



BIOMASS Processing Suite ICD

INTERFACE CONTROL DOCUMENT



biomass

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1. Introduction

1.1. Context

BIOMASS is ESA's 7th Earth Explorer mission. The purpose of the BIOMASS is to reduce the uncertainty in the worldwide spatial distribution and dynamics of forest biomass in order to improve current assessments and future projections of the global carbon cycle. This objective will be achieved by the implementation of a P-band SAR mission, providing global maps of forest biomass stocks, forest disturbance and growth.

The BIOMASS mission will also provide 3D views of forests through the “tomographic” phase and will also support additional science needs arising from the opportunity to explore the Earth for the first time with a P-band SAR system from space offering the possibility to “see” below the vegetated areas and in beneath bare soil or icy regions.

To achieve its challenging objectives, the BIOMASS mission requires a specific data processing strategy that combines different technologies at different processing level in order to generate the final Above Ground Biomass global map.

1.2. Scope of the document

The purpose of this document is to provide the “Interface Control Document (ICD)” for the BIOMASS Processing Suite (BPS) project.

This document is organized as follows:

- Section 2: BPS system and interfaces overview;
- Section 3: BPS processors and tasks;
- Section 4: L1 Processor ICD;
- Section 5: Stack Processor ICD;
- Section 6: L2a Processor ICD;
- Section 7: L2b Processor ICD;
- Section 8: L3 Processor ICD;
- Section 9: L1 Framing Processor ICD.

1.3. Acronyms

Acronym	Description
AD	Applicable Document
AGB	Above Ground Biomass
ARESIS	Advanced Remote Sensing and Systems

Acronym	Description
BPS	BIOMASS Processing Suite
DEM	Digital Elevation Model
DGM	Detected Ground-range Multi-looked
ESA	European Space Agency
FA	Forest Assembly
FD	Forest Disturbance
FH	Forest Height
ICD	Interface Control Document
INT	Interferometric Phase
L0	Level-0 product
L1a	Level-1a product
L1b	Level-1b product
L1c	Level-1c product
L1M	Level-1 Monitoring product
L1S	Level-1 Standard product
L2a	Level-2a product
L2b	Level-2b product
L3	Level-3 product
PARC	Polarimetric Active Radar Calibrator
PF	Processing Facility
PFD	Product Format Specification Document
RD	Reference Document
RXO	RX-Only product
SAR	Synthetic Aperture Radar
SCS	Single-look Complex Slant-range
STA	Coregistered Stack
TBD	To Be Defined
TBC	To Be Confirmed
TOM	Tomographic Phase

1.4. Symbols and Variables

Acronym	Description
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Acronym	Description
/	/

1.5. Applicable documents

- [AD1] [CPF_IPF_ICD] ESA-EOPG-EEGS-ID-0092, BIOMASS CPF-Processor ICD, I/R 2/0
- [AD2] ESA-EOPG-EEGS-ID-0083, Generic Processor ICD, I/R 1/3
- [AD3] [MPH] BIO-ESA-EOPG-EEGS-TN-0051, BIOMASS Products – Main Product Header Definition, I/R 2/4

1.6. Reference documents

- [RD1] [BPS_IODD] BPS Processors Input and Output Data Definition, I/R 3/0/2
- [RD2] [BPS_SDD] BPS Design Document, I/R 3/2
- [RD3] [BPS_L1_PFD] BIOMASS L1a/b/c Products Format Specification, I/R ½/5
- [RD4] [BPS_PPD] BIOMASS Product Performance Description, I/R 3/0
- [RD5] [BPS_AUX_FMT] BPS Auxiliary Product Format, I/R 3/2
- [RD6] BIO-ESA-EOPG-EEGS-TN-0046, BIOMASS Production Model, I/R ¾
- [RD7] [BPS_SUM] BPS Software User Manual, I/R 2/1/2

2. BPS Interfaces Overview

2.1. BPS system overview

The BIOMASS Processing Suite (BPS) is in charge of processing BIOMASS Level-0 data up to Level-3, generating a wide set of products. Product generation scheme is depicted in the following two figures respectively for TOM phase and for INT phase. The processing foresees the following steps:

- **L1 Processing:** the BIOMASS image formation step, taking in input 1 L0 slice and generating in output $N \geq 1$ L1 frames;
- **Stack Processing:** the coregistration and stacking processing step that will define the required 7-images Tomographic stacks or the 3-images Interferometric stacks. It includes stack phase calibration;
- **L2a Processing:** processing step for each stack that provides the inputs to the further products Tile Generation performed by the L2b processors. For one global cycle the number of stacks varies mainly with latitude, approximately from a minimum of two at the Equator (ascending/descending) to about six at higher latitudes (three ascending/descending pairs);
- **L2b Processing:** processing that aggregates all the stack-based L2a products insisting on the same location on ground (Tile) in the same time interval and generates a single BIOMASS L2b product. A different number of stacks may be available for each DGG tile, based on tile dimensions and swath coverage (which is not related to DGG tiling pattern);
- **L3 Processing:** consolidation processing removing discontinuities in L2b products.

An additional processing tool is provided as part of BPS, i.e., the **L1 Framing** one, which is in charge of computing the L1 frames start and stop times needed to trigger the L1 processing step.

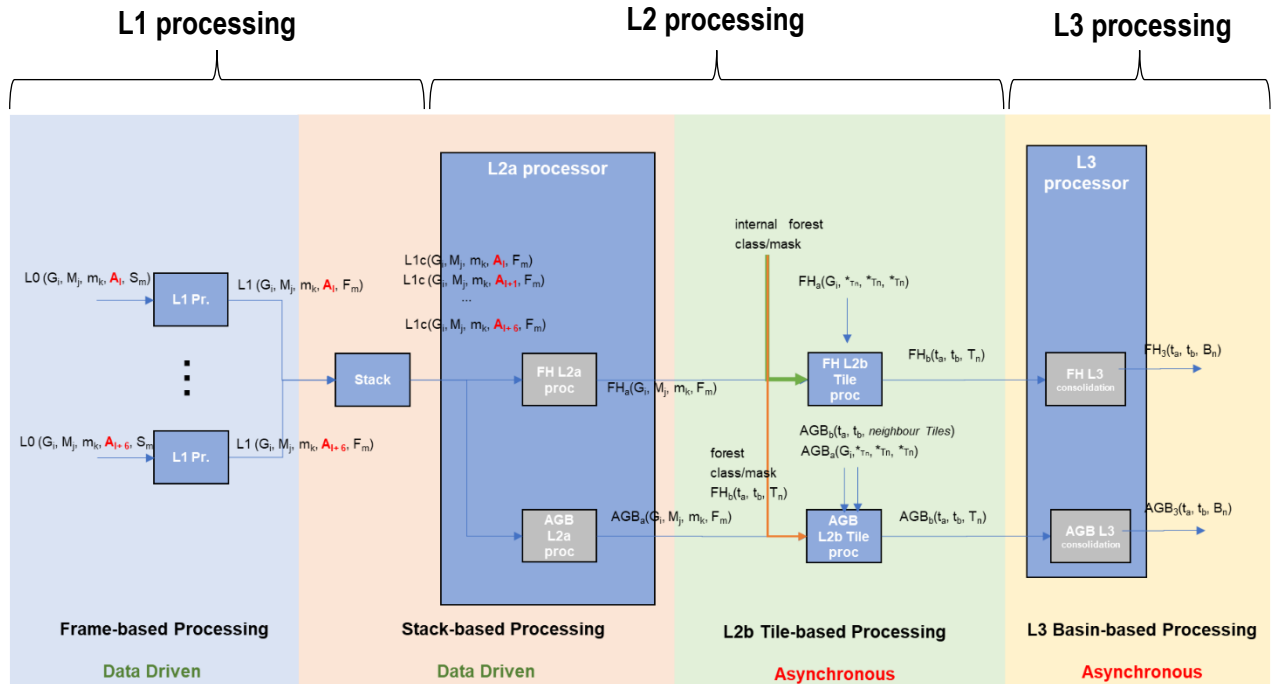


Fig.1 Biomass high-level processing scheme from L0 data to L3 products, TOM phase.

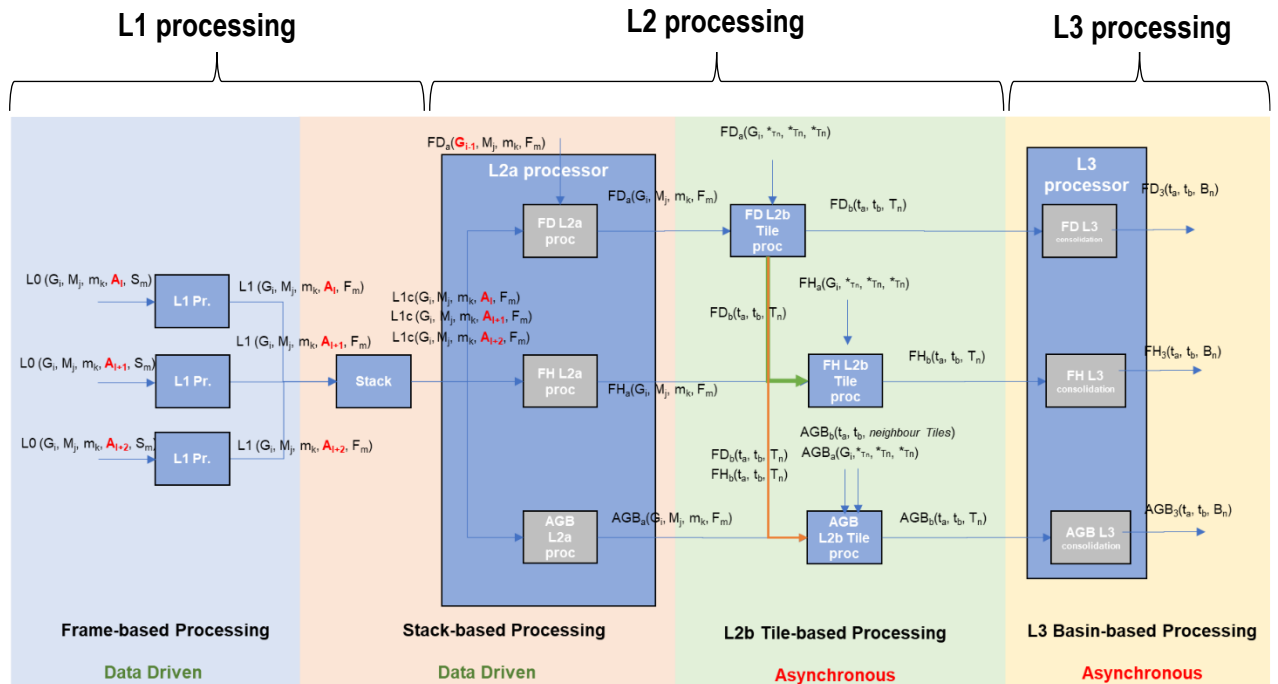


Fig.2 Biomass high-level processing scheme from L0 data to L3 products, INT phase.

NOTE: Regarding stack images cardinality, their number can vary (not always 3 or 7) due to contingency reasons and it can go up to 8 in TOM phase.

NOTE: Regarding AGB, the nomenclature AGB L2a (AGB_a) indicates the processing unit and flow, whereas the product for AGB flow at L2a is the ground cancelled product (GN) [RD6].

2.2. Data, Auxiliary Files and Control interfaces

The scope of the current document is to define the interfaces of each BPS processing step, with particular focus on the definition of the rules for a proper interaction between BPS and its orchestrator, the Processing Facility (PF).

BPS processing steps interfaces can be classified in three main categories:

- **Data interfaces:** these include the BPS official products, from L1 up to L3. Detailed description of such products is reported in [RD1] and in [RD4];
- **Auxiliary Products interfaces:** these include all the auxiliary information required to properly perform the BPS processing, e.g., orbit and attitude information, processing parameters, support databases, ... Detailed description of such files is reported in [RD1];
- **Control interfaces:** these are the interfaces used by PF to orchestrate BPS processing. Detailed description of such files is reported in [AD1] and in [AD2], while their tailoring for BPS is the main scope of the current document. The list includes:
 - **Processor Task Table:** the Task Table specifies the Processor structure (list of Tasks), the list of input/output of each Task and the hardware resources for each Task. There is one Processor Task Table for each Processor;
 - **Job Order:** the Job Order contains the set of input files to the Processor, a specification of the output product types and other processing parameters. A Job Order file can contain specifications for one or more Tasks of the same Processor;
 - **Logging:** each Task must log processing events according to a specific logging syntax and the logging level(s) specified in the Job Order;
 - **Exit Code:** the Exit Code of the processors is used to convey processing success/warnings/failure information to the Processing Facility;
 - **Product Metadata:** the Product Metadata consists in a file containing all the input needed by the PF to inventory the Product generated by the processor;
 - **Product Metadata Mapping:** this interface specifies how to retrieve product's metadata from the file containing them.

A specific note is required for **Auxiliary Products interfaces**: these interfaces are considered dynamic, i.e., updated on a regularly basis, and are provided in input to the Processor through the Job Order file, as part of its list of inputs. These interfaces are described in this document and also in [RD1] and [RD5]. This kind of interfaces differs from **Internal Resources** ones: in this case they are considered static (or updated on-demand upon specific conditions) and they can be shared by various Processors (provided together with them or made available to them). For this reason, they are provided in input to the

Processor again through the Job Order file, but as part of its list of configuration files. These interfaces are only briefly mentioned in this document and then described in details in [RD1].

For what concern the structure of this document, Sec. 3 is aimed at defining the BPS Processors and Tasks, while Sec. from 4 to 9 provide the detailed description of each BPS Processors control interfaces.

3. BPS Design: Processors & Tasks

Following the functional structure presented in Sec. 2 and the applicable guidelines defined in [AD1] and [AD2], the BPS system has been organized in the following set of processors:

- **L1 Processor (L1);**
- **Stack Processor (STA);**
- **L2a Processor (L2A);**
- **L2b Processor (L2B);**
- **L3 Processor (L3);**
- **L1 Framing Processor (L1F).**

Each processor has then been split into one or more tasks, following again the definition in [AD2] and trying to find the proper trade-off between modularity and complexity.

The following table lists all the BPS processors and the corresponding tasks, providing a brief description for each of them.

Processor	Task ID	Task Name	Description
L1 Processor (L1)	L1_P	L1 Standard Processing	Generates 1 L1a products (one frame, both standard and monitoring) and (optionally, default on) 1 L1b products (standard) starting from 1 L0 product (one slice, both standard and monitoring)
	L1_RXO_P	L1 RX-Only Processing	Generates 1 L1a products (one frame, only standard) starting from 1 L0 RX-Only product (one slice, only standard)
Stack Processor (STA)	STA_P	Stack Processing	Generates A (3 for INT phase, 7 for TOM phase, by default) L1c products (both standard and monitoring) starting from A L1a products (standard)
L2a Processor (L2A)	L2A_P	L2a Processing	Generates 1 L2a product per type (FD, FH and GN) starting from A L1c products (3 for INT phase, 7 for TOM phase, by default) and (optionally) 1 L2a FD product of previous global cycle
L2b Processor (L2B)	L2B_FD_P	L2b FD Processing	Generates 1 L2b FD product starting from TD L2a FD products acquired over the same tile NOTE: Valid only for INT phase
	L2B_FH_P	L2b FH Processing	Generates 1 L2b FH product starting from TD L2a FH products acquired over the same tile and (only for INT phase) the corresponding 1 L2b FD product

			NOTE: for TOM phase, FD optional input is replaced by an internal map
	L2B_AGB_P	L2b AGB Processing	Generates TI L2b AGB products from: - TD L2a AGB products acquired over the same tile and over surrounding ones (at the second iteration only) TT L2b AGB products acquired over surrounding tiles (only for INT phase) the corresponding TT L2b FD products NOTE: for TOM phase, FD optional input is replaced by an internal map
L3 Processor (L3)	L3_P	L3 Processing	Generates 2 L3 products per tile (one FH and one AGB) starting from TE L2b AGB, FH and FD products.
L1 Framing Processor (L1)	L1F_P	L1 Framing Processing	Generates F L1 Virtual Frame products (1 per frame) starting from 1 L0 product (one slice, both standard and monitoring)

Tab.1 BPS tasks list.

In order to complete the overall picture, the following table summarizes all the BPS tasks and the corresponding inputs and outputs.

The scope of this table is not to provide exhaustive information for each task (which is the scope of the following sections of the document), but to provide an overview of the main data flows inside BPS and of the relationships between BPS processors and tasks.

Task ID	Inputs	Card.	Origin	Outputs	Card.	Destination
L1_P	Sx_RAW__0S	1	/	Sx_SCS__1S	1	STA_P
	Sx_RAW__0M	1	/	Sx_SCS__1M	1	/
				Sx_DGM__1S	0..1	/
				Sx_SCS__1S	0, 4	/
L1_RXO_P	RO_RAW__0S	1	/	RO_SCS__1S	1	/
STA_P	Sx_SCS__1S	2..A	L1_P	Sx_STA__1S	2..A	L2A_P
				Sx_STA__1M	2..A	/

L2A_P	Sx_STA__1S	2..A	STA_P	FP_FD__L2A	0, 1	L2A_P, L2B_FD_P
	FP_FD__L2A	0, 1	L2A_P	FP_FH__L2A	0, 1	L2B_FH_P
				FP_GN__L2A	0, 1	L2B_AGB_P
L2B_FD_P	FP_FD__L2A	TD	L2A_P	FP_FD__L2B	1	L2B_FH_P, L2B_AGB_P, L3_P
L2B_FH_P	FP_FH__L2A	TD	L2A_P	FP_FH__L2B	1	L2B_AGB_P, L3_P
	FP_FD__L2B	0, 1	L2B_FD_P			
L2B_AGB_P	FP_GN__L2A	TD	L2A_P	FP_AGB_L2B	TI	L2B_AGB_P, L3_P
	FP_FD__L2B	0, TT	L2B_FD_P			
	FP_AGB_L2B	0, TT	L2B_AGB_P			
L3_P	FP_FD__L2B	TE	L2B_FD_P	FP_FD__L3T	0, B	/
	FP_FH__L2B	TE	L2B_FH_P	FP_FH__L3T	1	/
	FP_AGB_L2B	TE	L2B_AGB_P	FP_AGB_L3T	1	/
L1F_P	Sx_RAW__0S	1	/	CPF_L1VFRA	F	/
	Sx_RAW__0M	1	/			

Tab.2 BPS tasks inputs and outputs (only data interfaces) and relationships between tasks. Detailed symbols explanation is reported in Sec. 3.1.

The described workflow is in line with high-level production model sequence diagram described in [RD6] and here below reported just for convenience. As visible, the tasks define in Tab.2 have a one-to-one mapping with the columns of the sequence diagram, making it immediate how they have to be orchestrated to generate the various Biomass products, from L1 up to L3.

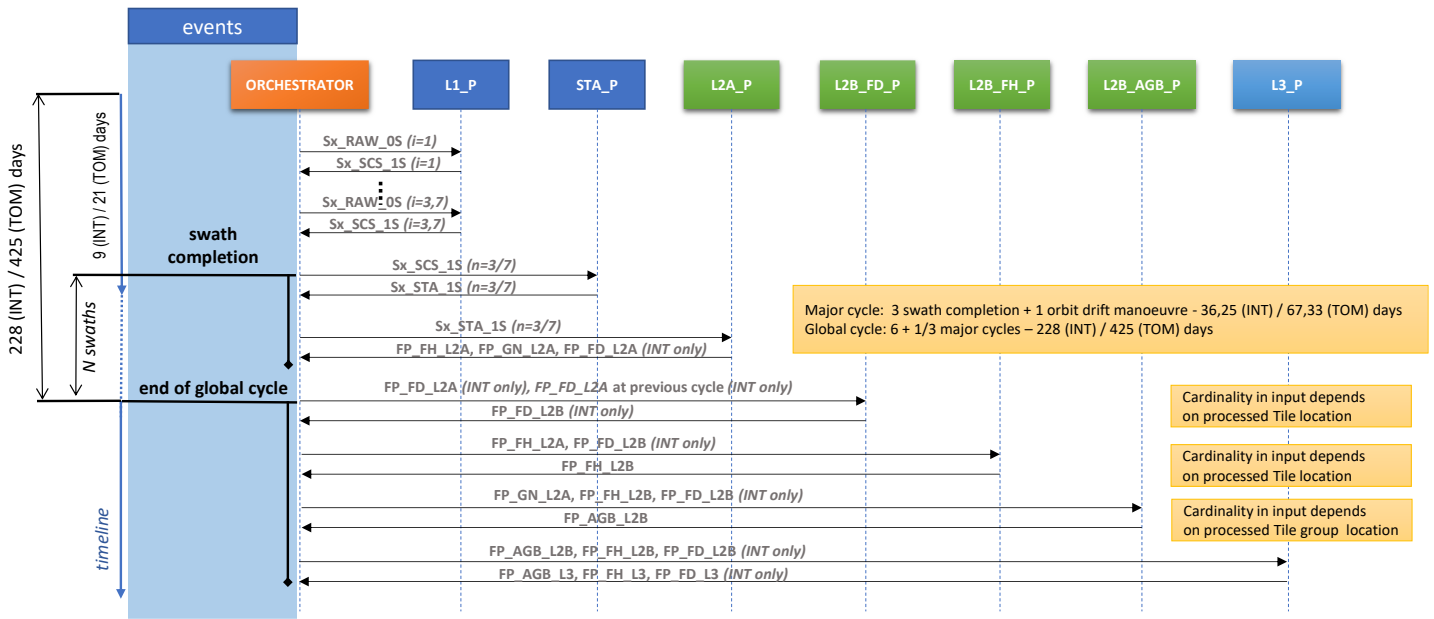


Fig.3 Biomass high-level production model sequence diagram.

3.1. Processors ICD guidelines and conventions

In the following sections the various BPS processors and tasks control interfaces are described.

In particular, for what concern the Task Tables, dedicated tables and figures are used, showing each task inputs/outputs and the rules to select/generate them. Here below adopted templates are reported.

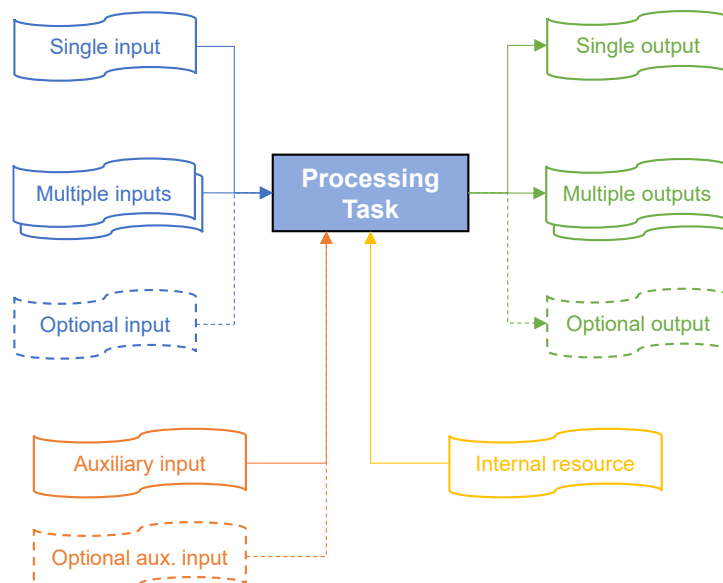


Fig.4 Generic task interfaces.

Product Type	Description	Card.	Origin	Instances	Start / Stop Offset	Overlap / Min Overlap	Metadata Names	Max. # of Files	Ordering

Product Type	Description	Card.	Dest.	Notes

Tab.3 Generic task input and output interfaces, respectively.

As visible, tables columns have a one-to-one mapping with Task Tables (and Job Orders) fields, as per [AD1] and [AD2]. In particular:

- Product Type → Task Table – File_Type element, child of Alternative_Type;
- Origin → Task Table – Origin element, child of Alternative_Type;
- Instances → Task Table – Instances element, child of Alternative_Type;
- Start / Stop Offset → Task Table – Start_Offset and Stop_Offset elements, children of Temporal_Parameters;
- Overlap / Min Overlap → Task Table – Overlap and Min_Overlap elements, children of Temporal_Parameters;
- Metadata Names → Task Table – Metadata_Name element, child of List_of_Metadata_Name;
- Max. # of Files → Task Table – Max_Number_of_Files element, child of Alternative_Type;
- Ordering → Task Table – Ordering element, child of Alternative_Type;
- Dest. → Task Table – Destination element, child of Output.

Throughout the whole document the following symbols and notations are adopted to fill these tables:

- Product Type legend:
 - Sx: BIOMASS beams, i.e., S1, S2, S3;
 - c: BIOMASS scattering responses, i.e., 1 (for Gt1), 2 (for Gt2), X, Y;
- Cardinalities legend:
 - F: number of L1 frames in a L0 slice;
 - A: number of images in a stack, i.e., 3 for Interferometric (INT) Phase, 7 for Tomographic (TOM) Phase (by default);
 - T: number of stacks per tile (which is latitude dependent);
 - TT (total), TB (boundary), TI (inside): number of L2a/L2b products over current and surrounding tiles (see Sec. 7 for more details);
 - TE: number of existing L2b product over current tiles. L3 processor take in input TE AGB,FH and FD L2b products;
 - B: number of tiles in a basin;
 - x, y: cardinality is x *or* y (if x=0 the input is optional and not mandatory);

- x..y: cardinality is *any number between* x and y (if x=0 the input is optional and not mandatory).

In addition it has to be noted that in the following the term “intermediate outputs” will be used with a direct reference to the tag present in Task Tables and Job Orders.

4. L1 Processor ICD

4.1. Processor Task Table and Job Order

As described in Sec. 3, L1 Processor is composed by two tasks, i.e.:

- **L1_P, L1 Standard Processing:** generates 1 L1a products (one frame, both standard and monitoring) and (optionally, default on) 1 L1b products (standard) starting from 1 L0 product (one slice, both standard and monitoring);
- **L1_RXO_P, L1 RX-Only Processing:** generates 1 L1a products (one frame, only standard) starting from 1 L0 RX-Only product (one slice, only standard).

In the following sub-sections details about these tasks inputs and outputs are provided, as well as precise rules used to define the corresponding Task Tables.

NOTE: PARC_INFO_ and Sx_SCS_1S are included respectively in the input and output interfaces of L1_P. However, they are not meant for an orchestrated production and for this reason, they will not be mentioned in the L1_P Task Tables.

4.1.1. L1 Standard Processing (L1_P)

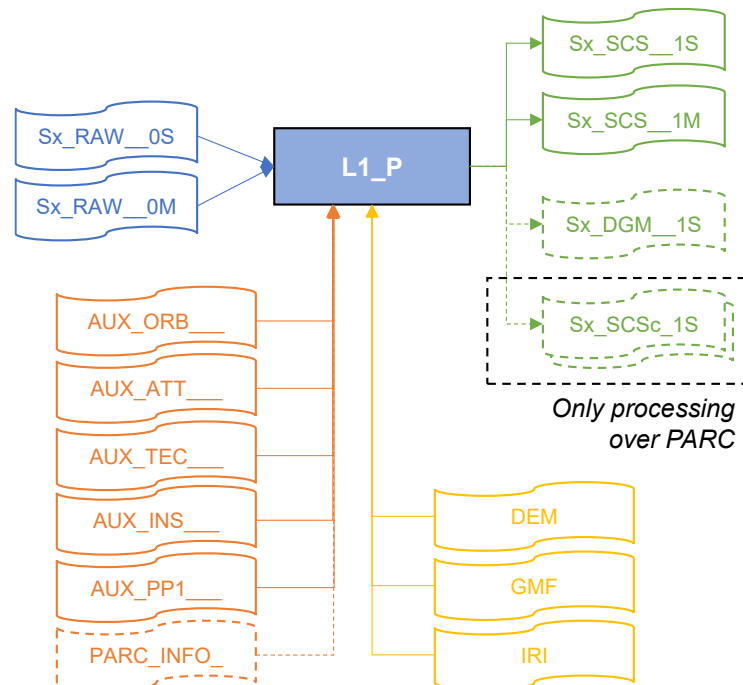


Fig.5 L1 Processor, L1 Standard Processing task interfaces.

4.1.1.1. Inputs

Product Type	Description	Card.	Origin	Instances	Start / Stop Offset	Overlap / Min Overlap	Metadata Names	Max. # of Files	Ordering
Sx_RAW__0S	Stripmap Level-0 – Standard product	1	External	Single	0 / 0	Yes / 100	/	1	Latest
Sx_RAW__0M	Stripmap Level-0 – Monitoring product	1	External	Single	0 / 0	Yes / 100	/	1	MaxTemporalOverlap, Latest
AUX_ORB__	Auxiliary Orbit	1	External	Single	0 / 0	Yes / 100	/	1	MaxTemporalOverlap, ClosestStart
AUX_ATT__	Auxiliary Attitude	1	External	Single	0 / 0	Yes / 100	/	1	MaxTemporalOverlap, ClosestStart
AUX_TEC__	Auxiliary TEC Map	1, 2	External	Single	0 / 0	Yes / 0	/	2	MaxTemporalOverlap, ClosestStart
AUX_INS__	Auxiliary Instrument Parameters	1	External	Single	0 / 0	Yes / 100	/	1	MaxTemporalOverlap, ClosestStart
AUX_PP1__	Auxiliary L1 Processing Parameters	1	External	Single	0 / 0	Yes / 100	/	1	MaxTemporalOverlap, ClosestStart
PARC_INFO_	Auxiliary Calibration Site Information	0, 1	External	Single	0 / 0	Yes / 100	/	1	MaxTemporalOverlap, ClosestStart

Tab.4 L1 Processor, L1 Standard Processing task input interfaces.

4.1.1.2. Outputs

Product Type	Description	Card.	Dest.	Notes
Sx_SCS__1S	Stripmap L1 SCS – Standard product	1	External (STA_P)	Collected by PF and used as input by Stack processor STA_P task
Sx_SCS__1M	Stripmap L1 SCS – Monitoring product	1	External	Collected by PF, but not used by other BPS tasks
Sx_DGM__1S	Stripmap L1 DGM – Standard product	0..1	External	Collected by PF, but not used by other BPS tasks Generated by default
Sx_SCS_1S	Stripmap L1 SCS Calibration – Standard product	0, 4	External	Collected by PF, but not used by other BPS tasks Generated only if PARC_INFO_ product is provided in input and only in case of processing of data acquired over PARC

Tab.5 L1 Processor, L1 Standard Processing task output interfaces.

4.1.1.3. Processing Parameters

Parameter Name	Description	Default Value
frame_id	This parameter is used to pass to the L1 Processor the absolute frame index of the frame to be generated. It is expressed as a string of 3 digits zero padded, starting from 1 (it cannot assume value equal to 0). Sample values: '001', '010', '100'; In case no framing is performed (i.e., the entire LOS slice shall be processed), this parameter is equal to '___'. It has to be noted that this parameter is used just for annotation purposes. Framing strategy is commanded directly via timing parameters provided in the Job Order (i.e., TOI/Start and TOI/Stop parameters).	Absolute frame index (string)
frame_status	Frame status. Allowed values are: - NOMINAL: if the L1 frame length is the nominal one i.e., aligned to the grid step and overlap defined in [RD6] - MERGED: if the L1 frame is resulting from the merging of a "short" frame with the contiguous one, according to the merging rules defined in [RD6] - PARTIAL: if the L1 frame length is not nominal, but it is not merged to a contiguous one since it is "long enough" according to the rules defined in [RD6] - INCOMPLETE: if the L1 frame length is not nominal due to contingency (e.g., data loss), according to the contingency cases management defined in [RD6] - NOT_FRAMED: the L1 product is not framed, i.e., as long as input LOS It has to be noted that this parameter is used just for annotation purposes. Framing strategy is commanded directly via timing parameters provided in the Job Order (i.e., TOI/Start and TOI/Stop parameters).	NOMINAL
range_start_time	Time coordinates defining the slant-range extent of input L0 data being processed (in [s]).	(Not specified)
range_stop_time	L0 azimuth portion is specified via TOI/Start and TOI/Stop parameters (see frame_id description). If not specified, the whole range extent of the input data is processed.	(Not specified)
rfi_mitigation_flag	Flag to activate RFI detection and mitigation step (True if it has to be performed, False otherwise). If specified, this parameter overrides the homonymous one in AUX_PP1___ input Auxiliary Product.	(Not specified)

Tab.6 L1 Processor, L1 Standard Processing task processing parameters.

4.1.1.4. Configuration Files

Through this section of the Task Table / Job Order the internal resources used by the L1 Processor are passed. In particular, their mounting point is indicated. The internal resources for the L1 Processor include:

- Digital Elevation Model (DEM) database;
- Geomagnetic Field (GMF) database;
- IRI data (IRI) database.

The detailed description is reported in [RD1].

4.1.1.5. Intermediate Outputs

The complete list of intermediate outputs is described in [RD2]. In the Task Table and Job Order a single entry is used to indicate the folder containing all the L1 Processor intermediate outputs.

Intermediate Output ID	Filename
IntermediateDataDir	intermediates

Tab.7 L1 Processor, L1 Standard Processing task intermediate outputs.

4.1.1.6. Exit Codes

The complete list of exit codes, being in common to all the tasks of the processor, is reported in Sec. 4.4.

4.1.2. L1 RX-Only Processing (L1_RXO_P)

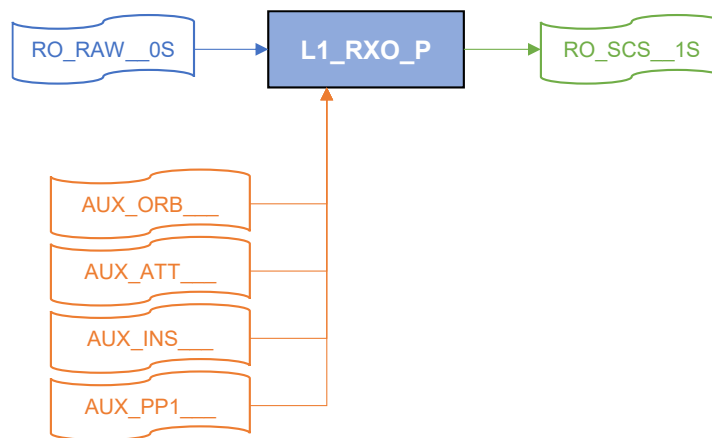


Fig.6 L1 Processor, L1 RX-Only Processing task interfaces.

4.1.2.1. Inputs

Product Type	Description	Card.	Origin	Instances	Start / Stop Offset	Overlap / Min Overlap	Metadata Names	Max. # of Files	Ordering
RO_RAW__0S	RX-Only Mode Level-0 – Standard product	1	External	Single	0 / 0	Yes / 100	/	1	Latest
AUX_ORB__	Auxiliary Orbit	1	External	Single	0 / 0	Yes / 100	/	1	MaxTemporalOverlap,

									ClosestStart
AUX_ATT__	Auxiliary Attitude	1	External	Single	0 / 0	Yes / 100	/	1	MaxTemporalOverlap, ClosestStart
AUX_INS__	Auxiliary Instrument Parameters	1	External	Single	0 / 0	Yes / 100	/	1	MaxTemporalOverlap, ClosestStart
AUX_PP1__	Auxiliary L1 Processing Parameters	1	External	Single	0 / 0	Yes / 100	/	1	MaxTemporalOverlap, ClosestStart

Tab.8 L1 Processor, L1 RX-Only Processing task input interfaces.

4.1.2.2. Outputs

Product Type	Description	Card.	Dest.	Notes
RO_SCS__1S	RX-Only Mode L1 SCS – Standard product	1	External	Collected by PF, but not used by other BPS tasks

Tab.9 L1 Processor, L1 RX-Only Processing task output interfaces.

4.1.2.3. Processing Parameters

Parameter Name	Description	Default Value
frame_id	See Sec. 4.1.1.3	Absolute frame index (string)
frame_status	See Sec. 4.1.1.3	NOMINAL

Tab.10 L1 Processor, L1 RX-Only Processing task processing parameters.

4.1.2.4. Configuration Files

No internal resources are foreseen for the L1 RX-Only Processor.

4.1.2.5. Intermediate Outputs

The complete list of intermediate outputs is described in [RD2]. See Sec. 4.1.1.5 for more details.

4.1.2.6. Exit Codes

The complete list of exit codes, being in common to all the tasks of the processor, is reported in Sec. 4.4.

4.2. Configuration Files

Through this section of the Task Table / Job Order the internal resources used by the L1 Processor tasks are passed. In particular, their mounting point is indicated. The internal resources for the L1 Processor tasks are listed in the corresponding tasks sections.

4.3. Logging

The processor implements the logging format described in [AD1].

In addition to this and in order to ease debugging and troubleshooting, the processor also stores all the log messages in a text file created into the working directory (see [RD2] for its complete structure).

The complete list of log messages, classified per type (debug/information/warning/error), is reported in [RD7].

4.4. Exit Code

The processor customizes the exit codes policy described in [AD1] as summarized in the following table.

Value	Mnemonic	Description
0	OK	The task execution was successfully completed.
128	FAILURE	Error exit code. The task is considered failed.

Tab.11 L1 Processor Exit Codes.

The complete list of exit codes is reported also in [RD7].

4.5. Product Metadata and Product Metadata Mapping

It is assumed that Product Metadata is the Main Product Header (MPH) file included in each L1 product generated by the processor.

The Product Metadata Mapping provides the rules on how to extract the information required by PF from MPH file. The list includes at least the following parameters, for which a mapping with MPH fields is provided according to [AD3]

Product Metadata Mapping Field	Link to Main Product Header Field
ProcessorName	/bio:EarthObservation/eop:metaDataProperty/bio:EarthObservationMetaData/eop:processing/bio:ProcessingInformation/eop:processorName
ProcessorVersion	/bio:EarthObservation/eop:metaDataProperty/bio:EarthObservationMetaData/eop:processing/bio:ProcessingInformation/eop:processorVersion
FileName	/bio:EarthObservation/eop:metaDataProperty/bio:EarthObservationMetaData/eop:identifier
FileClass	/bio:EarthObservation/eop:metaDataProperty/bio:EarthObservationMetaData/eop:processing/bio:ProcessingInformation/eop:processingMode
FileType	/bio:EarthObservation/eop:metaDataProperty/bio:EarthObservationMetaData/eop:productType
Baseline	/bio:EarthObservation/om:result/eop:EarthObservationResult/eop:product[1]/bio:ProductInformation/eop:version
ValidityStart	/bio:EarthObservation/om:validTime/gml:TimePeriod/gml:beginPosition
ValidityStop	/bio:EarthObservation/om:validTime/gml:TimePeriod/gml:endPosition
CreationDate	/bio:EarthObservation/eop:metaDataProperty/bio:EarthObservationMetaData/eop:processing/bio:ProcessingInformation/eop:processingDate
Geometry	/bio:EarthObservation/om:featureOfInterest/eop:Footprint/eop:multiExtentOf/gml:MultiSurface/gml:surfaceMember/gml:Polygon/gml:exterior/gml:LinearRing/gml:posList
Mission	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:platform/eop:platform/eop:shortName
DataTakeID	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:acquisitionParameters/bio:Acquisition/bio:dataTakeID
MissionPhase	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:acquisitionParameters/bio:Acquisition/bio:missionPhase
GlobalCoverageID	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:acquisitionParameters/bio:Acquisition/bio:globalCoverageID
MajorCycleID	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:acquisitionParameters/bio:Acquisition/bio:majorCycleID
RepeatCycleID	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:acquisitionParameters/bio:Acquisition/bio:repeatCycleID
SwathIdentifier	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:sensor/eop:Sensor/eop:swathIdentifier
TrackNumber	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:acquisitionParameters/bio:Acquisition/eop:wrsLongitudeGrid
FrameNumber	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:acquisitionParameters/bio:Acquisition/eop:wrsLatitudeGrid

Tab.12L1 Processor Product Metadata Mapping.

5. Stack Processor ICD

As described in Sec. 3, Stack Processor is composed by one task, i.e.:

- **STA_P, Stack Processing:** generates A (3 for INT phase, 7 for TOM phase, by default) L1c products (both standard and monitoring) starting from A L1a products (standard).

In the following sub-section details about this task inputs and outputs are provided, as well as precise rules used to define the corresponding Task Table.

5.1. Processor Task Table and Job Order

5.1.1. Stack Processing (STA_P)

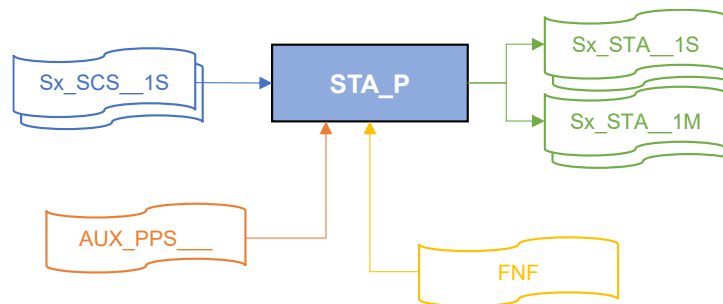


Fig.7 Stack Processor, Stack Processing task interfaces.

5.1.1.1. Inputs

Product Type	Description	Card.	Origin	Instances	Start / Stop Offset	Overlap / Min Overlap	Metadata Names	Max. # of Files	Ordering
Sx_SCS__1S	Stripmap Level-1 – SCS product	2..A	External (L1_P)	Single	-	-	Mission Phase Global Cycle Identifier Major Cycle Identifier Swath Identifier Track Number Frame Number *	8	Latest

AUX_PPS__	Auxiliary Stack Processing Parameters	1	External	Single	0 / 0	Yes / 100	/	1	MaxTemporalOverlap, ClosestStart
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** Mission Phase et al.: these parameters shall be taken from Sx_SCS__1S products MPH file and they shall be used to filter all the products in the selected processing time interval having the same mission phase, etc...*

Tab.13 Stack Processor, Stack Processing task input interfaces.

5.1.1.2. Outputs

Product Type	Description	Card.	Dest.	Notes
Sx_STA__1S	Stripmap L1 Coregistered stack – Standard product	2..A	External (L2A_P)	Collected by PF and used as input by L2a processor L2A_P task
Sx_STA__1M	Stripmap L1 Coregistered stack – Monitoring product	2..A	External	Collected by PF, but not used by other BPS tasks

Tab.14 Stack Processor, Stack Processing task output interfaces.

5.1.1.3. Processing Parameters

Parameter Name	Description	Default Value
primary_image	Name of input L1 product to be selected as primary image in the coregistration. If not specified, the primary image is automatically selected by the processor.	(Not specified)
calibration_primary_image	Name of input L1 product to be selected as primary image in the multi-baseline calibration steps. If not specified, the calibration primary image is automatically selected by the processor.	(Not specified)
range_start_time	Time coordinates defining the range portion of input L1 frame to be processed (in [s]).	(Not specified)
range_stop_time	Azimuth portion, if needed, is specified via TOI/Start and TOI/Stop parameters. If not specified, the whole range extent of the input L1 frame is processed.	(Not specified)

Tab.15 Stack Processor, Stack Processing task processing parameters.

5.1.1.4. Configuration Files

The configuration files, being in common to all the tasks of the processor, are described in Sec. 5.2.

5.1.1.5. Intermediate Outputs

The complete list of intermediate outputs is described in [RD2]. In the Task Table and Job Order a single entry is used to indicate the folder containing all the Stack Processor intermediate outputs.

Intermediate Output ID	Filename
IntermediateDataDir	intermediates

Tab.16 Stack Processor, Stack Processing task intermediate outputs.

5.1.1.6. Exit Codes

The complete list of exit codes, being in common to all the tasks of the processor, is reported in Sec. 5.4.

5.2. Configuration Files

Through this section of the Task Table / Job Order the internal resources used by the Stack Processor are passed. In particular, their mounting point is indicated. The internal resources for the Stack Processor include:

- Forest/Non-Forest mask (FNF) database.

The detailed description is reported in [RD1].

5.3. Logging

The processor implements the logging format described in [AD1].

In addition to this and in order to ease debugging and troubleshooting, the processor also stores all the log messages in a text file created into the working directory (see [RD2] for its complete structure).

The complete list of log messages, classified per type (debug/information/warning/error), is reported in [RD7].

5.4. Exit Code

The processor customizes the exit codes policy described in [AD1] as summarized in the following table.

Value	Mnemonic	Description
0	OK	The task execution was successfully completed.
128	FAILURE	Error exit code. The task is considered failed.

Tab.17 Stack Processor Exit Codes.

The complete list of exit codes is reported also in [RD7].

5.5. Product Metadata and Product Metadata Mapping

It is assumed that Product Metadata is the Main Product Header (MPH) file included in each Coregistered stack product generated by the processor.

The Product Metadata Mapping provides the rules on how to extract the information required by PF from MPH file. The list includes at least the following parameters, for which a mapping with MPH fields is provided according to [AD3].

Product Metadata Mapping Field	Link to Main Product Header Field
ProcessorName	/bio:EarthObservation/eop:metaDataProperty/bio:EarthObservationMetaData/eop:processing/bio:ProcessingInformation/eop:processorName
ProcessorVersion	/bio:EarthObservation/eop:metaDataProperty/bio:EarthObservationMetaData/eop:processing/bio:ProcessingInformation/eop:processorVersion
FileName	/bio:EarthObservation/eop:metaDataProperty/bio:EarthObservationMetaData/eop:identifier
FileClass	/bio:EarthObservation/eop:metaDataProperty/bio:EarthObservationMetaData/eop:processing/bio:ProcessingInformation/eop:processingMode
FileType	/bio:EarthObservation/eop:metaDataProperty/bio:EarthObservationMetaData/eop:productType
Baseline	/bio:EarthObservation/om:result/eop:EarthObservationResult/eop:product[1]/bio:ProductInformation/eop:version
ValidityStart	/bio:EarthObservation/om:validTime/gml:TimePeriod/gml:beginPosition
ValidityStop	/bio:EarthObservation/om:validTime/gml:TimePeriod/gml:endPosition
CreationDate	/bio:EarthObservation/eop:metaDataProperty/bio:EarthObservationMetaData/eop:processing/bio:ProcessingInformation/eop:processingDate
Geometry	/bio:EarthObservation/om:featureOfInterest/eop:Footprint/eop:multiExtentOf/gml:MultiSurface/gml:surfaceMember/gml:Polygon/gml:exterior/gml:LinearRing/gml:posList
Mission	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:platform/eop:platform/eop:shortName
DataTakeID	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:acquisitionParameters/bio:Acquisition/bio:dataTakeID

MissionPhase	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:acquisitionParameters/bio:Acquisition/bio:missionPhase
GlobalCoverageID	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:acquisitionParameters/bio:Acquisition/bio:globalCoverageID
MajorCycleID	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:acquisitionParameters/bio:Acquisition/bio:majorCycleID
RepeatCycleID	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:acquisitionParameters/bio:Acquisition/bio:repeatCycleID
SwathIdentifier	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:sensor/eop:Sensor/eop:swathIdentifier
TrackNumber	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:acquisitionParameters/bio:Acquisition/eop:wrsLongitudeGrid
FrameNumber	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:acquisitionParameters/bio:Acquisition/eop:wrsLatitudeGrid
TileIdentifier	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:acquisitionParameters/bio:Acquisition/bio:tileID

Tab.18 Stack Processor Product Metadata Mapping.

6. L2a Processor ICD

As described in Sec. 3, L2a Processor is composed by one task, i.e.:

- **L2A_P, L2a Processing:** generates 1 L2a product per type (FD, FH and GN) starting from A L1c products (3 for INT phase, 7 for TOM phase, by default) and (optionally) 1 L2a FD product of previous global cycle.

In the following sub-section details about this task inputs and outputs are provided, as well as precise rules used to define the corresponding Task Table.

NOTE: For what concern L2A_P, four versions of its Task Table will be generated, i.e.:

- *one for the nominal production scenario, where the three L2A output products (FD, FH and GN) are all generated;*
- *three for the reprocessing scenario, each one generating just one single L2A output product.*

At orchestration level, this simplifies the management of the L2A processor outputs according to the current Production Model.

6.1. Processor Task Table and Job Order

6.1.1. L2a Processing (L2A_P)

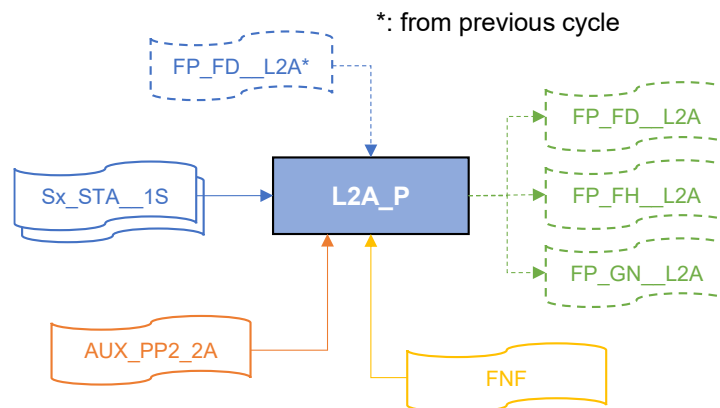


Fig.8 L2a Processor, L2a Processing task interfaces.

6.1.1.1. Inputs

Product Type	Description	Card.	Origin	Instances	Start / Stop Offset	Overlap / Min Overlap	Metadata Names	Max. # of Files	Ordering
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Sx_STA__1S	Stripmap Level-1 – Coregistered stack product	2..A	External (STA_P)	Single	-	-	Mission Phase Global Cycle Identifier Major Cycle Identifier Swath Identifier Track Number Frame Number *	8	Latest
FP_FD__L2A	L2a Forest Disturbance product	0, 1	External (L2A_P)	Single	-	-	Mission Phase Global Cycle Identifier Major Cycle Identifier Swath Identifier Track Number Frame Number *	1	Latest
AUX_PP2_2A	Auxiliary L2a Processing Parameters	1	External	Single	0 / 0	Yes / 100	/	1	MaxTemporalOverlap, ClosestStart

** Mission Phase et al.: these parameters shall be taken from Sx_STA__1S products MPH file and they shall be used to filter all the products in the selected processing time interval having the same mission phase, etc...*

Tab.19L2a Processor, L2a Processing task input interfaces.

6.1.1.2. Outputs

Product Type	Description	Card.	Dest.	Notes
FP_FD__L2A	L2a Forest Disturbance product	0, 1	External (L2A_P) External (L2B_FD_P)	Collected by PF and used as input by L2a processor L2A_P task and by L2b processor L2B_FD_P task Generated by default (in INT phase, while optional in TOM phase)
FP_FH__L2A	L2a Forest Height product	0, 1	External (L2B_FH_P)	Collected by PF and used as input by L2b processor L2B_FH_P task Generated by default

FP_GN__L2A	L2a Ground Cancelled product	0, 1	External (L2B_AGB_P)	Collected by PF and used as input by L2b processor L2B_AGB_P task Generated by default
------------	---------------------------------	------	-------------------------	--

Tab.20 L2a Processor, L2a Processing task output interfaces.

6.1.1.3. Processing Parameters

Parameter Name	Description	Default Value
-	-	-

Tab.21 L2a Processor, L2a Processing task processing parameters.

6.1.1.4. Configuration Files

The configuration files, being in common to all the tasks of the processor, are described in Sec. 6.2.

6.1.1.5. Intermediate Outputs

No intermediate outputs are foreseen for L2a Processor.

6.1.1.6. Exit Codes

The complete list of exit codes, being in common to all the tasks of the processor, is reported in Sec. 6.4.

6.2. Configuration Files

Through this section of the Task Table / Job Order the internal resources used by the L2a Processor are passed. In particular, their mounting point is indicated. The internal resources for the L2a Processor include:

- Forest/Non-Forest mask (FNF) database.

The detailed description is reported in [RD1].

6.3. Logging

The processor implements the logging format described in [AD1].

In addition to this and in order to ease debugging and troubleshooting, the processor also stores all the log messages in a text file created into the working directory.

The complete list of log messages, classified per type (debug/information/warning/error), is reported in [RD7].

6.4. Exit Code

The processor customizes the exit codes policy described in [AD1] as summarized in the following table.

Value	Mnemonic	Description
0	OK	The task execution was successfully completed.
128	FAILURE	Error exit code. The task is considered failed.

Tab.22L2a Processor Exit Codes.

The complete list of exit codes is reported also in [RD7].

6.5. Product Metadata and Product Metadata Mapping

It is assumed that Product Metadata is the Main Product Header (MPH) file included in each product generated by the processor.

The Product Metadata Mapping provides the rules on how to extract the information required by PF from MPH file. The list includes at least the following parameters, for which a mapping with MPH fields is provided according to [AD3].

Product Metadata Mapping Field	Link to Main Product Header Field
ProcessorName	/bio:EarthObservation/eop:metaDataProperty/bio:EarthObservationMetaData/eop:processing/bio:ProcessingInformation/eop:processorName
ProcessorVersion	/bio:EarthObservation/eop:metaDataProperty/bio:EarthObservationMetaData/eop:processing/bio:ProcessingInformation/eop:processorVersion
FileName	/bio:EarthObservation/eop:metaDataProperty/bio:EarthObservationMetaData/eop:identifier
FileClass	/bio:EarthObservation/eop:metaDataProperty/bio:EarthObservationMetaData/eop:processing/bio:ProcessingInformation/eop:processingMode
FileType	/bio:EarthObservation/eop:metaDataProperty/bio:EarthObservationMetaData/eop:productType
Baseline	/bio:EarthObservation/om:result/eop:EarthObservationResult/eop:product[1]/bio:ProductInformation/eop:version
ValidityStart	/bio:EarthObservation/om:validTime/gml:TimePeriod/gml:beginPosition
ValidityStop	/bio:EarthObservation/om:validTime/gml:TimePeriod/gml:endPosition

CreationDate	/bio:EarthObservation/eop:metaDataProperty/bio:EarthObservationMetaData/eop:processing/bio:ProcessingInformation/eop:processingDate
Geometry	/bio:EarthObservation/om:featureOfInterest/eop:Footprint/eop:multiExtentOf/gml:MultiSurface/gml:surfaceMember/gml:Polygon/gml:exterior/gml:LinearRing/gml:posList
Mission	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:platform/eop:platform/eop:shortName
DataTakeID	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:acquisitionParameters/bio:Acquisition/bio:dataTakeID
MissionPhase	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:acquisitionParameters/bio:Acquisition/bio:missionPhase
GlobalCoverageID	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:acquisitionParameters/bio:Acquisition/bio:globalCoverageID
MajorCycleID	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:acquisitionParameters/bio:Acquisition/bio:majorCycleID
RepeatCycleID	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:acquisitionParameters/bio:Acquisition/bio:repeatCycleID
SwathIdentifier	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:sensor/eop:Sensor/eop:swathIdentifier
TrackNumber	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:acquisitionParameters/bio:Acquisition/eop:wrsLongitudeGrid
FrameNumber	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:acquisitionParameters/bio:Acquisition/eop:wrsLatitudeGrid
TileIdentifier	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:acquisitionParameters/bio:Acquisition/bio:tileID

Tab.23L2a Processor Product Metadata Mapping.

7. L2b Processor ICD

As described in Sec. 3, L2b Processor is composed by three tasks, i.e.:

- **L2B_FD_P, L2b FD Processing:** generates 1 L2b FD product starting from TD L2a FD products acquired over the same tile (only for INT phase);
- **L2B_FH_P, L2b FH Processing:** generates 1 L2b FH product starting from TD L2a FH products acquired over the same tile and (only for INT phase) the corresponding 1 L2b FD product;
- **L2B_AGB_P, L2b AGB Processing:** generates TI=9 L2b AGB products from TD L2a AGB products acquired over the same tiles and over surrounding ones, (optionally, except for the first run) TT=25 L2b AGB products acquired over surrounding tiles and (only for INT phase) the corresponding TT=25 L2b FD products.

In the following sub-sections details about these tasks inputs and outputs are provided, as well as precise rules used to define the corresponding Task Tables.

NOTE: For what concern L2B_FH_P, two versions of its Task Table will be generated, one with the FP_FD__L2B input mandatory and one without it. At orchestration level, this simplifies the management of the optional FP_FD__L2B input according to the current Production Model.

NOTE: For what concern L2B_AGB_P, four versions of its Task Table will be generated, the first couple to be used during first iteration:

- *with and without the FP_FD__L2B input, without FP_AGB_L2B;*

the second couple to be used during the second iteration:

- *with and without the FP_FD__L2B input, with FP_AGB_L2B.*

At orchestration level, this simplifies the management of the optional inputs according to the current Production Model.

7.1. Processor Task Table and Job Order

7.1.1. L2b FD Processing (L2B_FD_P)

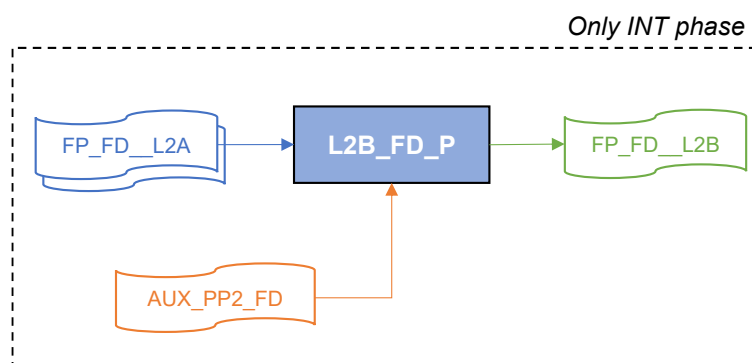


Fig.9 L2b Processor, L2b FD Processing task interfaces.

7.1.1.1. Inputs

Product Type	Description	Card.	Origin	Instances	Start / Stop Offset	Overlap / Min Overlap	Metadata Names	Max. # of Files	Ordering
FP_FD__L2A	L2a Forest Disturbance product	TD	External (L2A_P)	Single	0 / 0	Yes / 100	Mission Phase Global Cycle Identifier Tile Identifier *	N.D.	Latest
AUX_PP2_FD	Auxiliary L2b FD Processing Parameters	1	External	Single	0 / 0	Yes / 100	/	1	MaxTemporalOverlap, ClosestStart

* Mission Phase et al.: these parameters shall be taken from FP_FD__L2A products MPH file and they shall be used to filter all the products in the selected processing time interval having the same mission phase, etc...

Tab.24L2b Processor, L2b FD Processing task input interfaces.

7.1.1.2. Outputs

Product Type	Description	Card.	Dest.	Notes
FP_FD__L2B	L2b Forest Disturbance product	1	External (L2B_FH_P, L2B_AGB_P) External (L3_P)	Collected by PF and used as input by L2b processor L2B_FH_P and L2B_AGB_P tasks and by L3 processor L3_P task

Tab.25L2b Processor, L2b FD Processing task output interfaces.

7.1.1.3. Processing Parameters

Parameter Name	Description	Default Value
tile_id	This parameter is used to pass to the L2b Processor the absolute tile index of the tile to be generated. It is expressed as a string of 7 chars expressed as NxxEyyy. Sample value: 'N01E100'. It has to be noted that this parameter is used both to trigger processing on the desired tile and for annotation purposes.	Absolute tile index (string)

Tab.26L2b Processor, L2b FD Processing task processing parameters.

7.1.1.4. Configuration Files

No internal resources are foreseen for the L2b FD Processor.

7.1.1.5. Intermediate Outputs

No intermediate outputs are foreseen for L2b FD Processor.

7.1.1.6. Exit Codes

The complete list of exit codes, being in common to all the tasks of the processor, is reported in Sec. 7.4.

7.1.2. L2b FH Processing (L2B_FH_P)

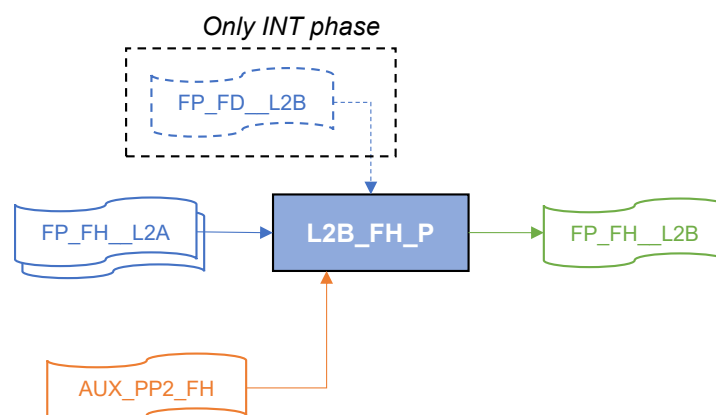


Fig.10 L2b Processor, L2b FH Processing task interfaces.

7.1.2.1. Inputs

Product Type	Description	Card.	Origin	Instances	Start / Stop Offset	Overlap / Min Overlap	Metadata Names	Max. # of Files	Ordering
FP_FH__L2A	L2a Forest Height product	TD	External (L2A_P)	Single	0 / 0	Yes / 100	Mission Phase Global Cycle Identifier Tile Identifier *	N.D.	Latest
FP_FD__L2B	L2b Forest Disturbance product	0, 1	External (L2B_FD_P)	Single	0 / 0	Yes / 100	Mission Phase Global Cycle Identifier Tile Identifier *	1	Latest
AUX_PP2_FH	Auxiliary L2b FH Processing Parameters	1	External	Single	0 / 0	Yes / 100	/	1	MaxTemporalOverlap, ClosestStart

* Mission Phase et al.: these parameters shall be taken from FP_FH__L2A and FP_FD__L2B products MPH file and they shall be used to filter all the products in the selected processing time interval having the same mission phase, etc...

Tab.27 L2b Processor, L2b FH Processing task input interfaces.

7.1.2.2. Outputs

Product Type	Description	Card.	Dest.	Notes
FP_FH__L2B	L2b Forest Height product	1	External (L2B_AGB_P) External (L3_P)	Collected by PF and used as input by L2b processor L2B_AGB_P task and by L3 processor L3_P task

Tab.28 L2b Processor, L2b FH Processing task output interfaces.

7.1.2.3. Processing Parameters

Parameter Name	Description	Default Value
tile_id	This parameter is used to pass to the L2b Processor the absolute tile index of the tile to be generated. It is expressed as a string of 7 chars expressed as NxxEyyy. Sample value: 'N01E100'. It has to be noted that this parameter is used both to trigger processing on	Absolute tile index (string)

the desired tile and for annotation purposes.

Tab.29 L2b Processor, L2b FH Processing task processing parameters.

7.1.2.4. Configuration Files

No internal resources are foreseen for the L2b FH Processor.

7.1.2.5. Intermediate Outputs

No intermediate outputs are foreseen for L2b FH Processor.

7.1.2.6. Exit Codes

The complete list of exit codes, being in common to all the tasks of the processor, is reported in Sec. 7.4.

7.1.3. L2b AGB Processing (L2B_AGB_P)

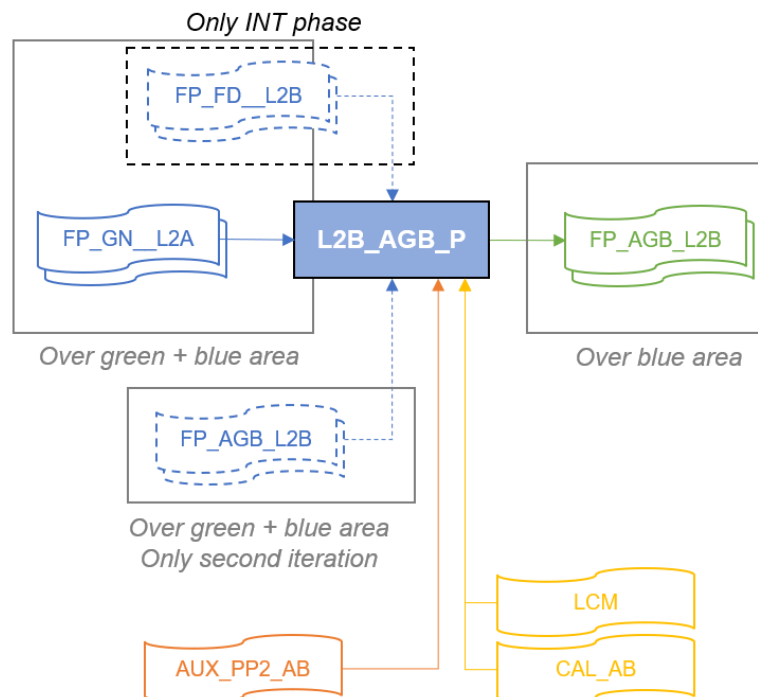




Fig.11 (top) L2b Processor, L2b AGB Processing task interfaces; (bottom) Graphical representation of DGG tiles, explaining “chromatic” input and output data selection policies.

7.1.3.1. Inputs

Product Type	Description	Card.	Origin	Instances	Start / Stop Offset	Overlap / Min Overlap	Metadata Names	Max. # of Files	Ordering
FP_GN_L2A	L2a Ground Cancelled product	TD	External (L2A_P)	Single	0 / 0	Yes / 100	Mission Phase Global Cycle Identifier Tile Identifier *	N.D.	Latest
FP_FD_L2B	L2b Forest Disturbance product	0, TT	External (L2B_FD_P)	Single	0 / 0	Yes / 100	Mission Phase Global Cycle Identifier Tile Identifier *	N.D.	Latest
FP_AGB_L2B	L2b Above Ground Biomass product	0, TT	External (L2B_AGB_P)	Single	0 / 0	Yes / 100	Mission Phase Global Cycle Identifier Tile Identifier *	N.D.	Latest
AUX_PP2_AB	Auxiliary L2b AB Processing Parameters	1	External	Single	0 / 0	Yes / 100	/	1	MaxTemporalOverlap, ClosestStart

** Mission Phase et al.: these parameters shall be taken from input products MPH file and they shall be used to filter all the products in the selected processing time interval having the same mission phase, etc... and a tile identifier in agreement with selection policy described in Fig.11 and in [RD6].*

Tab.30L2b Processor, L2b AGB Processing task input interfaces.

7.1.3.2. Outputs

Product Type	Description	Card.	Dest.	Notes
FP_AGB_L2B	L2b Above Ground Biomass product	TI	External (L2B_AGB_P) External (L3_P)	Collected by PF and used as input by L2b processor L2B_AGB_P task and by L3 processor L3_P task

Tab.31L2b Processor, L2b AGB Processing task output interfaces.

7.1.3.3. Processing Parameters

Parameter Name	Description	Default Value
central_tile_id	This parameter is used to pass to the L2b Processor the absolute tile index of the tile to be generated (central tile for both GB estimation area and AGB neighborhood, fig. 12) It is expressed as a string of 7 chars expressed as NxxEyyy. Sample value: 'N01E100'. It has to be noted that this parameter is used both to trigger processing on the desired tile and for annotation purposes.	Absolute tile index (string)

Tab.32L2b Processor, L2b AGB Processing task processing parameters.

7.1.3.4. Configuration Files

Through this section of the Task Table / Job Order the internal resources used by the L2b AGB Processor are passed. In particular, their mounting point is indicated. The internal resources for the L2b AGB Processor include:

- Land Cover Map (LCM) database;
- Reference AGB (CAL_AB) database.

The detailed description is reported in [RD1].

7.1.3.5. Intermediate Outputs

No intermediate outputs are foreseen for L2b AGB Processor.

7.1.3.6. Exit Codes

The complete list of exit codes, being in common to all the tasks of the processor, is reported in Sec. 7.4.

7.2. Configuration Files

Through this section of the Task Table / Job Order the internal resources used by the L2b Processor tasks are passed. In particular, their mounting point is indicated. The internal resources for the L2b Processor tasks are listed in the corresponding tasks sections.

7.3. Logging

The processor implements the logging format described in [AD1].

In addition to this and in order to ease debugging and troubleshooting, the processor also stores all the log messages in a text file created into the working directory.

The complete list of log messages, classified per type (debug/information/warning/error), is reported in [RD7].

7.4. Exit Code

The processor customizes the exit codes policy described in [AD1] as summarized in the following table.

Value	Mnemonic	Description
0	OK	The task execution was successfully completed.
128	FAILURE	Error exit code. The task is considered failed.

Tab.33L2b Processor Exit Codes.

The complete list of exit codes is reported also in [RD7].

7.5. Product Metadata and Product Metadata Mapping

It is assumed that Product Metadata is the Main Product Header (MPH) file included in each product generated by the processor.

The Product Metadata Mapping provides the rules on how to extract the information required by PF from MPH file. The list includes at least the following parameters, for which a mapping with MPH fields is provided according to [AD3].

Product Metadata Mapping Field	Link to Main Product Header Field
ProcessorName	/bio:EarthObservation/eop:metaDataProperty/bio:EarthObservationMetaData/eop:processing/bio:ProcessingInformation/eop:processorName
ProcessorVersion	/bio:EarthObservation/eop:metaDataProperty/bio:EarthObservationMetaData/eop:processing/bio:ProcessingInformation/eop:processorVersion
FileName	/bio:EarthObservation/eop:metaDataProperty/bio:EarthObservationMetaData/eop:identifier
FileClass	/bio:EarthObservation/eop:metaDataProperty/bio:EarthObservationMetaData/eop:processing/bio:ProcessingInformation/eop:processingMode
FileType	/bio:EarthObservation/eop:metaDataProperty/bio:EarthObservationMetaData/eop:productType
Baseline	/bio:EarthObservation/om:result/eop:EarthObservationResult/eop:product[1]/bio:ProductInformation/eop:version
ValidityStart	/bio:EarthObservation/om:validTime/gml:TimePeriod/gml:beginPosition
ValidityStop	/bio:EarthObservation/om:validTime/gml:TimePeriod/gml:endPosition
CreationDate	/bio:EarthObservation/eop:metaDataProperty/bio:EarthObservationMetaData/eop:processing/bio:ProcessingInformation/eop:processingDate
Geometry	/bio:EarthObservation/om:featureOfInterest/eop:Footprint/eop:multiExtentOf/gml:MultiSurface/gml:surfaceMember/gml:Polygon/gml:exterior/gml:LinearRing/gml:posList
Mission	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:platform/eop:platform/eop:shortName
DataTakeID	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:acquisitionParameters/bio:Acquisition/bio:dataTakeID
MissionPhase	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:acquisitionParameters/bio:Acquisition/bio:missionPhase
GlobalCoverageID	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:acquisitionParameters/bio:Acquisition/bio:globalCoverageID
MajorCycleID	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:acquisitionParameters/bio:Acquisition/bio:majorCycleID
RepeatCycleID	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:acquisitionParameters/bio:Acquisition/bio:repeatCycleID
SwathIdentifier	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:sensor/eop:Sensor/eop:swathIdentifier
TrackNumber	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:acquisitionParameters/bio:Acquisition/eop:wrsLongitudeGrid
FrameNumber	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:acquisitionParameters/bio:Acquisition/eop:wrsLatitudeGrid

TileIdentifier	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:acquisitionParameters/bio:Acquisition/bio:tileID
BasinIdentifier	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:acquisitionParameters/bio:Acquisition/bio:basinID
agbTileStatus	/bio:EarthObservation/eop:metaDataProperty/bio:EarthObservationMetaData/bio:agbTileStatus

Tab.34L2b Processor Product Metadata Mapping.

8. L3 Processor ICD

As described in Sec. 3, L3 Processor is composed by one task, i.e.:

L3_P, L3 Processing: generates 2 L3 products per tile (one FH and one AGB) starting from TE L2b products. In the following sub-section details about this task inputs and outputs are provided, as well as precise rules used to define the corresponding Task Table.

8.1. Processor Task Table and Job Order

8.1.1. L3 Processing (L3_P)

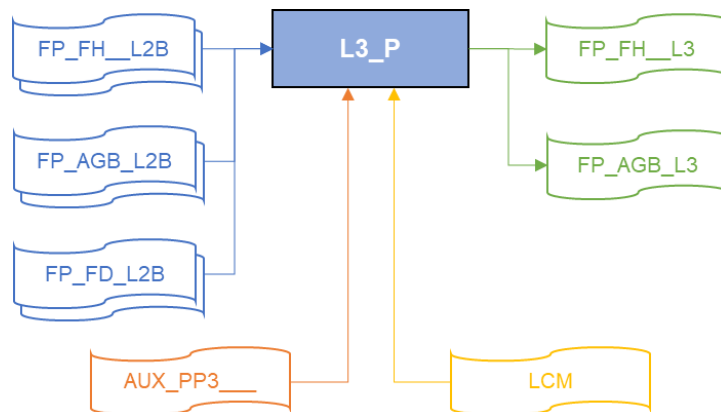


Fig.12 L3 Processor, L3 Processing task interfaces.

8.1.1.1. Inputs

Product Type	Description	Card.	Origin	Instances	Start / Stop Offset	Overlap / Min Overlap	Metadata Names	Max. # of Files	Ordering
FP_FH_L2B	L2b Forest Height product	TE	External (L2B_FH_P)	Single	0 / 0	Yes / 100	Mission Phase Global Cycle Identifier Tile index *	N.D.	Latest
FP_AGB_L2B	L2b Above Ground Biomass product	TE	External (L2B_AGB_P)	Single	0 / 0	Yes / 100	Mission Phase Global Cycle Identifier	N.D.	Latest

							Tile index *		
FP_FD_L2B	L2b Forest Disturbance product	TE	External (L2B_AGB_P)	Single	0 / 0	Yes / 100	Mission Phase Global Cycle Identifier Tile index *	N.D.	Latest
AUX_PP3__	Auxiliary L3 Processing Parameters	1	External	Single	0 / 0	Yes / 100	/	1	MaxTemporalOverlap, ClosestStart

** Mission Phase et al.: these parameters shall be taken from input products MPH file and they shall be used to filter all the products in the selected processing time interval having the same mission phase, etc...*

Tab.35L3 Processor, L3 Processing task input interfaces.

8.1.1.2. Outputs

Product Type	Description	Card.	Dest.	Notes
FP_FH_L3T	L3 Forest Height product	1	External	Collected by PF, but not used by other BPS tasks
FP_AGB_L3T	L3 Above Ground Biomass product	1	External	Collected by PF, but not used by other BPS tasks

Tab.36L3 Processor, L3 Processing task output interfaces.

8.1.1.3. Processing Parameters

No processing parameters are foreseen for the L3 Processor.

8.1.1.4. Configuration Files

The configuration files, being in common to all the tasks of the processor, are described in Sec. 8.2.

8.1.1.5. Intermediate Outputs

No intermediate outputs are foreseen for L3 Processor.

8.1.1.6. Exit Codes

The complete list of exit codes, being in common to all the tasks of the processor, is reported in Sec. 8.4.

8.2. Configuration Files

Through this section of the Task Table / Job Order the internal resources used by the L3 Processor are passed. In particular, their mounting point is indicated. The internal resources for the L3 Processor include:

- Land Cover Map input (LCM) database;

The detailed description is reported in [RD1].

8.3. Logging

The processor implements the logging format described in [AD1].

In addition to this and in order to ease debugging and troubleshooting, the processor also stores all the log messages in a text file created into the working directory.

The complete list of log messages, classified per type (debug/information/warning/error), is reported in [RD7].

8.4. Exit Code

The processor customizes the exit codes policy described in [AD1] as summarized in the following table.

Value	Mnemonic	Description
0	OK	The task execution was successfully completed.
128	FAILURE	Error exit code. The task is considered failed.

Tab.37 L3 Processor Exit Codes.

The complete list of exit codes is reported also in [RD7].

8.5. Product Metadata and Product Metadata Mapping

It is assumed that Product Metadata is the Main Product Header (MPH) file included in each product generated by the processor.

The Product Metadata Mapping provides the rules on how to extract the information required by PF from MPH file. The list includes at least the following parameters, for which a mapping with MPH fields is provided according to [AD3].

Product Metadata Mapping Field	Link to Main Product Header Field
ProcessorName	/bio:EarthObservation/eop:metaDataProperty/bio:EarthObservationMetaData/eop:processing/bio:ProcessingInformation/eop:processorName
ProcessorVersion	/bio:EarthObservation/eop:metaDataProperty/bio:EarthObservationMetaData/eop:processing/bio:ProcessingInformation/eop:processorVersion
FileName	/bio:EarthObservation/eop:metaDataProperty/bio:EarthObservationMetaData/eop:identifier
FileClass	/bio:EarthObservation/eop:metaDataProperty/bio:EarthObservationMetaData/eop:processing/bio:ProcessingInformation/eop:processingMode
FileType	/bio:EarthObservation/eop:metaDataProperty/bio:EarthObservationMetaData/eop:productType
Baseline	/bio:EarthObservation/om:result/eop:EarthObservationResult/eop:product[1]/bio:ProductInformation/eop:version
ValidityStart	/bio:EarthObservation/om:validTime/gml:TimePeriod/gml:beginPosition
ValidityStop	/bio:EarthObservation/om:validTime/gml:TimePeriod/gml:endPosition
CreationDate	/bio:EarthObservation/eop:metaDataProperty/bio:EarthObservationMetaData/eop:processing/bio:ProcessingInformation/eop:processingDate
Geometry	/bio:EarthObservation/om:featureOfInterest/eop:Footprint/eop:multiExtentOf/gml:MultiSurface/gml:surfaceMember/gml:Polygon/gml:exterior/gml:LinearRing/gml:posList
Mission	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:platform/eop:platform/eop:shortName
DataTakeID	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:acquisitionParameters/bio:Acquisition/bio:dataTakeID
MissionPhase	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:acquisitionParameters/bio:Acquisition/bio:missionPhase
GlobalCoverageID	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:acquisitionParameters/bio:Acquisition/bio:globalCoverageID
MajorCycleID	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:acquisitionParameters/bio:Acquisition/bio:majorCycleID
RepeatCycleID	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:acquisitionParameters/bio:Acquisition/bio:repeatCycleID
SwathIdentifier	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:sensor/eop:Sensor/eop:swathIdentifier
TrackNumber	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:acquisitionParameters/bio:Acquisition/eop:wrsLongitudeGrid
FrameNumber	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:acquisitionParameters/bio:Acquisition/eop:wrsLatitudeGrid
TileIdentifier	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:acquisitionParameters/bio:Acquisition/bio:tileID

BasinIdentifier	/bio:EarthObservation/om:procedure/eop:EarthObservationEquipment/eop:acquisitionParameters/bio:Acquisition/bio:basinID
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Tab.38L3 Processor Product Metadata Mapping.

9. L1 Framing Processor ICD

9.1. Processor Task Table and Job Order

As described in Sec. 3, L1 Framing Processor is composed by one task, i.e.:

- **L1F_P, L1 Framing Processing:** generates F L1 Virtual Frames products (1 per frame) starting from 1 L0 product (one slice, both standard and monitoring).

In the following sub-section details about this task inputs and outputs are provided, as well as precise rules used to define the corresponding Task Table.

9.1.1. L1 Framing Processing (L1F_P)

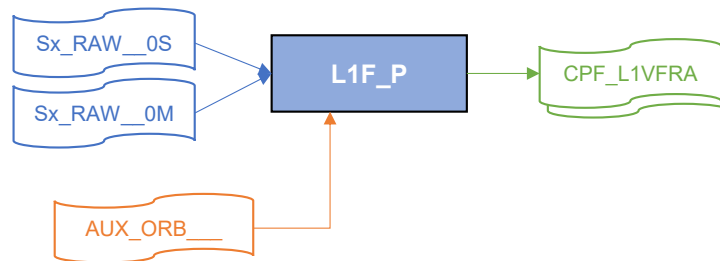


Fig.13 L1 Framing Processor, L1 Framing Processing task interfaces.

9.1.1.1. Inputs

Product Type	Description	Card.	Origin	Instances	Start / Stop Offset	Overlap / Min Overlap	Metadata Names	Max. # of Files	Ordering
Sx_RAW__OS	Stripmap Level-0 – Standard product	1	External	Single	0 / 0	Yes / 100	/	1	Latest
Sx_RAW__OM	Stripmap Level-0 – Monitoring product	1	External	Single	0 / 0	Yes / 100	/	1	MaxTemporalOverlap, Latest
AUX_ORB__	Auxiliary Orbit	1	External	Single	0 / 0	Yes / 100	/	1	MaxTemporalOverlap, ClosestStart

Tab.39 L1 Framing Processor, L1 Framing Processing task input interfaces.

9.1.1.2. Outputs

Product Type	Description	Card.	Dest.	Notes
CPF_L1VFRA	L1 Virtual Frame product	F	External	Collected by PF, but not used directly by other BPS tasks Used by PF to retrieve parameters needed to trigger L1_P task

Tab.40L1 Framing Processor, L1 Framing Processing task output interfaces.

9.1.1.3. Processing Parameters

No processing parameters are foreseen for L1 Framing Processor.

9.1.1.4. Configuration Files

The configuration files, being in common to all the tasks of the processor, are described in Sec. 9.2.

9.1.1.5. Intermediate Outputs

No intermediate outputs are foreseen for L1 Framing Processor.

9.1.1.6. Exit Codes

The complete list of exit codes, being in common to all the tasks of the processor, is reported in Sec. 9.4.

9.2. Configuration Files

No internal resources are foreseen for the L1 Framing Processor.

9.3. Logging

The processor implements the logging format described in [AD1].

In addition to this and in order to ease debugging and troubleshooting, the processor also stores all the log messages in a text file created into the working directory.

The complete list of log messages, classified per type (debug/information/warning/error), is reported in [RD7].

9.4. Exit Code

The processor customizes the exit codes policy described in [AD1] as summarized in the following table.

Value	Mnemonic	Description
0	OK	The task execution was successfully completed.
128	FAILURE	Error exit code. The task is considered failed.

Tab.41 L1 Framing Processor Exit Codes.

The complete list of exit codes is reported also in [RD7].

9.5. Product Metadata and Product Metadata Mapping

It is assumed that Product Metadata is the L1 Virtual Frame product itself.

The Product Metadata Mapping provides the rules on how to extract the information required by PF from this file. The list includes at least the following parameters, for which a mapping with L1 Virtual Frame product fields is provided.

Product Metadata Mapping Field	Link to Main Product Header Field
ProcessorName	/Earth_Explorer_File/Earth_Explorer_Header/Fixed_Header/Source/Creator
ProcessorVersion	/Earth_Explorer_File/Earth_Explorer_Header/Fixed_Header/Source/Creator_Version
FileName	/Earth_Explorer_File/Earth_Explorer_Header/Fixed_Header/File_Name
FileClass	/Earth_Explorer_File/Earth_Explorer_Header/Fixed_Header/File_Class
FileType	/Earth_Explorer_File/Earth_Explorer_Header/Fixed_Header/File_Type
Baseline	/Earth_Explorer_File/Earth_Explorer_Header/Fixed_Header/File_Version
ValidityStart	/Earth_Explorer_File/Data_Block/frame_start_time
ValidityStop	/Earth_Explorer_File/Data_Block/frame_stop_time
CreationDate	/Earth_Explorer_File/Earth_Explorer_Header/Fixed_Header/Source/Creation_Date
Mission	/Earth_Explorer_File/Earth_Explorer_Header/Fixed_Header/Mission
FrameNumber	/Earth_Explorer_File/Data_Block/frame_id
FrameStatus	/Earth_Explorer_File/Data_Block/frame_status

Tab.42 L1 Framing Processor Product Metadata Mapping.