CRYOSAT Ground Segment
Instrument Processing Facility

Baseline F Evolutions
[BAS-F-EVO]

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Document Signature Table

APPROVAL TABLE		
Date		
Name	**Function**	**Signature**
F. CARRIERO	EXPRIVIA Project Manager	
M. SCAGLIOLA	ESA Techinical Officer	
T. PARRINELLO	Cryosat Mission Manager	

CONTRACTOR TABLE				
	Name	**Function**	**Signature**	**Date**
Author	T. GEMINALE	System Engineer		14/03/2025
Quality Assurance	A. GIUSTINIANI	Project Quality and Conf. Control Officer		14/03/2025
Verification/Approval	F. CARRIERO	Project Manager		14/03/2025

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1 APPLICABLE AND REFERENCE DOCUMENTS

1.1 APPLICABLE DOCUMENTS

Document Title	Identifier	Reference
PDS IPF Generic Interface Guidelines Issue 2.2	CS-ID-ACS-GS-0001	[PROC-ICD]
CRYOSAT Ground Segment Payload Data Segment Level 1b Processor Interface Control Document	CS-ID-ACS-GS-0116	[L1b-ICD]
CRYOSAT Ground Segment Payload Data Segment Level 2 Processor Interface Control Document	CS-ID-ACS-GS-0117	[L2-ICD]
CRYOSAT Ground Segment Payload Data Segment Level-0 Products Specification Format	CS-ID-ACS-GS-0119	[L0-FMT]
Cryosat Instrument Processing Facility L1b Level 1b product Formats Specification	CS-RS-ACS-GS-5106	[PROD-FMT]
Cryosat Instrument Processing Facility Ocean CONFORM Product Formats Specification	C2-RS-ACS-ESL-5266	[PFS-OCE]
Cryosat Instrument Processing Facility L1b Ice L1b CONFORM Product Formats Specification	C2-RS-ACS-ESL-5264	[PFS-I-L1b]
Cryosat Instrument Processing Facility L1b Ice L2 CONFORM Product Formats Specification	C2-RS-ACS-ESL-5265	[PFS-I-L2]
[DPM] - IPF1 Detailed Processing Model	CS-TN-ACS-GS-5105	[DPM]
Cryosat IPF_STR_PROC: Detailed Processing Model	CS-DD-ARS-GS-5003	[STR-DPM]
CryoSat-2 Product Handbook BaselineF draftB	C2-LI-ACS-ESL-5319	[PH]

1.2 REFERENCE DOCUMENTS

Document Title	Identifier	Reference

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2 DEFINITIONS AND ABBREVIATIONS

ACS	Advanced Computer Systems S.p.A.
ARTS	Anomaly Report Tracking System
ATP	Acceptance Test Plan and Procedures document
CFI	Customer Furnished Item
COM	Centre Of Mass
CONFORM	CryOsat Netcdf FORMat
COTS	Commercial Off The Shelf
EE	Earth Explorer
EO	Earth Observation
ESA	European Space Agency
FOS	CryoSat Ground Segment Flight Operation System
G/S	Ground Segment
GDR	Global Data Record
HW	Hardware
ICD	Interface Control Document
ID	IDentifier
I/O	Input/Output
IPF	Instrument Processing Facility
ISP	Instrument Source Packet
LE	Leading Edge of the waveform
LIRT	Land Ice ReTracker
NRT	Near Real Time
OO	Object Oriented
PCD	Product Confidence Data
PCONF	Processor Configuration File
PDS	CryoSat Ground Segment Payload Data Segment
QWG	Quality Working Group
SPR	Software Problem Report
SVVP	System Verification and Validation Plan
TBC	To Be Clarified
TBD	To Be Defined
USO	Ultra-Stable Oscillator
UTC	Universal Time Co-ordinates

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3 DOCUMENT STRUCTURE

The document includes the following sections:

Section 4 – Introduction	Introduction to the whole document
Section 5 - General Overview	This section gives an overview of the CryoSat IPF1 ICE processors as well as a short introduction to the netCDF
Section 6 – Baseline F Evolutions Released	This section describes the improvements and new features included in the ICE processors
Section 7 – Software Problem Report Resolved in Baseline-F	This section includes features which have been resolved in the ICE processors

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4 INTRODUCTION

This document specifies the Baseline F Evolutions for the ICE IPF1/IPF2 Processors.

The list of evolutions reported in sections 6 and 7 uses the official ID with which they have been registered in the Anomaly Report Tracking System (ARTS) used for the CryoSat project (https://arts.esrin.esa.int/).

1.1 PURPOSE AND SCOPE

The purpose of the document is to support final Users with a clear list of all the Baseline F evolutions, to support the investigation of improvements and differences since the previous Baseline E release.

The Baseline-F products include the evolutions listed in section 6. Section 7 describes the software issues resolved in the new ICE processors.

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5 GENERAL OVERVIEW

All CryoSat Level 1 (L1) and Level 2 (L2) products are provided in NetCDF format and follow the convensions specified in the relevant CryoSat NetCDF format (CONFORM) documents, [PFS-I-L1b] and [PFS-I-L2], respectively.

The L1 products are generated from the SIRAL instrument Level 0 data by the Instrument Processing Facility Level 1 (IPF1) processor, which algorithms are defined in [DPM]. The IPF1 processing chains provide five types of L1 products:

❒ **Level 1B (L1B)**

The L1B data is the main product output from the IPF1. In the case of SIRAL's SAR and SARIn acquisition modes, the L1B data are strongly compressed in size following the application of SAR/SARIn algorithms and multilook for speckle reduction.

❒ **Level 1B Calibration (CAL)**

CAL1 and CAL2 products also belong to the L1B class. CAL1 data are available for LRM/SAR/SARIn modes, while CAL2 data are available only for SAR/SARIn modes.

❒ **Full Bit Rate (FBR)**

The FBR product is an intermediate output before the L1B processing is completed. This is the highest processing stage reached before information compression occurs. In particular, the FBR data for SAR and SARIn modes still contain the echo data as complex numbers.

❒ **Monitoring (MON)**

Monitoring data is a systematic product aiming to provide timely information on the health of the instrument. It consists of a set of instrument parameters which may be produced rapidly and routinely starting from LRM/tracking (TRK) SIRAL data, SAR or SARIn data.

❒ **Level 1B Science Stack (L1B-S)**

L1B-S Stack products (in SAR/SARIn modes) provide detailed information about the waveform stack and might be useful to the end Users. This is considered an optional product.

The IPF1 has as output the following products:

- **Level 1B Science Data (distributed to Users)**
  - LRM Level 1B generated and distributed in CONFORM
  - SAR Level 1B generated and distributed in CONFORM
  - SARIn Level 1B generated and distributed in CONFORM
  - SAR Level 1B Stack generated and distributed in CONFORM (optionally generated during reprocessing campaign, not operationally)
  - SARIn Level 1B Stack generated and distributed in CONFORM (optionally generated during reprocessing campaign, not operationally)

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- **FBR Science Data**
  - LRM FBR generated, but no more distributed, in Earth Explorer format
  - SAR FBR generated and distributed in CONFORM
  - SARIn FBR generated and distributed in CONFORM
- **Auxiliary Calibration Data**
  - CAL1 LRM generated in Earth Explorer format
  - CAL1 SAR generated in Earth Explorer format
  - CAL1 SARIn generated in Earth Explorer format
  - CAL2 SAR generated in Earth Explorer format
  - CAL2 SARIn generated in Earth Explorer format
  - Complex CAL1 SARIn generated in Earth Explorer format
- **Monitoring Products**
  - MON LRM/TRK generated in Earth Explorer format
  - MON SAR generated in Earth Explorer format
  - MON SARIn generated in Earth Explorer format

The Earth Explorer product format is specified in [PROD-FMT].

The L2 products are generated for each science mode (i.e., LRM, SAR and SARIn) from the corresponding CryoSat L1B data using the IPF2 processing. Additionally, a Global Data Record (GDR) product is generated by concatenating multi-mode L2 products between two consecutive ascending equator crossing nodes. The following products are distributed to Users:

- **Level 2 Science Data (distributed to Users)**
  - LRM Level 2 generated and distributed in CONFORM
  - SAR Level 2 generated and distributed in CONFORM
  - SARIn Level 2 generated and distributed in CONFORM
  - GDR product generated and distributed in CONFORM
- **Level 2 In-Depth (L2I) Science Data (distributed to Users)**
  - LRM Level 2I generated and distributed in CONFORM
  - SAR Level 2I generated and distributed in CONFORM
  - SARIn Level 2I generated and distributed in CONFORM

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A common layout (i.e. independent from the SIRAL operational mode) is defined for all the L2 products. A L2 product is generated soon after a L1B product is available, thus, resembling still a data driven approach. This implies that following this first generation step, there will be L2 products still separated by acquisition mode (LRM, SAR, SARIn) defined over the same time window of the L1B input.

The L2 data is the main output from the L2 processors and it is distributed as a Compact product, a format designed to minimise the data volume distributed to Users. However, for all modes, another L2 data set is available and called 'In-depth L2' (L2I) and is identified with an 'I' in the filetype: SIR_xxxI2_. This dataset contains many more parameters and flags and is therefore much larger. This detailed product is required as the input to the second pass of the L2 SAR processing chain, where the sea-surface height anomaly is interpolated to the location of all measurements identified as sea ice to allow the computation of freeboard.

The L2I products are sometimes referred to as the Intermediate products. This is an old terminology coming from the early phases of the CryoSat project and shouldn't be used anymore.

In the next table, a summary of the evolutions included in the Baseline F is provided. Anomalies and Evolutions are identified by an ARTS ID, the same identification code used in ESA's Anomaly Report Tracking System (ARTS) (https://arts.esrin.esa.int/). The evolutions that are not yet implemented in the Test Data Set (TDS) distributed to the QWG for analysis are highlighted in red.

- Change Request #684: **CRYO-IDE-304** Baseline-E: adding RIP to L1b products
- Change Request #690: **CRYO-IDE-331** Baseline-E: L1b netCDF format issue for Python users
- Change Request #691: **CRYO-IDE-332** Update to EECFI Branch 4
- Change Request #695: **CRYO-IDE-355** Review of the CryoSat product flags and conventions
- Change Request #696: **CRYO-IDE-356** Future evolutions to reduce SARIn freeboard outliers
- Change Request #701: **CRYO-IDE-363** Review of the Calibration TTs
- Change Request #702: **CRYO-IDE-365** DOIs not updated at Baseline-E
- Change Request #703: **CRYO-IDE-366** Short NRT products due to incomplete inputs
- Change Request #704: **CRYO-IDE-368** Increase resolution of path delay correction in INT_FBR (Baseline F)
- Change Request #705: **CRYO-IDE-369** Checklist of preparatory activities before new baseline TTO
- Change Request #712: **CRYO-IDE-378** L0 timestamp issue & pre-processor
- Change Request #973: **CRYO-IDE-381** PTR in FBR characterisation file
- Change Request #976: **CRYO-IDE-382** Update STR_PROC to list inputs
- Change Request #977: **CRYO-IDE-383** Reprocess CAL models
- Change Request #978: **CRYO-IDE-384** BaselineF: Update to latest stable netcdf library
- Change Request #979: **CRYO-IDE-385** BaselineF: Evaluate to import next POD baseline
- Change Request #980: **CRYO-IDE-386** BaselineF: AUX alignment with COP processor
- Change Request #981: **CRYO-IDE-387** STR PROC Evolution
- Change Request #982: **CRYO-IDE-388** Remove dependency of libCurl for processors

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- Change Request #983: **CRYO-IDE-389** Add distance to nearest non-ocean record or a distance to coast field to the product
- Change Request #984: **CRYO-IDE-390** Activate ambiguity mitigation module to IPF
- Change Request #985: **CRYO-IDE-391** Update ocean tide at L1 to FES2022
- Change Request #986: **CRYO-IDE-356** Future evolutions to reduce SARIn freeboard outliers
- Change Request #987: **CRYO-IDE-392** Add Cryosat QA website support for new parameters
- Change Request #988: **CRYO-IDE-393** BaselineF: Update snow depth climatology using AWI merged climatology
- Change Request #989: **CRYO-IDE-394** BaselineF: Update to DTU21 MSS model
- Change Request #990: **CRYO-IDE-395** BaselineF: Cross-correlate waveform parameters against coincident SAR and use results to derive optimal discrimination recipe
- Change Request #991: **CRYO-IDE-396** BaselineF: SARIn: Unwrap measurements detected as wrapped via ambiguity DEM (Land Ice)
- Change Request #992: **CRYO-IDE-397** BaselineF: SARIn: Implement CryoTEMPO coherence-based retracker
- Change Request #993: **CRYO-IDE-398** BaselineF: Use time varying ice shelf masks to optimise discrimination recipe to retrieve lead measurments from polynea near to ice shelf edges
- Change Request #994: **CRYO-IDE-399** BaselineF: Update surface type mask to have ice shelves and add CATS2008a tide model
- Change Request #995: **CRYO-IDE-400** BaselineF: Comparison study using REMA/Arctide DEM against the current Helm DEMs
- Change Request #996: **CRYO-IDE-401** BaselineF: Compute and output sea ice thickness, with an associated snow loading correction
- Change Request #997: **CRYO-IDE-402** BaselineF: Add snow density climatology and/or support for dynamic data
- Change Request #998: **CRYO-IDE-403** BaselineF: Correct lead height measurements for off-nadir angle in SARIn mode
- Change Request #999: **CRYO-IDE-404** BaselineF: Assess moving average of stack peakiness as a discrimination metric
- Change Request #1000: **CRYO-IDE405** BaselineF: Implement processing of PLRM data
- Change Request #1001: **CRYO-IDE-406** BaselineF: Add leading edge width as a parameter for SAR/SIN data for use in deriving freeboard correction for sea ice roughness
- Change Request #1002: **CRYO-IDE-407** BaselineF: Add additional Cryosat QA website features based on code developed for other projects
- Change Request #1003: **CRYO-IDE-408** BaselineF:Updates to product handbook to support changes

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- Change Request #1004: **CRYO-IDE-409** BaselineF:Improve product consistency in terms of using _FillValue where data is known bad (CRYO-IDE-355)
- Change Request #1005: **CRYO-IDE-410** BaselineF:implement LARM type retracker (i.e. Landy et al, 2019 and evolution) for winter processing
- Change Request #1006: **CRYO-IDE-411** BaselineF:flag_sea_ice_type_20_ku in the L2I product only. To be added in L2 as well
- Change Request #1895: **CRYO-IDE-412** L2 PLRM processing
- Change Request #1897: **CRYO-IDE-385** BaselineF: Evaluate to import next POD baseline
- Change Request #1898: **CRYO-IDE-413** BaselineF: Add distance to nearest lead in L2I

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6 BASELINE-F EVOLUTIONS RELEASED

This section includes a short desctiption of the evolutions implemented at Baseline F.

6.1 CRYO-IDE-304 BASELINE-E: ADDING RIP TO L1B PRODUCTS

6.1.1 Overview

It has been requested to add the Range Integrated Power into the L1B products.

6.1.2 Evolution

rip_20_ku has been added to L1B and rip_ku has been added to L1BS products. They can be found in the Waveforms group of all products generated with the Baseline F IPF.

rip_20_ku(time_20_ku, ns_looks_ku)

```
float rip_20_ku(time_20_ku, nlooks_ku) ;
rip_20_ku:long_name = "range integrated power L1B" ;
rip_20_ku:units = "W" ;
rip_20_ku:comment = " The Range Integrated Power (RIP), computed from the
                      surface sample stack. Each sample of the RIP is
                      computed as the sum of N samples of the
                      corresponding single look waveform in the
                      stack.;
rip_20_ku:scale_factor = 1. ;
rip_20_ku:add_offset = 0. ;
rip_20_ku:coordinates = "lon_20_ku lat_20_ku" ;
rip_20_ku:_FillValue = NaN ;
```

6.2 CRYO-IDE-331 BASELINE-E: L1B NETCDF FORMAT ISSUE FOR PYTHON USERS

6.2.1 Overview

It looks like Python interprets a value of 65535 in the waveform as missing data, so _FillValue has been suppressed from attributes to avoid this interpretation. Despite this, Python interprets maximum value as fillValue.

6.2.2 Evolution

Python users to unmask the data to get the correct results. Clarification added in Product Handbook [PH]

6.3 CRYO-IDE-355 REVIEW OF THE CRYOSAT PRODUCT FLAGS AND CONVENTIONS

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6.3.1 Overview

At each baseline the product format should be checked against current applicable standards for data products.

6.3.2 Evolution

Product format checked against CF standards.

6.4 CRYO-IDE-356 FUTURE EVOLUTIONS TO REDUCE SARIN FREEBOARD OUTLIERS

6.4.1 Overview

Land contamination sometimes present in freeboard results.

6.4.2 Evolution

Additional discrimination options added to enable better filtering. Small improvement expected.

6.5 CRYO-IDE-365 DOIS NOT UPDATED AT BASELINE-E

6.5.1 Overview

DOI for Baseline F will be updated before TTO to following values:

NAME	LANDING PAGE URL	PRODUCT TYPE	DOI
GDR Precise Orbit	https://earth.esa.int/eogateway/catalog/cryosat-products	SIR_GDR_2_	10.57780/cr2-2598fe5
L1b LRM Precise Orbit	https://earth.esa.int/eogateway/catalog/cryosat-products	SIR_LRM_1B	10.57780/cr2-47a8769
L1b SAR Precise Orbit	https://earth.esa.int/eogateway/catalog/cryosat-products	SIR_SAR_1B	10.57780/cr2-b5a8369
L1b SARin Precise Orbit	https://earth.esa.int/eogateway/catalog/cryosat-products	SIR_SIN_1B	10.57780/cr2-8da8f29
L2 LRM Precise Orbit	https://earth.esa.int/eogateway/catalog/cryosat-products	SIR_LRM_2_	10.57780/cr2-80a8b29
L2 SAR Precise Orbit	https://earth.esa.int/eogateway/catalog/cryosat-products	SIR_SAR_2_	10.57780/cr2-5b98729
L2 SARin Precise Orbit	https://earth.esa.int/eogateway/catalog/cryosat-products	SIR_SIN_2_	10.57780/cr2-da98329

6.5.2 Evolution

New dedicated page for Baseline F products

6.6 CRYO-IDE-368 INCREASE RESOLUTION OF PATH DELAY CORRECTION IN INT_FBR (BASELINE F)

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6.6.1 Overview

INT_FBR modification to increase the resolution of the path delay correction applied to science processing

Now the correction is annotated with mm precision: switching to sll type would allow to apply corrections in internal path delay of the order of less than 1 mm exploiting the improved algorithm in CAL1 processor.

Resolution of the internal path delay correction improved in BaselineF

6.6.2 Evolution

Now the correction is stored to allow precision of cal measure below millimeter: corrections in internal path delay of the order of less than 1 mm exploiting the improved algorithm in CAL1 processor implemented in Baseline E **CRYO-IDE-226.**

6.7 CRYO-IDE-378 L0 TIMESTAMP ISSUE & PRE-PROCESSOR

6.7.1 Overview

From the analysis of COP failed jobs (CRYO-COP-62), it has been verified that Cryosat Satellite, sometimes, sends incorrect science datation, shifted ahead by 1 radar cycle. Thales confirmed this finding.

It has been decided to proceed fixing all the wrong datation in the L0 product, restoring the correct radar cycle, before the L1B product processing.

The correction involves:

- LRM L1 pre-processor: from L0 to L1B
- SAR/SARIN pre-processors: from L0 to FBR/L1B

6.7.2 Evolution

FBR/L1B wrong datation corrected for the radar cycle. Before this fix, no products were available since the processing fails.

6.8 CRYO-IDE-382 UPDATE STR_PROC TO LIST INPUTS

6.8.1 Overview

For tracking purposes, it has been requested that all input files which were provided to the Star Tracker Processor in it's JobOrder file should be included in the output as well.

6.8.2 Evolution

Updated the Star Tracker Processor to include the list of inputs used in the produced output files.

6.9 CRYO-IDE-384 BASELINEF: UPDATE TO LATEST STABLE NETCDF LIBRARY

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6.9.1 Overview

The ICE Baseline E level 1 IPF doesn't use the latest stable release of the netCDF library.

6.9.2 Evolution

Update netCDF to version 4.9.2.

6.10 CRYO-IDE-387 STR PROC EVOLUTION

6.10.1 Overview

Update of AUX_STRDB to provide STR processor values for roll bias approximation with linear fitting.

6.10.2 Evolution

A new auxiliary data file CS_OFFL_STR_ATTBIA_20100101T000000_99999999T999999_E001.NC will be added to the inputs of the Star Tracker Procesor. This file contains the biases for pitch, roll and yaw for

each of the 3 star trackers. The Star Tracker Procesor will use this auxiliary file to identify the bias values with are the closed to the date to be processed and will use these during the processing.

6.11 CRYO-IDE-389 ADD DISTANCE TO NEAREST NON-OCEAN RECORD OR A DISTANCE TO COAST FIELD TO THE PRODUCT

6.11.1 Overview

L1 and L2 Baseline F have been updated to include distance to coast information.

Map used is derived from GSHHG v2.3.7 and generated by Remkoo Scharroo (EUMETSAT).

Distance to coastline is negative over land, positive over water bodies and grid used is based on grid step of 0.016666666666666666 degrees.

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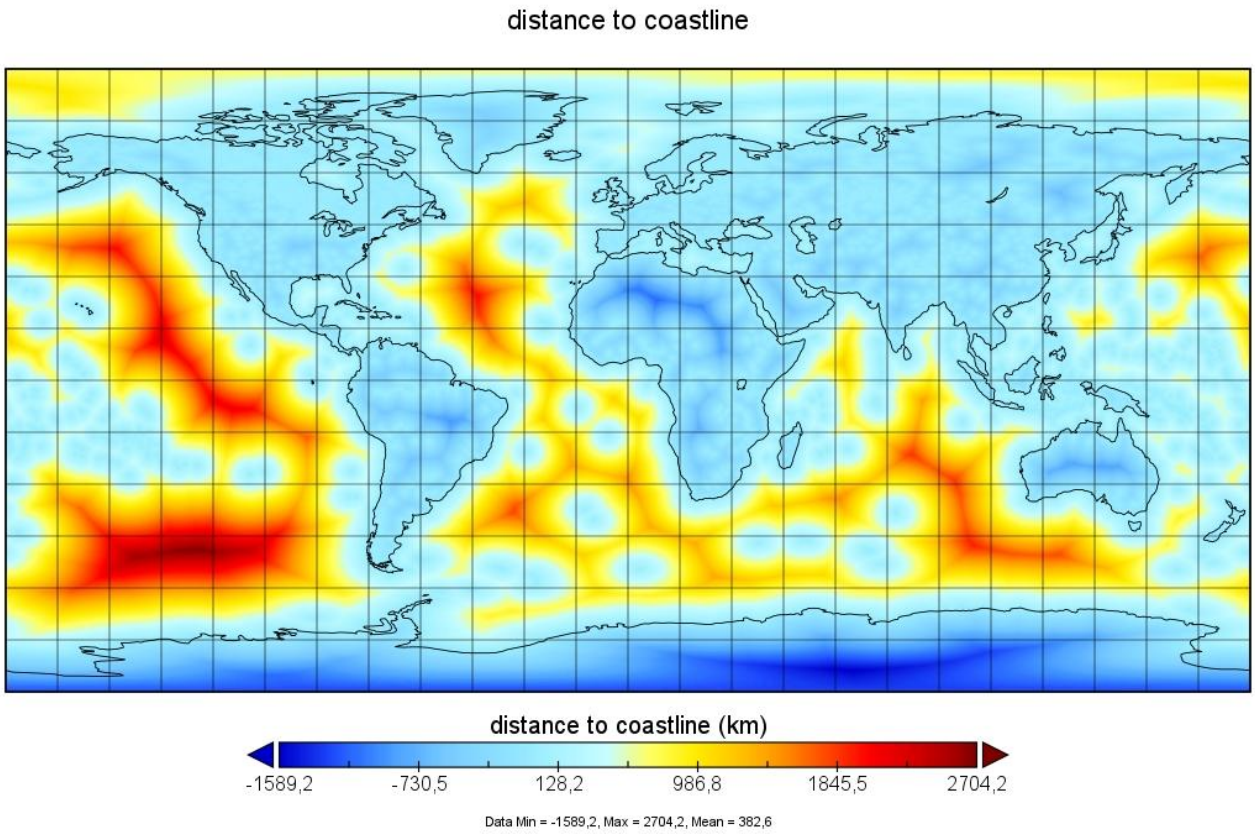


Figure 1 distance to coastline map

6.11.2 Evolution

New variables available at 20Hz and 1Hz:

distance_to_coast_20_ku(time_20_ku)

```
      short distance_to_coast_20_ku(time_20_ku) ;
            distance_to_coast_20_ku:_FillValue = -32767s ;
            distance_to_coast_20_ku:long_name = "Distance to the coast" ;
            distance_to_coast_20_ku:units = "m"
            distance_to_coast_20_ku:scale_factor = 1.e+2 ;
            distance_to_coast_20_ku:comment = "Distance to the closest coast (negative
    over land, positive over water bodies)" ;
            distance_to_coast_20_ku:coordinates = "lon_20_ku lat_20_ku" ;
            distance_to_coast_20_ku:institution = "EUMETSAT" ;
            distance_to_coast_20_ku:source = "GSHHG v2.3.7" ;
```

distance_to_coast_01(time_cor_01)

```
      short distance_to_coast_01(time_cor_01) ;
            distance_to_coast_01:_FillValue = -32767s ;
            distance_to_coast_01:long_name = "Distance to the coast" ;
            distance_to_coast_01:units = "m"
            distance_to_coast_01:scale_factor = 1.e+2 ;
```

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```
        distance_to_coast_01:comment = "Distance to the closest coast (negative over
land, positive over water bodies)" ;
        distance_to_coast_01:coordinates = "lon_01 lat_01" ;
        distance_to_coast_01:institution = "EUMETSAT" ;
        distance_to_coast_01:source = "GSHHG v2.3.7" ;
```

New Auxiliary product AUX_DCOAST introduced, variable among global attributes in the netcdf product.

6.12 CRYO-IDE-391 UPDATE OCEAN TIDE AT L1 TO FES2022

6.12.1 Overview

Ocean and Lode timed models, based on FES2004 in BaselineE, have been updated to latest recent model provided by Aviso FES2022b.

FES2022 has been computed by LEGOS, NOVELTIS and CLS, in the frame of a CNES funded project. The product is based on a hydrodynamic model which assimilates some altimeter data and a few tide gauges.

The main improvements compared to FES2014b are:

- Improved bathymetry in many shallow waters and coastal areas
- Globally enhanced and refined high-resolution mesh
- Globally enhanced altimeter and tidal gauges datasets
- Improved T-UGO model version for both the spectral and sequential modes
- Improved assimilation ensembles simulations
- Significant improvement in coastal areas

More details available in the Product Hadbook:

https://www.aviso.altimetry.fr/fileadmin/documents/data/tools/hdbk_FES2022.pdf

6.12.2 Evolution

ocean_tide_01 and load_tide_01 corrections computed with new model FES2022b: they are the pure ocean tide and the load tide as extracted by the FES2022b, based on datation and location of the acquisition.

ocean_tide_01(time_cor_01)

```
      int ocean_tide_01(time_cor_01) ;
          ocean_tide_01:_FillValue = -2147483648 ;
          ocean_tide_01:units = “m” ;
          ocean_tide_01:long_name = “pure ocean tide (1-way)” ;
          ocean_tide_01:standard_name                                          =
“sea_surface_height_amplitude_due_to_pure_ocean_tide” ;
          ocean_tide_01:add_offset = 0. ;
          ocean_tide_01:scale_factor = 0.001 ;
          ocean_tide_01:comment = “Ocean Tide. This correction is to be accounted for
                    during the computation of height to remove the effect of local
                    tide and adjust the measurement to the mean sea surface. This
                    is the pure ocean tide, not including the corresponding loading
                    tide [load_tide_01] or the equilibrium long-period ocean tide
```

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```
                    height [ocean_tide_eq_01]. The permanent tide (zero frequency)
                    is not included in this parameter because it is included in the
                    geoid [geoid_01] and mean sea surface
                    [mean_sea_surf_sea_ice_01]. This correction accounts for heigh
                    of the diurnal and semi-diurnal and the heigh of the long period
                    wave constituents of the tidal spectrum. It is set to nan if
                    no data is available at the given position. Geocentric elastic
                    tide is given by [load_tide_01]+[ocean_tide_01] " ;
          ocean_tide_01:source = "FES2022b" ;
          ocean_tide_01:institution = "CNES" ;
          ocean_tide_01:coordinates = "lon_cor_01 lat_cor_01";
```

load_tide_01(time_cor_01)

```
     int load_tide_01(time_cor_01) ;
          load_tide_01:_FillValue = -2147483648 ;
          load_tide_01:units = "m" ;
          load_tide_01:long_name = "ocean loading tide (1-way)" ;
          load_tide_01:add_offset = 0. ;
          load_tide_01:scale_factor = 0.001 ;
          load_tide_01:comment = "Ocean loading tide. This correction is to be
                 accounted for during the computation of height to remove the effect
                 of local tidal distortion to the Earth's crust, caused by increasing
                 weight of ocean as local water tide rises. This correction accounts
                 for heigh of the diurnal and semi-diurnal and the heigh of the long
                 period wave constituents of the tidal spectrum. It is set to nan if
                 no data is available at the given position. Geocentric elastic tide
                 is given by [load_tide_01]+[ocean_tide_01]  " ;
          load_tide_01:source = "FES2022b" ;
          load_tide_01:institution = "CNES" ;
load_tide_01:coordinates = "lon_cor_01 lat_cor_01";
```

6.13 CRYO-IDE-392 ADD CRYOSAT QA WEBSITE SUPPORT FOR NEW PARAMETERS

6.13.1 Overview

Sea ice freeboard and thickness have been added to the L2 products at Baseline F. These parameters should be added to the set of parameters displayed on the QA website.

6.13.2 Evolution

The QA website is being upgraded to support vF products and will add plots for the new parameters.

6.14 CRYO-IDE-393 BASELINEF: UPDATE SNOW DEPTH CLIMATOLOGY USING CRYOTEMPO CLIMATOLOGY

6.14.1 Overview

The CryoTEMPO project has delivered snow depth climatologies derived from multi-band altimetry.

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6.14.2 Evolution

Snow depth climatology aux files updated with data taken from the CryoTEMPO files. Snow depth now available in SH.

6.15 CRYO-IDE-394 BASELINEF: UPDATE TO DTU21 MSS MODEL

6.15.1 Overview

DTU21 is currently regarded as the best performing MSS model.

6.15.2 Evolution

Updated MSS aux file to contain data from DTU21 model.

Andersen, O. B., Rose, S. K., Abulaitijiang, A., Zhang, S., and Fleury, S.: The DTU21 global mean sea surface and first evaluation, *Earth Syst. Sci. Data*, 15, 4065–4075, https://doi.org/10.5194/essd-15-4065-2023, 2023.

6.16 CRYO-IDE-395 BASELINEF: CROSS-CORRELATE WAVEFORM PARAMETERS AGAINST COINCIDENT SAR AND USE RESULTS TO DERIVE OPTIMAL DISCRIMINATION RECIPE

6.16.1 Overview

Some tracks of CS2 data across sea ice have SAR images available that were taken at the same time as the pass, and the passes cross leads visible in the imagery.

6.16.2 Evolution

The images were used as ground truth when reviewing the performance of the discrimination metrics. No change was made to existing discrimination metrics. New metrics added and configured to not reject any current classifications.

6.17 CRYO-IDE-396 BASELINEF: SARIN: UNWRAP MEASUREMENTS DETECTED AS WRAPPED VIA AMBIGUITY DEM (LAND ICE)

6.17.1 Overview

SARIn results are flagged as ambiguous if more than 50 m from the reference DEM. This can be due to phase wrap.

6.17.2 Evolution

Once the surface height has been estimated and geolocated by the SARIn chain, a test is made against a DEM to derive the absolute magnitude of the diference in height. If the result differs by more than 60m then the echo is likely ambiguous. The phase is unwrapped by 2pi and the height estjmation and geolocation is repeatched. The height difference is checked again with the phase unwrapped location and the measurement

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is relocated to the second location if the measurement there if closer to the reference DEM. This may result in an increase in performance and/or a decrease in the number of ambiguous records.

6.18 CRYO-IDE-397 BASELINEF: SARIN: IMPLEMENT CRYOTEMPO COHERENCE-BASED RETRACKER

6.18.1 Overview

The coherence based retracker implemented in CryoTEMPO was chosen because it out-performed the model fit retracker in the IPF2 chain.

6.18.2 Evolution

Changed the SARIn retracker in the IPF2 chain to the coherence based retracker. The retracker is implemented from the CryoTEMPO ATBD LU_ESA_Cryo-TEMPO_ATBD_LI v 3.0 which is based on:

J. Aublanc, P. Thibaut, A. Guillot, F. Boy, and N. Picot, 'Ice Sheet Topography from a New CryoSat-2 SARIn Processing Chain, and Assessment by Comparison to ICESat-2 over Antarctica', *Remote Sensing*, vol. 13, no. 22, p. 4508, Nov. 2021, doi: 10.3390/rs13224508.

6.19 CRYO-IDE-398 BASELINEF: USE TIME VARYING ICE SHELF MASKS TO OPTIMISE DISCRIMINATION RECIPE TO RETRIEVE LEAD MEASURMENTS FROM POLYNEA NEAR TO ICE SHELF EDGES

6.19.1 Overview

There have been reports of missing data near ice shelves where ocean returns from polynea could be expected. No confirmed time or location data is available though.

6.19.2 Evolution

Added Bedmachine mask to the L2 data to allow filtering of data to locations near ice shelves.

byte flag_bedmachine_mask_20_ku(time_20_ku) ;

flag_bedmachine_mask_20_ku:_FillValue = -128b ;

flag_bedmachine_mask_20_ku:comment = "Mask variable taken from Bedmachine. For use in locating ice shelves." ;

flag_bedmachine_mask_20_ku:coordinates = "lon_20_ku lat_20_ku" ;

flag_bedmachine_mask_20_ku:flag_meanings = "ocean ice_free_land grounded_ice floating_ice lake_vostok" ;

flag_bedmachine_mask_20_ku:flag_values = 0b, 1b, 2b, 3b, 4b ;

flag_bedmachine_mask_20_ku:grid_mapping = "mapping" ;

flag_bedmachine_mask_20_ku:long_name = "Bedmachine mask" ;

flag_bedmachine_mask_20_ku:source = "Antarctic Digital Database (rock outcrop) and Jeremie Mouginot (pers. comm., grounding lines)" ;

flag_bedmachine_mask_20_ku:valid_range = 0b, 4b ;

DOI:10.5067/FPSU0V1MWUB6

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6.20 CRYO-IDE-399 BASELINEF: UPDATE SURFACE TYPE MASK TO HAVE ICE SHELVES AND ADD CATS2008A TIDE MODEL

6.20.1 Overview

CATS2008 tide model is preferred by some groups studying ice shelves.

6.20.2 Evolution

Supply the CATS2008 correction in the product for their use.

cats2008_tide_01(time_cor_01)

```
int cats2008_tide_01(time_cor_01) ;
        cats2008_tide_01:_FillValue = -2147483648;
        cats2008_tide_01:comment = "CATS2008 tide correction. This correction HAS
NOT been applied during L2 processing, and is supplied here so that data users can
remove the applied tide corrections and replace them with CATS2008 if desired. This
field will only be filled if CATS2008 computation has been enabled." ;
        cats2008_tide_01:coordinates = "lon_cor_01 lat_cor_01" ;
        cats2008_tide_01:institution = "OSU" ;
        cats2008_tide_01:long_name = "CATS2008 tide correction" ;
        cats2008_tide_01:scale_factor = 0.001 ;
        cats2008_tide_01:source = "CATS2008 is available for download through the
U.S. Antarctic Program Data Center: Data DOI: 10.15784/601235" ;
        cats2008_tide_01:units = "m" ;
```

6.21 CRYO-IDE-400 BASELINEF: COMPARISON STUDY USING REMA/ARCTIDE DEM AGAINST THE CURRENT HELM DEMS

6.21.1 Overview

Maintenance of the slope model to be the best performing model is an ongoing process for each baseline evolution.

6.21.2 Evolution

Candidate slope model produced from REMA and Arctic DEM which shows a small improvement when crossover analysis is performed but no improvement in comparison with IS2. Existing model kept unchanged for this baseline.

6.22 CRYO-IDE-401 BASELINEF: COMPUTE AND OUTPUT SEA ICE THICKNESS, WITH AN ASSOCIATED SNOW LOADING CORRECTION

6.22.1 Overview

As this was to be the last opportunity to change the code before the end of the mission, add code necessary to enable the output of sea ice freeboard and thickness.

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6.22.2 Evolution

Code implemented and variables added to product specification.

int sea_ice_freeboard_20_ku(time_20_ku) ;

sea_ice_freeboard_20_ku:_FillValue = -2147483648 ;

sea_ice_freeboard_20_ku:comment = "Sea ice freeboard, the height of the snow–ice interface above the local sea surface. Only output if computation has been activated. Computed as [sea_ice_freeboard_20_ku] = [radar_freeboard_20_ku] + [snow_depth_cor_20_ku]. Unused in LRM mode." ;

sea_ice_freeboard_20_ku:coordinates = "lon_20_ku lat_20_ku" ;

sea_ice_freeboard_20_ku:long_name = "sea ice freeboard" ;

sea_ice_freeboard_20_ku:scale_factor = 0.001 ;

sea_ice_freeboard_20_ku:units = "m" ;

int sea_ice_thickness_20_ku(time_20_ku) ;

sea_ice_thickness_20_ku:_FillValue = -2147483648 ;

sea_ice_thickness_20_ku:comment = "Sea ice thickness. Only output if computation has been activated. Computed as (sea_ice_freeboard_20_ku * water_density_20_ku + snow_depth_20_ku * snow_density_20_ku) / (water_density_20_ku - ice_density_20_ku). Unused in LRM mode." ;

sea_ice_thickness_20_ku:coordinates = "lon_poca_20_ku lat_poca_20_ku" ;

sea_ice_thickness_20_ku:long_name = "sea ice thickness" ;

sea_ice_thickness_20_ku:scale_factor = 0.001 ;

sea_ice_thickness_20_ku:units = "m" ;

6.23 CRYO-IDE-402 BASELINEF: ADD SNOW DENSITY CLIMATOLOGY AND/OR SUPPORT FOR DYNAMIC DATA

6.23.1 Overview

Density values are needed to perform the conversion from freeboard to thickness.

6.23.2 Evolution

Added a new auxiliary file to enable time/space variable values of density to be written into the products.

6.24 CRYO-IDE-403 BASELINEF: CORRECT LEAD HEIGHT MEASUREMENTS FOR OFF-NADIR ANGLE IN SARIN MODE

6.24.1 Overview

Height measurements from off-nadir leads are not corrected for geometric effects.

6.24.2 Evolution

Processing options added to enable this correction. Currently turned off as not yet proven to improve results.

6.25 CRYO-IDE-404 BASELINEF: ASSESS MOVING AVERAGE OF STACK PEAKINESS AS A DISCRIMINATION METRIC

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6.25.1 Overview

Moving window averages of discrimination parameters have been shown in the literature to improve discrimination results.

6.25.2 Evolution

Add moving window averages of peakiness and stack peakiness to the product and enable their use as discrimination metrics.

6.26 CRYO-IDE405 BASELINEF: IMPLEMENT PROCESSING OF PLRM DATA/ CRYO-IDE-412 L2 PLRM PROCESSING

6.26.1 Overview

L2 processing chain has been modified to implement processing of LRM data, available from L1b product.
The processing chain has been modified to include a new task, but the product interface is unchanged, new PLRM variable are available in the existing L2 product.

6.26.2 Evolution

New variables available for bot L2I and L2.
Introduced PLRM variable for L2 product:
cats2008_tide_plrm_01
echo_avg_numval_plrm_20_ku
flag_cor_applied_plrm_20_ku
flag_prod_status_plrm_20_ku
height_ocog_plrm_20_ku
lat_poca_plrm_20_ku
lat_plrm_20_ku
lon_poca_plrm_20_ku
lon_plrm_20_ku
peakiness_plrm_20_ku
range_ocog_plrm_20_ku
retracker_ocog_quality_plrm_20_ku
sig0_ocog_plrm_20_ku
surf_type_plrm_20_ku

Introduced PLRM variable for LI2 product:
cats2008_tide_plrm_01
alt_plrm_20_ku
height_ocog_plrm_20_ku
lat_poca_plrm_20_ku
lat_plrm_20_ku
lon_poca_plrm_20_ku
lon_plrm_20_ku

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peakiness_plrm_20_ku
range_ocog_plrm_20_ku
retracker_ocog_quality_plrm_20_ku
surf_type_plrm_20_ku
uso_cor_plrm_20_ku

6.27 CRYO-IDE-406 BASELINEF: ADD LEADING EDGE WIDTH AS A PARAMETER FOR SAR/SIN DATA FOR USE IN DERIVING FREEBOARD CORRECTION FOR SEA ICE ROUGHNESS

6.27.1 Overview

Leading edge width could be useful in deriving an empirical correction to freeboard to account for effects due to sea ice roughness.

6.27.2 Evolution

Leading edge width is available as a retracker parameter in the L2I product.

int retracker_output_16_20_ku(time_20_ku) ;
retracker_output_16_20_ku:_FillValue = -2147483648;
retracker_output_16_20_ku:comment = "The meaning and units of this field vary by mode. LRM: unused. SAR: Sea ice floe LEW [millibins]. SARIn: Sea ice floe LEW [millibins]." ;
retracker_output_16_20_ku:coordinates = "lon_poca_20_ku lat_poca_20_ku" ;
retracker_output_16_20_ku:long_name = "retracker output 16" ;

6.28 CRYO-IDE-408 BASELINEF:UPDATES TO PRODUCT HANDBOOK TO SUPPORT CHANGES

6.28.1 Overview

Due to processing changes and addition of new variables to the products during Baseline F, the product handbook requires updating.

6.28.2 Evolution

Product handbook updated to reflect Baseline F.

6.29 CRYO-IDE-409 BASELINEF:IMPROVE PRODUCT CONSISTENCY IN TERMS OF USING _FILLVALUE WHERE DATA IS KNOWN BAD (CRYO-IDE-355)

6.29.1 Overview

Previous product formats used 0 in the variable field and raised a flag to indicate bad data. This could cause problems with using the data if the flag was ignored.

6.29.2 Evolution

Switch to using _FillValue in the netCDF products for values which are known to be bad. The flag is still set.

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6.30 CRYO-IDE-411 BASELINEF:FLAG_SEA_ICE_TYPE_20_KU IN THE L2I PRODUCT ONLY. TO BE ADDED IN L2 AS WELL

6.30.1 Overview

Availability of variable flag_sea_ice_type_20_ku has been extended to L2I product as well

6.30.2 Evolution

flag_sea_ice_type_20_ku variable available in all L2I products.

6.31 CRYO-IDE-413 BASELINEF: ADD DISTANCE TO NEAREST LEAD IN L2I

6.31.1 Overview

Distance to nearest lead can be used as a metric when assessing the reliability of freeboard measurements.

6.31.2 Evolution

Distance to the nearest lead added as a product field.

int distance_to_lead_20_ku(time_20_ku) ;
distance_to_lead_20_ku:_FillValue = -2147483648 ;
distance_to_lead_20_ku:comment = "Distance to the sea ice lead. SAR/SIN only." ;
distance_to_lead_20_ku:coordinates = "lon_20_ku lat_20_ku" ;
distance_to_lead_20_ku:long_name = "Distance to nearest lead" ;
distance_to_lead_20_ku:scale_factor = 1. ;
distance_to_lead_20_ku:units = "m" ;

6.32 CRYO-IDE-419 BLF: INCREASE THE PRECISION FOR "INSTRUMENT RANGE CORRECTION RX"

6.32.1 Overview

During QWG#10, a number of observations were made for BLF products with anomalous values of elevation over land ice. This was due to increase in precision of the range correction which was not factored into the window delay formula.

Similar to what has already been done for increase the precision for "Instrument range correction Tx Rx", the same change needs to be done also for "Instrument range correction Rx" :

- change unit of measurement from mm to micrometer

- change datatype from 4 byte to 8 byte

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6.32.2 Evolution

Following variables increased their precision in the L1B/FBR product

instr_cor_range_tx_rx_20_ku, instr_cor_range_tx_rx_21_ku and instr_cor_range_tx_rx_85_ku

instr_cor_range_rx_20_ku, instr_cor_range_rx_21_ku and instr_cor_range_rx_85_ku

7.3

6.33 CRYO-IDE-433 BLF: RECOMMEND CATS TIDE OVER ICE SHELF & IN L1B

6.33.1 Overview

IPF2 processing to use cats tide for the specific areas containing ice shelves.

Consider moving CATS2008 tide correction from L2 to L1 and include in L1B files.

6.33.2 Evolution

Variable available in L1B Product (and reported in L2 as well):

```
int cats2008_tide_01(time_cor_01) ;
        cats2008_tide_01:_FillValue = -2147483648;
        cats2008_tide_01:comment = "CATS2008 tide correction. This correction HAS
NOT been applied during L2 processing, and is supplied here so that data users can
remove the applied tide corrections and replace them with CATS2008 if desired. This
field will only be filled if CATS2008 computation has been enabled." ;
        cats2008_tide_01:coordinates = "lon_cor_01 lat_cor_01" ;
        cats2008_tide_01:institution = "OSU" ;
        cats2008_tide_01:long_name = "CATS2008 tide correction" ;
        cats2008_tide_01:scale_factor = 0.001 ;
        cats2008_tide_01:source = "CATS2008 is available for download through the
U.S. Antarctic Program Data Center: Data DOI: 10.15784/601235" ;
        cats2008_tide_01:units = "m" ;
```

6.34 CRYO-IDE-437 BLF: ADD SIG0_OCOG_PLRM TO L2I

6.34.1 Overview

Update product format to include sig0_ocog_plrm in L2I.

6.34.2 Evolution

Variable now available for both L2 and L2I product

6.35 CRYO-IDE-451 BLF: UPDATE TO COMMENT ATTRIBUTES

6.35.1 Overview

Based on observations from QWG#10;

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Update sources in comment attribute for flag_sea_ice_type_20_ku, sea_ice_concentration_01, snow_density_01 and snow_depth_cor_20_ku.

To be resolved before TTO of BLF. Captured in delta_BasF_planning_table (ID39).

6.35.2 Evolution

CDL updated:

flag_sea_ice_type_20_ku(time_20_ku)

```
 byte flag_sea_ice_type_20_ku(time_20_ku) ;
        flag_sea_ice_type_20_ku:_FillValue = -128b ;
        flag_sea_ice_type_20_ku:comment = "Flag indicating sea ice type. Unused in
LRM mode." ;
        flag_sea_ice_type_20_ku:coordinates = "lon_20_ku lat_20_ku" ;
        flag_sea_ice_type_20_ku:flag_masks = 1b, 2b, 3b, 4b ;
        flag_sea_ice_type_20_ku:flag_meanings    =    "open_water    first_year_ice
multi_year_ice ambiguous" ;
        flag_sea_ice_type_20_ku:institution = "EUMETSAT OSI SAF" ;
        flag_sea_ice_type_20_ku:long_name = "sea ice type flag" ;
        flag_sea_ice_type_20_ku:source = "OSI SAF Sea Ice Edge and Type Product" ;
```

sea_ice_concentration_01(time_cor_01)

```
 short sea_ice_concentration_01 (time_cor_01);
        sea_ice_concentration_01:units = "percent";
        sea_ice_concentration_01:_FillValue = -32768s;
        sea_ice_concentration_01:long_name = "sea ice area fraction";
        sea_ice_concentration_01:standard_name = "sea_ice_area_fraction";
        sea_ice_concentration_01:source = "UCL";
        sea_ice_concentration_01:institution = "UCL";
        sea_ice_concentration_01:scale_factor = 1.;
        sea_ice_concentration_01:coordinates = "lon_01 lat_01";
        sea_ice_concentration_01:comment = " Sea ice concentration derived from
NSIDC-0081 (before July 2025) or OSI-408-a data depending on time period. Unused in
LRM mode.";
```

snow_density_01(time_cor_01)

```
 short snow_density_01(time_cor_01);
        snow_density_01:units = "kg/m^3";
        snow_density_01:_FillValue = -32768s;
        snow_density_01:long_name = "snow density";
        snow_density_01:standard_name = "snow_density";
        snow_density_01:source = "UCL AUX_DENSSI from R. D. C. Mallett, 'A
methodologically robust densification function for snow on multiyear Arctic sea
ice', J. Glaciol., vol. 71, p. e24, 2025, doi: 10.1017/jog.2025.5. and M. Bocquet,
S. Fleury, F. Rémy, and F. Piras, 'Arctic and Antarctic Sea Ice Thickness and Volume
Changes From Observations Between 1994 and 2023', JGR Oceans, vol. 129, no. 11, Nov.
2024, doi: 10.1029/2023jc020848.";
        snow_density_01:institution = "UCL";
        snow_density_01:scale_factor = 1.0;
        snow_density_01:coordinates = "lon_01 lat_01";
        snow_density_01:comment =
```

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"Snow density. Interpolated from a monthly model file. Unused in LRM mode." ;

snow_depth_cor_20_ku(time_20_ku)

```
      short snow_depth_cor_20_ku(time_20_ku) ;
            snow_depth_cor_20_ku:_FillValue = -32768s ;
            snow_depth_cor_20_ku:comment = "Snow depth correction. This one-way
       correction corrects for the propagation delay caused by snow present on top of sea
       ice. To apply, add to range or subtract from height or freeboard. The correction
       in m is directly proportional to snow depth (-0.25 x snow_depth)." ;
            snow_depth_cor_20_ku:coordinates = "lon_20_ku lat_20_ku" ;
            snow_depth_cor_20_ku:long_name = "snow depth correction" ;
            snow_depth_cor_20_ku:scale_factor = 0.001 ;
snow_depth_cor_20_ku:units = "m" ;
```

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7 SOFTWARE PROBLEM REPORT RESOLVED IN BASELINEF

7.1 CRYO-IDE-279 ICE PROCESSING FAILURE: TAI DATATION OUTSIDE THE PROCESSING WINDOW

7.2 CRYO-IDE-281 PROCESSING FAILURE: ERROR IN XO_INTERPOL: THE REQUESTED DATE IS OUT OF THE DATA BASE

7.3 CRYO-IDE-312 FORECAST AUXI METEO XREFS IN ICE BASELINE-D NRT PRODUCTS

7.4 CRYO-IDE-324 BASELINE-E: DSD NAME INCONSISTENCY IN L2 LRM/ SIN PRODUCTS

7.5 CRYO-IDE-325 L1B SIN PRODUCT WITH STOP TIME OF 60S

7.6 CRYO-IDE-327 INCONSISTENT CYCLE NUMBERS

7.7 CRYO-IDE-333 GDR PRODUCTS NOT CUT AT EQUATOR (ANX)

7.8 CRYO-IDE-334 L1 PROCESSING FAILURE: NO ERRORS, MANY WARNINGS

7.9 CRYO-IDE-354 BASELINE-E L1 SAR FAILURE DUE TO MEANINGLESS DATATION

7.10 CRYO-IDE-360 PCONF FILE VERSION NUMBER

7.11 CRYO-IDE-361 SSB UNFILLED IN BASELINE-E L2 LRM

7.12 CRYO-IDE-362 NRT FAILURE: ERROR COMPUTING CARTESIAN STATE VECTOR

7.13 CRYO-IDE-372 BASELINE-E FAILURE: [I] STOP EXIT_CODE 128 TASK IPF1_SRNP IS ENDING UNSUCCESSFULLY

7.14 CRYO-IDE-373 BASELINE-E FAILURE RELATED TO PITCH ESTIMATION

7.15 CRYO-IDE-374 GDR REPROCESSING TASK TABLE UPDATE

7.16 CRYO-IDE-375 BASELINE-E FAILURE: [E] ...EXPLORER LIB TIME CONVERSION: ASCII TIME CONVERSION FAILED

7.17 CRYO-IDE-376 REVIEW OF DTC AND WTC VALUES

7.18 CRYO-IDE-377 GDR FAILURES WHEN WD CONTAINS ONLY 1 L2 PRODUCT

7.19 CRYO-IDE-421 BLF: UNEXPECTED INCREASE IN FILESIZES OF L1B PRODUCTS

7.20 CRYO-IDE-422 BLF: REDUCE IPF1 LOG VERBOSITY

7.21 CRYO-IDE-423 BLF: LOAD_TIDE ASSIGNED A VALUE OF 0 OVER LAND

7.22 CRYO-IDE-424 BLF: NO VALUES FOR SEA ICE FREEBOARD AND ASSOCIATED AUXILIARY VARIABLES

7.23 CRYO-IDE-425 BLF: L2 OCEAN AND LOAD TIDE SOURCE FIELD INCORRECTLY REFERS TO FES2004 RATHER THAN FES2022B

7.24 CRYO-IDE-426 BLF: STRONG DIFFERENCES BETWEEN BASELINE_E AND BASELINE_F IN THE WINDOW DELAY VARIABLE IN L1B

7.25 CRYO-IDE-427 BLF: INCORRECT SARIN MODE HEIGHT SIGN ERROR

7.26 CRYO-IDE-428 BLF: HEIGHT BIAS IN LARM RANGE FOR SIN MODE ONLY

7.27 CRYO-IDE-430 BLF: SOME PLRM VARIABLES IN THE L2 HAVE NON-PLRM POCA VARIABLE USED AS THE COORDINATE ATTRIBUTE.

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7.28 CRYO-IDE-430 BLF: DISTANCE TO COAST VALUES ARE NOT CORRECT FOR NEGATIVE LATITUDES IN THE REFERENCE [-180 TO 180]

7.29 CRYO-IDE-430 BLF: SHIFTS IN SSHA VALUES

7.30 CRYO-IDE-440 BLF: RADAR BACKSCATTER SHOWS LARGE DIFFERENCE IN SOME ORBITS BETWEEN BLE AND BLF

7.31 CRYO-IDE-441 BLF: LARM WAVEFORM FITTING

7.32 CRYO-IDE-442 BLF: ESA L2 RADAR FREEBOARD MEASUREMENTS ARE SIGNIFICANTLY THICKER THAN LARM OR CRYOTEMPO AND APPEAR TO FILTER THIN ICE.

7.33 CRYO-IDE-444 BLF: VALUE OF SNOW DENSITY SHOULD NOT BE A CONSTANT VALUE

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