS RR   1150 km *   1150 km,
    - AATSR   512 km   *   512 km,

- Or, the size of a granule, for global products with inherent granularity,

- Or, a single data set record, when there is no other inherent minimum size.

Estimates of product sizes can be found in the sections corresponding to individual instruments.

---

1. in the case of floating scene distributed products, the minimum size is specified as the scene size
2. may be larger (up to 100 km) for different swath choices

DISTRIBUTION LIST

NAME	COPY	NAME	COPY
I. MCLEOD	X	THOMSON-CSF	1X
GEO-INFO LIBRARY	X		