



CryoSat 2 Ocean Processor

CryoSat Ocean NetCDF PFS (L1b&L2)

Doc. No.: C2-RS-ACS-ESL-5266

Issue: 3.4

Date: 17 November 2018

Page: 1

CRYOSAT Ground Segment

CryoSat Ocean Processor

CryoSat Ocean NetCDF Product Format Specification (L1b&L2)

[PFS-OCE]

C2-RS-ACS-ESL-5266

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Document Change Record

Issue/Rev.	Class (R=Review /A=Approval)	Date	Reason for Change	Changed Pages/Paragraphs
1.0draft	R	02/05/2016	First Issue	All
2.0draft		22/07/2016	Accounting for 2 nd collocation meeting	All
1.0	R	29/07/2016	First Official Issue	All
1.1	R	19/09/2016	Implementation of ESA's comments	
1.2	R	22/03/2017	Implementation of ESA's comments, before COP CONFORM final AR	All
2.0	R	03/04/2017	Introduction of the L1b SAR and SARin products merging SAR (or SARin) figures with PLRM figures	Sections 2.1, 2.3, 3.1 and 3.3 Appendix A
2.1	R	11/05/2017	Update of L1b SAR and SARin merge products: use of "hr" suffix for HR, instead of use of "plrm" suffix" for PLRM	
3.0	R	06/06/2017	<p>Generic improvement of the text</p> <p>Description of the P2P products</p> <p>Conventions used for the variable names explained</p> <p>Explanation of the use of the indices between 1Hz and 20 Hz measurements</p> <p>L1b variable names and long_names have been reviewed</p> <p>COG has been replaced with CoM in the "long_name" and "comment" attributes</p> <p>"long_name" of L2 HR variables reviewed</p> <p>L2 20 Hz Variables flag_instr_op_mode_20_plrm_ku and flag_instr_op_mode_20_ku have been added</p>	<p>Section 2.1</p> <p>Section 2.1 and section 5 added.</p> <p>Section 2.4 added</p> <p>Section 2.5</p> <p>Section 3.1, 3.3.22, 3.3.40 and Appendix A</p> <p>Section 3.1.1, 3.1.3, 3.1.4, 3.3.8, 3.3.10, 4.1.1, 4.1.5, 4.3.7, 4.3.69 -> 4.3.72, 4.3.79 -> 4.3.82</p> <p>Section 3.3</p> <p>Section 4.1.1, 4.1.2, 4.3.10 and 4.3.11</p>

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			<p>L2 20 Hz Variables time_1hz_20_ku and time_1hz_20_plrm_ku have been added</p>	<p>Section 4.1.1, 4.1.2, 4.3.135 and 4.3.136</p>
3.1	R	21/09/2017	<p>General improvement for V3.10 CLS COP delivery</p>	<p>Section 3:</p> <ul style="list-style-type: none"> - off_nadir_pitch_angle_str_20_ku, off_nadir_roll_angle_str_20_ku, off_nadir_yaw_angle_str_20_ku, flag_instr_conf_rx_str_in_use_20_ku, flag_instr_mode_att_ctrl_20_ku <p>variables suppressed in L1B product</p> <p>Section 3.3 added</p> <p>Section 4:</p> <ul style="list-style-type: none"> - Fix for plrm variables. Comment modified to have "Not provided in LRM" in place of "Set to FillValue in LRM" <p>Section 4.3 added</p>
3.2	R	31/07/2018	<p>CRYO-COP-24 issue correction</p>	<p>Section 3:</p> <ul style="list-style-type: none"> - hf_fluct_cor_01, inv_bar_cor_01 <p>variables comment attributes corrected in L1B products</p> <p>Section 4:</p> <ul style="list-style-type: none"> - hf_fluct_cor_01, inv_bar_cor_01, ssha_01_ku, ssha_20_ku, ssha_01_plrm_ku, ssha_20_plrm_ku <p>variables comment attributes corrected in L2 products</p>
3.3	R	26/09/2018	<p>Release for the implementation of the following ARTS:</p> <p>CRYO-COP-4 CRYO-COP-8 CRYO-COP-24 CRYO-COP-25 CRYO-COP-26</p>	<p>Section 3.4:</p> <ul style="list-style-type: none"> - cdl dump format reviewed and aligned with product content <p>Section 4.4:</p> <ul style="list-style-type: none"> - cdl dump format reviewed and aligned with product content <p>Appendix D:</p>

		<p style="text-align: right;"><i>CryoSat 2 Ocean Processor</i></p> <p style="text-align: right;"><i>CryoSat Ocean NetCDF PFS (L1b&L2)</i></p> <p><i>Doc. No.: C2-RS-ACS-ESL-5266</i></p> <p><i>Issue: 3.4</i></p> <p><i>Date: 17 November 2018</i></p> <p><i>Page: 6</i></p>
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				<p>- XML Header Product File rationale clarified</p>
3.4	R	17/11/2018	CRYO-COP-35	<p>Section 3.4.95 FillValue suppressed for pwr_waveform_20_hr_ku: no fillValue foreseen for this variable.</p> <p>Typo fixed: "commment" occurrences fixed in the whole document</p>

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1 INTRODUCTION

This document specifies the NetCDF format of the Level-1b and Level-2 Near-Real Time (NOP), Intermediate (IOP) and Geophysical (GOP) Ocean Products generated by the CryoSat ocean processing chains.

1.1 PURPOSE AND SCOPE

The purpose of the document is to specify the NetCDF product structure and content of the Level-1b and Level 2 products generated by the CryoSat ocean processing.

Since the beginning of the mission (2010), all CryoSat products had been generated in EE (Earth Explorer) a bespoke format devised for the CryoSat products at the time of the CryoSat-1 mission and derived from the ENVISAT products format with the purpose to maximise the reuse of decoding/analysis tools developed for this mission.

In 2015 the Agency decided to migrate from this Earth Explorer format to the more flexible and up-to-date NetCDF model for those products that are intended to be distributed to the users.

This new format is called CONFORM (CryOsat Netcdf FORMat) and is applicable to the whole CryoSat ocean production.

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1.2 DOCUMENT STRUCTURE

The document includes the following sections:

Section 1 – Introduction	Introduction to the whole document
Section 2 - General Overview	This section gives an overview of the CryoSat ocean production as well as a short introduction to the NetCDF.
Section 3 - Level-1b Format Description	<p>This section contains the specification of the L1b ocean CONFORM products. In particular:</p> <ul style="list-style-type: none"> • section 3.1 lists the variables of the L1b products and links each of them to the relevant CDL dump • section 3.2 lists the variables of the products and links each of them to the relevant CDL dump • section 3.3 contains the CDL dump of each variable • section 3.4 specifies the global attributes of each product
Section 4 - Level 2 Format Description	<p>This section contains the specification of the L2 ocean CONFORM products. In particular:</p> <ul style="list-style-type: none"> • section 4.1 lists the variables of the L2 products and links each of them to the relevant CDL dump • section 4.2 lists the variables of the products and links each of them to the relevant CDL dump • section 4.3 contains the CDL dump of each variable • section 4.4 specifies the global attributes of each product
Section 5- CryoSat Ocean CONFORM Products	Here is the list of CONFORM ocean products
Appendix A – Variables to Products Mapping	In this section there is the variable name list alphabetically ordered and for each variable it shows in which product types it can be used
Appendix B : Default Setting of the Attribute: _FillValue	In this section the list of _FillValues for each variable type is listed

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Appendix C: Timestamps Data Type

In this section it is demonstrated that the timestamps used in the CONFORM products are reliable till January 2034

Appendix D - EE to NetCDF Migration

This section contains a short description of the general rules followed to migrate from the EE format to CONFORM

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1.3 APPLICABLE & REFERENCE DOCUMENTS

1.3.1 Applicable Documents

Document Title	Identifier	Reference
CCN #3: CONFORM [IPF1-CCN3] Issue 1.0	C2-CN-ACS-GS-5343	[CCN3-TN]
Minute of CCN#3 and CCN#4 KO meeting	C2-MN-ACS-GS-5248	[CCN3-KO]

1.3.2 Reference Documents

Document Title	Identifier	Reference
IEEE Standard for Binary Floating-Point Arithmetic. ANSI/IEEE Std 754-1985 Institute of Electrical and Electronics Engineers Issued 1985	IEEE-754	[IEEE]
CCSDS Recommendation Time Code Formats Blue Book Issue 2.0, April 1990	CCSDS 301.0-B-2	[CCSDS-TIMEGUIDE]
IOP & GOP Product Format Specification	C2-RS-ACS-ESL-5213	[COP-FMT]

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1.4 ACRONYMS AND ABBREVIATIONS

AGC	Automatic Gain Control
CAL	Calibration
CCSDS	Consultative Committee for Space Data Systems
CONFORM	CryOsat NecdF FORMat
DSR	Data Set Record
EE	Earth Explorer
EO	Earth Observation
ESA	European Space Agency
FBR	Full Bit Rate
GOP	Geophysical Ocean Product
ID	IDentifier
I/O	Input/Output
IOP	Intermediate Ocean Product
IPF	Instrument Processing Facility
ISP	Instrument Source Packet
L1B	Level 1B
LRM	Low Rate Mode
MDS	Measurement Data Set
MJD	Modified Julian Day
MPH	Main Product Header
NetCDF	Network Common Data Form
NOP	Near-real-time Ocean Product
NPM	Noise Power Measurement
PDS	Payload Data System
PLRM	Pseudo LRM
PTR	Point Target Response
SIRAL	Synthetic Interferometric Radar ALtimeter
SOW	Statement Of Work
SPH	Specific Product Header
TAI	International Atomic Time Reference
TBC	To Be Clarified
TBD	To Be Defined
TRK	TRaKing
UTC	Universal Time Co-ordinates
XML	eXtensible Markup Language
WGS84	World Geodetic System 1984

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2 GENERAL OVERVIEW

2.1 OVERVIEW OF THE CRYOSAT OCEAN PRODUCTION

The CryoSat ocean chains process SIRAL instrument Level 0 LRM, SAR and SARin products to generate L1b and L2 ocean products by applying the processing algorithms specified for the ocean.

The ocean processing chains provide three classes of products sorted according to their delivering latency:

- Near-Real Time Ocean Products (NOP)** – delivered three hours after acquisition
- Intermediate Ocean Products (IOP)** – delivered 48 hours after acquisition
- Geophysical Ocean Products (GOP)** – delivered one month after acquisition

The processing applied to generate these products is the same and the only difference lies in the different types of auxiliary files (i.e. corrections and orbit) used for the generation: the shorter the latency, the poorer the accuracy of the orbit used for the generation.

All these products are further classified according to processing level (L1b and L2) and the acquisition mode (LRM, SAR and SARin) and therefore the total ocean production consists of the following products:

- L1b Ocean Products – nine products:**
 - **L1b LRM (NOP, IOP and GOP)** containing LRM measurements and data
 - **L1b SAR (NOP, IOP and GOP)** containing PLRM (data acquired in SAR mode and reduced to a sequence of LRM-like echoes) and SAR measurements and data
 - **L1b SARin (NOP, IOP and GOP)** containing PLRM (data acquired in SARin mode and reduced to a sequence of LRM-like echoes) and SARin measurements and data
- L2 Ocean Products – nine products:**
 - **L2 LRM (NOP, IOP and GOP)** containing LRM measurements and data
 - **L2 SAR (NOP, IOP and GOP)** containing PLRM and SAR measurements and data
 - **L2 SARin (NOP, IOP and GOP)** containing PLRM and PSAR (i.e. the two SARin channels data averaged in the L1b processing and retracked as SAR data in the L2 processing) measurements and data

Beside the products listed above, one more set of L2 products is generated by the CryoSat Ocean Chains and they are the pole to pole products, i.e. multi-mode L2 products with a half-orbit coverage (from one pole to the other): LRM, SAR and SARin L2 products are concatenated into a single P2P product.

Accordingly, the list of products has to be completed with:

		<p style="text-align: right;"><i>CryoSat 2 Ocean Processor</i></p> <p style="text-align: right;"><i>CryoSat Ocean NetCDF PFS (L1b&L2)</i></p> <p><i>Doc. No.:</i> C2-RS-ACS-ESL-5266 <i>Issue:</i> 3.4 <i>Date:</i> 17 November 2018 <i>Page:</i> 23</p>
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❑ Pole to Pole Ocean Products – two products:

- **IOP P2P** containing LRM, SAR and SARin L2 IOP data and covering half an orbit.
- **GOP P2P** containing LRM, SAR and SARin L2 GOP data and covering half an orbit.

NOP P2P products do not exist because of the three hours latency constraint.

The complete set of the L1b and L2 CryoSat Ocean Product and their dependencies is depicted in figure 2.1-1 where each product is identified by the following file types:

The following table provides the Product Identification for each CONFORM product generated by the IPF1.

Product Identification	Description
SIR_NOPM1B	NRT L1B LRM Ocean Product
SIR_NOPR1B	NRT L1B SAR Ocean Product
SIR_NOPN1B	NRT L1B SARin Ocean Product
SIR_IOPM1B	Intermediate L1B LRM Ocean Product
SIR_IOPR1B	Intermediate L1B SAR Ocean Product
SIR_IOPN1B	Intermediate L1B SARin Ocean Product
SIR_GOPM1B	Geophysical L1B LRM Ocean Product
SIR_GOPR1B	Geophysical L1B SAR Ocean Product
SIR_GOPN1B	Geophysical L1B SARin Ocean Product
SIR_NOPM_2	NRT L2 LRM Ocean Product
SIR_NOPR_2	NRT L2 SAR Ocean Product
SIR_NOPN_2	NRT L2 SARin Ocean Product
SIR_IOPM_2	Intermediate L2 LRM Ocean Product
SIR_IOPR_2	Intermediate L2 SAR Ocean Product
SIR_IOPN_2	Intermediate L2 SARin Ocean Product
SIR_GOPM_2	Geophysical L2 LRM Ocean Product
SIR_GOPR_2	Geophysical L2 SAR Ocean Product
SIR_GOPN_2	Geophysical L2 SARin Ocean Product
SIR_IOP_2_	Intermediate L2 Pole-to-Pole Ocean Product
SIR_GOP_2_	Geophysical L2 Pole-to-Pole Ocean Product

Table 3-1: CryoSat Ocean CONFORM products list

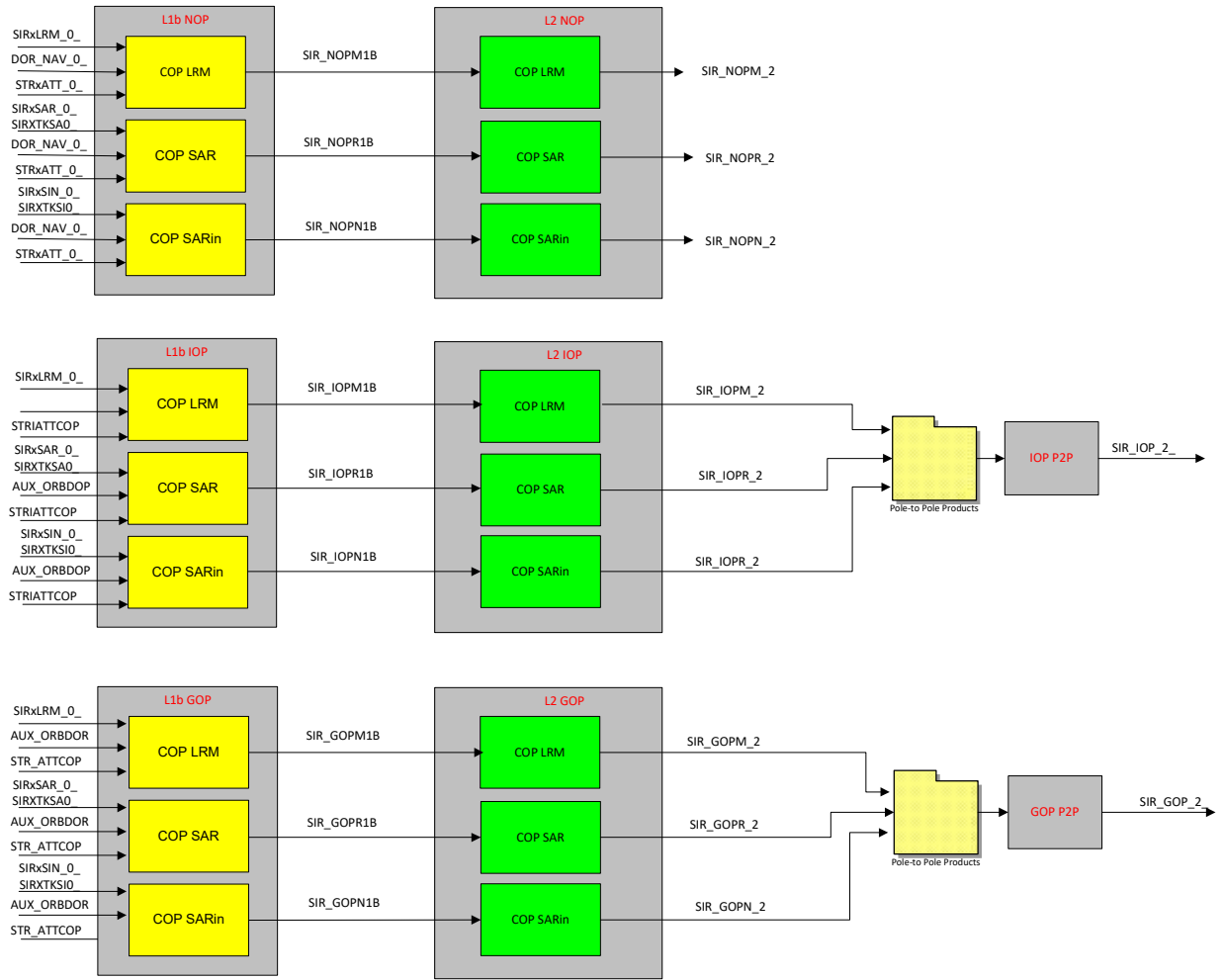


Figure 2.1-1 The CryoSat Ocean Products

		<p style="text-align: right;"><i>CryoSat 2 Ocean Processor</i></p> <p style="text-align: right;"><i>CryoSat Ocean NetCDF PFS (L1b&L2)</i></p> <p><i>Doc. No.: C2-RS-ACS-ESL-5266</i></p> <p><i>Issue: 3.4</i></p> <p><i>Date: 17 November 2018</i></p> <p><i>Page: 25</i></p>
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2.2 CRYOSAT OCEAN PRODUCTS FILE NAMES

The file name of each CryoSat Ocean Product is built up as follows:

MM_CCCC_TTTTTTTTTT_yyyymmddThhmmss_YYYYMMDDTHHMMSS_bvvv.nc

where

MM is the mission identifier **CS** for CryoSat

CCCC is the file class (i.e.: OPER for routine operation, NRT_ for Near Real Time, RPRO for Reprocessing, TEST for Testing or TIXx for stand alone IPF1 testing associated to Test Data Sets tagged as Tixx, LTA_ for products generated in the Long Term Archive).

TTTTTTTTTT is the file type and corresponds to the Product ID of the Table 3-1

yyymmddThhmmss is the validity start time and corresponds to the time of the first valid record stored in the Interim FBR.

YYYYMMDDTHHMMSS is the validity stop time and correspond to time of the last valid record stored in the Interim FBR.

b is the baseline identifier as read-in from the PCONF

vvv is the version number

For example, in case of an operational Intermediate L1B Ocean product of the SIRAL instrument in baseline C and version 1 the name could be:

CS_OPER_SIR_IOP1B_20170624T075728_20170624T080231_C001.nc

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2.3 OVERVIEW OF THE NETCDF

NetCDF (Network Common Data Form) is a set of software libraries and self-describing, machine-independent data formats that support the creation, access, and sharing of array-oriented scientific data.

The version of the NetCDF libraries used for the CryoSat ice production is **NetCDF-4 CF compliant** and consists of the following elements:

- **DIMENSIONS:**
A dimension is used to represent a real physical dimension (for example, time, latitude, longitude, and height) or to index other quantities (for example number of records or waveforms or samples). A dimension can also be used to index other quantities (waveforms index for example). A NetCDF dimension has both a name and a length and can be limited or unlimited (i.e. a dimension that can be appended to).
- **VARIABLES:**
Variables are used to store the bulk of the data in a NetCDF dataset. A variable represents an array of values of the same type. A scalar value is treated as a 0-dimensional array. A variable has a name, a data type, and a shape described by its list of dimensions specified when the variable is created. A variable may also have associated attributes, which may be added, deleted or changed after the variable is created.
- **COORDINATE VARIABLES:**
A variable can have the same name as a dimension and in this case the variable is called a coordinate variable. It typically defines a physical coordinate corresponding to that dimension. If a dimension has a corresponding coordinate variable, then this provides an alternative, and often more convenient, means of specifying position along it. Current application packages that make use of coordinate variables commonly assume they are numeric vectors and strictly monotonic (all values are different and either increasing or decreasing).
- **ATTRIBUTES:**
Attributes are used to store information about the data (ancillary data or metadata). Most attributes provide information about a specific variable. These are identified by the name (or ID) of that variable, together with the name of the attribute.
The order of the attributes, when reading netcdf product, is not guaranteed to be as provided in the current document: the templates to WRITE a netcdf product can have an order of attributes which can result in a different order when READING the product (which can use different tools, like panoply, ncdump, etc).
- **GLOBAL ATTRIBUTES:**
Some attributes provide information about the dataset as a whole and are called global attributes. In particular, the global attributes used in the CryoSat products contains the information that were present in the EE header (see [PROD-FMT])

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2.4 CRYOSAT NETCDF VARIABLE NAME CONVENTIONS

The names of the CryoSat NetCDF variables are as much as possible self-explaining and a specific effort has been done to align them to the same kind of variables used in other current and future altimetric missions (e.g. Sentinel 3 and Sentinel 6/Jason-CS).

Moreover, the following template has been used for the **L1b variables** names:

variable_name_F1_F2_F3

where:

- Variable_name is a self-explaining name for the variable. This lowercase name can contain underscores and numbers (e.g. *cor2_applied*) and it is mandatory
- F1: this field can be **01** or **20** to state whether the variable is a 1-Hz or a 20-Hz variable (e.g. *cor2_applied_20*) and it is mandatory
- F2: this field can only hold **hr** (i.e. high resolution) and it is used for the variables computed by processing native SAR or SARin waveforms. This suffix is not used for variable computed with PLRM waveforms and it is therefore optional. Example: *cor2_applied_20* or *cor2_applied_20_hr*
- F3: this field can only hold **ku** and it is used flag variable computed with data coming from the satellite (Ku-band) and therefore it is optional. Example: *cor2_applied_20_ku* or *cor2_applied_20_hr_ku* but *wind_speed_mod_v_01*

The conventions used for **L2 variables** names are alike but not exactly the same. In this case the convention is:

variable_name_F1_F4_F3

where:

- Variable_name is a self-explaining name for the variable. This lowercase name can contain underscores and numbers (e.g. *lon*) and it is mandatory
- F1: this field can be **01** or **20** to state whether the variable is a 1-Hz or a 20-Hz variable (e.g. *lon_20*) and it is mandatory
- F4: this field can only hold **plrm** and it is used for the variables computed by processing PLRM L1 data. This suffix is not used for variable computed with high resolution (SAR/SARin) L1b variables and it is therefore optional. Example: *lon_20* or *lon_20_plrm*
- F3: this field can only hold **ku** and it is used flag variable computed with data coming from the satellite (Ku-band) and therefore it is optional. Example: *lon_20_ku* or *lon_20_plrm_ku* but *wind_speed_mod_v_01*

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2.5 NETCDF PRIMITIVES

2.5.1 Dimensions and Indices

The following **dimensions** are used in the CryoSat ocean CONFORM L1b products:

Dimensions					
Name	Description	Size	Units	Type	Limited/ Unlimited
time_01	Timestamp of the 1Hz power waveforms	Number of 1 Hz measurements in the product file	UTC seconds since 2000-01-01 00:00:00.0	double	Limited
time_20_hr_ku	Timestamp of the 20Hz high resolution power waveforms	Number of 20 Hz HR measurements in the product file	TAI seconds since 2000-01-01 00:00:00.0	double	Unlimited
time_20_ku	Timestamp of the 20Hz power waveforms	Number of 20 Hz measurements in the product file	UTC seconds since 2000-01-01 00:00:00.0	double	Limited
ns_20_hr_ku	Number of samples in one high resolution waveform	Number of samples in one HR waveform	count	short	Unlimited
ns_20_ku	Number of samples in one low resolution waveform	Number of samples in one LR waveform	count	short	Limited
space_3d	3 dimensions of space (x,y,z)	3	count	short	Limited

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The following **dimensions** are used in the CryoSat ocean CONFORM L2 products:

Dimensions					
Name	Description	Size	Units	Type	Limited/ Unlimited
time_01	Timestamp of the 1Hz measurements	Number of 1 Hz measurements in the product file	UTC seconds since 2000-01-01 00:00:00.0	double	Limited
time_20_ku	Timestamp of the 20Hz measurements	Number of 20 Hz measurements in the product file	UTC seconds since 2000-01-01 00:00:00.0	double	Limited
time_20_plrm_ku	Timestamp of the 20Hz low resolution measurements	Number of 20 Hz low resolution measurements in the product file	TAI seconds since 2000-01-01 00:00:00.0	double	Unlimited

The following **indices** are used in the CryoSat ocean products:

Indices				
Name	Description	L1B	L2	
ind_first_meas_20hz_01	Index of the first 20Hz measurement of the 1Hz packet	x	x	
ind_first_meas_20hz_01_plrm_ku	Index of the first 20Hz PLRM measurement of the 1Hz packet		x	
ind_meas_1hz_20_ku	Index of the 1Hz measurement to which belongs the 20Hz measurement	x	x	
ind_meas_1hz_20_plrm_ku	Index of the 1Hz measurement to which belongs the 20Hz PLRM measurement		x	

2.5.2 Types

The following **types** are used in the CryoSat ocean CONFORM products:

Types	
Name	Description
byte	8-bit data signed
short	16-bit signed integer

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int	32-bit signed integer
double	IEEE double precision floating point (64 bits)

2.5.3 Attributes

The following **attributes** are used in the CryoSat ocean CONFORM products:

Attributes	
Name	Description
add_offset	If present, this number is to be added to the date after it is read by an application. If both <i>scale_factor</i> and <i>add_offset</i> attributes are present, the date are first scaled before the offset is added.
calendar	Reference time calendar
comment	Miscellaneous information about the data or the methods used to produce it
coordinates	Identified auxiliary coordinates variables
_FillValue	A value used to represent missing or undefined data
flag_meanings	Use in conjunction with <i>flag_values</i> to provide descriptive words or phrase for each flag value.
flag_values	Provide a list of the flag values. Use in conjunction with <i>flag_meanings</i> .
flag_mask	Provide a list of number of independent Boolean conditions using bit field notation. Use in conjunction with <i>flag_meanings</i> .
institution	Institution which provides the data
long_name	A descriptive name that indicates a variable's content. This name is not standardized.
quality_flag	Name of the variable(s) (quality flag) representing the quality of the current variable
scale_factor	If present, the date is to be multiplied by this factor after the data are read by an application. See also <i>add_offset</i> attribute
source	Data source (model features, or observation)
standard_name	A standard name that references a description of a variables' content in the standard name table .
tai_utc_difference	Difference between TAI and UTC reference time
units	Unit of a variable's content. The value of this attribute must be a string that can be recognized by the UNIDATA's Udunits package .

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3 L1B PRODUCT FORMAT SPECIFICATION

3.1 L1B PRODUCT FORMAT SPECIFICATION – LIST OF VARIABLES

The contents of the CryoSat science ocean products can be logically grouped in:

1. 20-Hz Time and Orbit
2. 20-Hz Measurements
3. 1-Hz Time and Orbit
4. 1-Hz Corrections
5. 20-Hz-Waveforms

This logical classification could be implemented in the NetCDF 4.0 model by means of a specific structure called **group**, however this feature is not used in the CryoSat products because users could be forced to update their existing analysis/visualisation tools in order to keep up with these new NetCDF features.

Nevertheless the logic behind this grouping is kept in the definition of the products and the remaining of this section will follow this hierarchy for the format specification.

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3.1.1 20-Hz Time and Orbit

20-Hz Time and Orbit				
Variable Name	Dimension	long_name	units	EE Field
time_20_ku	time_20_ku	UTC: 20 Hz	s	20-Hz Data Record Time (MDSR Time Stamp)
time_20_hr_ku	time_20_hr_ku	TAI: 20 Hz HR	s	/
ind_meas_1hz_20_ku	time_20_ku	index of the 1Hz measurement: 20 Hz	count	/
flag_instr_op_mode_20_ku	time_20_ku	mode id - operative mode: 20 Hz	FLAG	/
flag_instr_op_mode_20_hr_ku	time_20_hr_ku	mode id - operative mode : 20 Hz from HR data	FLAG	20-Hz Mode ID
flag_instr_mode_att_ctrl_20_hr_ku	time_20_hr_ku	mode id -platform attitude control: 20 Hz from HR data	FLAG	/
flag_instr_mode_flags_20_hr_ku	time_20_hr_ku	mode id - identifies the siral instrument measurement mode from HR data	FLAG	/
seq_count_20_ku	time_20_ku	sequence counter: 20 Hz	count	20-Hz Source Sequence Counter



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20-Hz Time and Orbit				
Variable Name	Dimension	long_name	units	EE Field
seq_count_20_hr_ku	time_20_hr_ku	sequence counter: 20 Hz from HR data	count	/
flag_instr_conf_rx_in_use_20_ku	time_20_ku	instrument configuration flag - rx chain in use : 20 Hz	FLAG	20-Hz Instrument Configuration
flag_instr_conf_rx_in_use_hr_20_ku	time_20_hr_ku	instrument configuration flag - rx chain in use : 20 Hz from HR data	FLAG	/
flag_instr_conf_rx_bwdt_20_ku	time_20_ku	instrument configuration flag - bandwidth: 20 Hz	FLAG	20-Hz Instrument Configuration
flag_instr_conf_rx_bwdt_20_hr_ku	time_20_hr_ku	instrument configuration flag - bandwidth: 20 Hz from HR data	FLAG	/
flag_instr_conf_rx_trk_mode_20_ku	time_20_ku	instrument configuration flag - tracking mode: 20 Hz	FLAG	20-Hz Instrument Configuration
flag_instr_conf_rx_trk_mode_20_hr_ku	time_20_hr_ku	instrument configuration flag - tracking mode: 20 Hz from HR data	FLAG	/
flag_instr_conf_rx_flags_20_ku	time_20_ku	instrument configuration flag - flags: 20 Hz	FLAG	20-Hz Instrument Configuration



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20-Hz Time and Orbit				
Variable Name	Dimension	long_name	units	EE Field
flag_instr_conf_rx_flags_20_hr_ku	time_20_hr_ku	instrument configuration flag - flags: 20 Hz from HR data	FLAG	/
rec_count_20_ku	time_20_ku	record counter: 20 Hz	count	20-Hz Burst counter
rec_count_20_hr_ku	time_20_hr_ku	record counter: 20 Hz from HR data	count	/
lat_20_ku	time_20_ku	latitude: 20 Hz	degrees_north	20-Hz Latitude of measurement
lat_20_hr_ku	time_20_hr_ku	latitude: 20 Hz from HR data	degrees_north	/
lon_20_ku	time_20_ku	longitude: 20 Hz	degrees_east	20-Hz Longitude of measurement
lon_20_hr_ku	time_20_hr_ku	longitude: 20 Hz from HR data	degrees_east	/
alt_20_ku	time_20_ku	altitude of CoM above reference ellipsoid [WGS84]: 20 Hz	m	20-Hz Altitude of CoM above reference ellipsoid
alt_20_hr_ku	time_20_hr_ku	altitude of CoM above reference ellipsoid [WGS84] : 20 Hz from HR data	m	/



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20-Hz Time and Orbit				
Variable Name	Dimension	long_name	units	EE Field
orb_alt_rate_20_ku	time_20_ku	centre of mass altitude rate with respect to the reference ellipsoid [WGS84]: 20 Hz	m/s	20-Hz Instantaneous altitude rate derived from orbit Satellite velocity vector
orb_alt_rate_20_hr_ku	time_20_hr_ku	centre of mass altitude rate with respect to the reference ellipsoid [WGS84]: 20 Hz from HR data	m/s	/
flag_mcd_20_ku	time_20_ku	measurement confidence data: 20 Hz	FLAG	20-Hz Level 1b Measurement Confidence Data (flag word)
flag_mcd_20_hr_ku	time_20_hr_ku	measurement confidence data: 20 Hz from HR data	FLAG	/
flag_instr_conf_rx_str_in_use_20_hr_ku	time_20_hr_ku	instrument configuration flags: star tracker used: 20 Hz form HR data	FLAG	/
inter_base_vec_20_hr_ku	time_20_hr_ku,space_3d	interferometric baseline direction vector in crf from HR data	m	/



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20-Hz Time and Orbit				
Variable Name	Dimension	long_name	units	EE Field
off_nadir_roll_angle_str_20_hr_ku	time_20_hr_ku	off nadir roll angle derived from star tracker data: 20 Hz from HR data	degrees	/
off_nadir_pitch_angle_str_20_hr_ku	time_20_hr_ku	off nadir pitch angle derived from star tracker data: 20 Hz from HR data	degrees	/
off_nadir_yaw_angle_str_20_hr_ku	time_20_hr_ku	off nadir yaw angle derived from star tracker data: 20 Hz from HR data	degrees	/
ph_diff_waveform_20_hr_ku	time_20_hr_ku,ns_20_hr_ku	l1b Phase Difference waveform	rad	/
sat_vel_vec_20_hr_ku	time_20_hr_ku,space_3d	velocity vector in itrfr	m/s	/
beam_dir_vec_20_hr_ku	time_20_hr_ku,space_3d	real beam direction vector in crf	m	/

Table 3.1.1-1 – 20-Hz Time and Orbit Variables



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3.1.2 20-Hz Measurements

20-Hz Measurements				
Variable Name	Dimension	long_name	units	EE Field
window_del_20_hr_ku	time_20_hr_ku	calibrated window delay (2way)	s	/
tracker_range_20_ku	time_20_ku	corrected tracker range: 20 Hz	m	20-Hz Tracker Range
h0_applied_20_ku	time_20_ku	range height initial word (12.5/256 ns): 20 Hz	count	20-Hz H0 Initial Height Word
h0_applied_20_hr_ku	time_20_hr_ku	range height initial word: 20 Hz from HR data	s	/
agc_ch1_20_hr_ku	time_20_hr_ku	agc gain applied on rx channel 1 HR. Gain calibration corrections are applied	dB	/
agc_ch2_20_hr_ku	time_20_hr_ku	agc gain applied on rx channel 2 HR. Gain calibration corrections are applied	dB	/
cor2_applied_20_ku	time_20_ku	range height rate initial word (3.05 ps): 20 Hz	count	20-Hz COR2 Height Rate
cor2_applied_20_hr_ku	time_20_hr_ku	range height rate initial word: 20 Hz cor2 height rate	seconds/r c	/



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20-Hz Measurements				
Variable Name	Dimension	long_name	units	EE Field
h0_lai_word_20_ku	time_20_ku	coarse range word (12.5 ns): 20 Hz	count	20-Hz Coarse Range word LAI
h0_lai_word_20_hr_ku	time_20_hr_ku	coarse range word (12.5 ns): 20 Hz from HR data	s	/
h0_fai_word_20_ku	time_20_ku	fine range word (12.5/256 ns): 20 Hz	count	20-Hz Fine Range word FAI
h0_fai_word_20_hr_ku	time_20_hr_ku	fine range word (12.5/256 ns): 20 Hz from HR data	s	/
uso_cor_20_ku	time_20_ku	uso correction on the altimeter range (2-way): 20 Hz	m	20-Hz USO drift correction
uso_cor_20_hr_ku	time_20_hr_ku	uso correction on the altimeter range (2-way): 20 Hz from HR data	/	/
dop_cor_20_ku	time_20_ku	doppler correction on the altimeter range: 20 Hz	m	20-Hz Doppler correction
dop_cor_20_hr_ku	time_20_hr_ku	doppler correction on the altimeter range: 20 Hz from HR data	m	/



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20-Hz Measurements				
Variable Name	Dimension	long_name	units	EE Field
instr_cor_range_tx_rx_20_hr_ku	time_20_hr_ku	2-way instrument range correction (tx-rx chain) from HR data	m	/
instr_cor_range_rx_20_hr_ku	time_20_hr_ku	2-way instrument range correction (rx only chain) from HR data	m	/
instr_cor_gain_tx_rx_20_hr_ku	time_20_hr_ku	instrument gain correction (tx-rx chain) from HR data	dB	/
instr_cor_gain_rx_20_hr_ku	time_20_hr_ku	instrument gain correction (rx only chain) from HR data	dB	/
instr_int_ph_cor_20_hr_ku	time_20_hr_ku	internal phase correction computed from the cal-4 from HR data	rad	/
instr_ext_ph_cor_20_hr_ku	time_20_hr_ku	external phase correction taken from the ipfdb file from HR data	rad	/
agc_20_ku	time_20_ku	corrected AGC: 20 Hz	dB	20-Hz AGC
tot_gain_ch1_20_hr_ku	time_20_hr_ku	total fixed gain on channel 1 HR	dB	/
tot_gain_ch2_20_hr_ku	time_20_hr_ku	total fixed gain on channel 2 HR	dB	/
transmit_pwr_20_hr_ku	time_20_hr_ku	transmitted power from HR data	Watt	/



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20-Hz Measurements				
Variable Name	Dimension	long_name	units	EE Field
scale_factor_20_ku	time_20_ku	scaling factor for backscatter coefficient evaluation: 20 Hz	dB	20-Hz Scaling Factor for Backscatter Coefficient Evaluation
noise_power_20_ku	time_20_ku	noise power measurement: 20 Hz	dB	20-Hz Noise power measurement
noise_power_20_hr_ku	time_20_hr_ku	noise power measurement: 20 Hz from HR data	dB	/
ph_slope_cor_20_hr_ku	time_20_hr_ku	phase slope correction from HR data	rad	/

Table 3.1.2-1 – 20-Hz Measurements Variables



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3.1.3 1-Hz Time and Orbit

20-Hz Time and Orbit Group				
Variable Name	Dimension	long_name	units	EE Field
time_01	time_01	UTC: 1 Hz	seconds since 2000-01-01 00:00:00.0	Data Record Time (MDSR Time Stamp)
ind_first_meas_20hz_01	time_01	index of the first 20Hz measurement: 1 Hz	count	/
num_meas_20hz_01	time_01	number of 20Hz measurements: 1 Hz	count	/
lat_01	time_01	latitude: 1 Hz	degrees_north	Latitude of measurement
lon_01	time_01	longitude: 1 Hz	degrees_east	Longitude of measurement
alt_01	time_01	altitude of CoM above reference ellipsoid [WGS84]: 1 Hz	m	Altitude of CoM above reference ellipsoid
orb_alt_rate_01	time_01	centre of mass altitude rate with respect to the reference ellipsoid [WGS84]: 1 Hz	m/s	Instantaneous altitude rate derived from orbit Satellite velocity vector

Table 3.1.3-1 – 1-Hz Time and Orbit Variables



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3.1.4 1-Hz Corrections Group

1-Hz Corrections				
Variable Name	Dimension	long_name	units	EE Field
cog_cor_01	time_01	distance antenna-CoM correction on altimeter range: 1 Hz	m	Distance antenna- CoM
uso_cor_01_ku	time_01	uso correction on the altimeter range (2-way): 1 Hz	m	USO drift correction
dop_cor_01_ku	time_01	doppler correction on the altimeter range: 1 Hz	m	Doppler correction
int_path_cor_01	time_01	internal path correction on the altimeter range: 1 Hz	m	Range internal calibration correction (CAL1)
agc_01_ku	time_01	corrected AGC: 1 Hz	dB	AGC (Corrected)
agc_cor_01	time_01	correction for instrumental errors on AGC: 1 Hz	dB	AGC Correction
internal_cor_sig0_01	time_01	internal calibration correction on the backscatter coefficient: 1 Hz	dB	Backscatter coefficient internal calibration correction (CAL1)



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1-Hz Corrections				
Variable Name	Dimension	long_name	units	EE Field
mod_dry_tropo_cor_01	time_01	model dry tropospheric correction: 1 Hz	m	Dry Tropospheric Correction
mod_wet_tropo_cor_01	time_01	model wet tropospheric correction: 1 Hz	m	Wet Tropospheric Correction
inv_bar_cor_01	time_01	inverted barometer height correction: 1 Hz	m	Inverse Barometric Correction
hf_fluct_cor_01	time_01	high frequency fluctuations of the sea surface topography: 1 Hz	m	Dynamic Atmospheric Correction
iono_cor_gim_01	time_01	GIM ionospheric correction: 1 Hz	m	GIM Ionospheric Correction
ocean_tide_sol1_01	time_01	geocentric ocean tide height (solution 1): 1 Hz	m	Elastic Ocean Tide
ocean_tide_sol2_01	time_01	geocentric ocean tide height (solution 2): 1 Hz	m	Elastic Ocean Tide
ocean_tide_eq_01	time_01	equilibrium long-period ocean tide height: 1 Hz	m	Long Period Ocean Tide
ocean_tide_non_eq_01	time_01	non-equilibrium long-period ocean tide height: 1 Hz	m	/



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1-Hz Corrections				
Variable Name	Dimension	long_name	units	EE Field
load_tide_sol1_01	time_01	load tide height for geocentric ocean tide (solution 1): 1 Hz	m	Ocean Loading Tide
load_tide_sol2_01	time_01	load tide height for geocentric ocean tide (solution 2): 1 Hz	m	Ocean Loading Tide
solid_earth_tide_01	time_01	solid earth tide height: 1 Hz	m	Solid Earth Tide
pole_tide_01	time_01	geocentric tide height: 1 Hz	m	Geocentric Polar Tide
wind_speed_mod_u_01	time_01	U component of the model wind vector: 1 Hz	m/s	U-component of the wind vector
wind_speed_mod_v_01	time_01	V component of the model wind vector: 1 Hz	m/s	V-component of the wind vector
surf_type_01	time_01	surface type: 1 Hz	FLAG	Surface type flag
flag_cor_status_01	time_01	correction status flag: 1 Hz	FLAG	Correction status flags
flag_cor_err_01	time_01	correction error flag: 1 Hz	FLAG	Correction error flags

Table 3.1.4-1 – 1-Hz Corrections Variables



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3.1.5 20-Hz Waveforms

20-Hz Waveform				
Variable Name	Dimension	long_name	units	EE Field
pwr_waveform_20_ku	time_20_ku, ns_20_ku	waveform samples (scaled): 20 Hz	count	20-Hz Scaled Power Echo Waveform [128]
echo_scale_pwr_20_hr_ku	time_20_hr_ku	echo scale power (a power of 2) from HR data	count	/
pwr_waveform_20_hr_ku	time_20_hr_ku, ns_20_hr_ku	l1b power waveform scaled 0-65535 from HR data	count	/
echo_scale_20_ku	time_20_ku	echo scale factor: 20 Hz	count	20-Hz Echo Scale Factor
echo_scale_20_hr_ku	time_20_hr_ku	echo scale factor : 20 Hz from HR data (to scale echo to watts)	count	/
echo_numval_20_ku	time_20_ku	number of echoes averaged: 20 Hz	count	20-Hz Number of echoes averaged
echo_numval_20_hr_ku	time_20_hr_ku	number of echoes averaged: 20 Hz from HR data	count	/



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20-Hz Waveform				
Variable Name	Dimension	long_name	units	EE Field
flag_echo_20_hr_ku	time_20_hr_ku	flags for errors or information about L1b 20Hz power waveform from HR data	FLAG	/
flag_trk_cycle_20_ku	time_20_ku	tracking cycle report: 20 Hz	FLAG	20-Hz Flags
flag_trk_cycle_20_hr_ku	time_20_hr_ku	tracking cycle report: 20 Hz from HR data	FLAG	/
dop_angle_start_20_hr_ku	time_20_hr_ku	doppler angle start from HR data	rad	/
dop_angle_stop_20_hr_ku	time_20_hr_ku	doppler angle stop from HR data	rad	/
look_angle_start_20_hr_ku	time_20_hr_ku	look angle start from HR data	rad	/
look_angle_stop_20_hr_ku	time_20_hr_ku	look angle stop from HR data	rad	/
stack_number_after_weighting_20_hr_ku	time_20_hr_ku	number of contributing beams in the stack after weighting from HR data	count	/
stack_number_before_weighting_20_hr_ku	time_20_hr_ku	number of contributing beams in the stack before weighting from HR data	count	/
coherence_waveform_20_hr_ku	time_20_hr_ku	l1b coherence waveform from HR data	count	/



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20-Hz Waveform				
Variable Name	Dimension	long_name	units	EE Field
stack_std_20_hr_ku	time_20_hr_ku	Gaussian power fitting: std wrt beam number from HR data	count	/
stack_centre_20_hr_ku	time_20_hr_ku	gaussian power fitting: center wrt beam number from HR data	count	/
stack_scaled_amplitude_20_hr_ku	time_20_hr_ku	gaussian power fitting: amplitude from HR data	dB	/
stack_skewness_20_hr_ku	time_20_hr_ku	gaussian power fitting: skewness wrt beam number from HR data	count	/
stack_kurtosis_20_hr_ku	time_20_hr_ku	gaussian power fitting: kurtosis wrt beam number from HR data	count	/
stack_std_angle_20_hr_ku	time_20_hr_ku	gaussian power fitting: std wrt boresight angle from HR data	rad	/
stack_centre_angle_20_hr_ku	time_20_hr_ku	gaussian power fitting: center wrt boresight angle from HR data	rad	/

Table 3.1.5-1 – 20-Hz Waveforms Variables



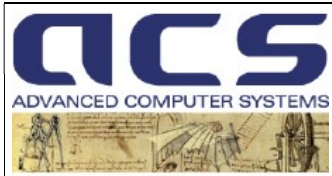
3.2 L1B PRODUCT FORMAT SPECIFICATION – GLOBAL ATTRIBUTES

The global attributes contains general information about the product and are listed in this section.

The classification of each attribute is adopted for the sake of clarity and to trace each attribute back to the EE Header field where the attribute comes from.

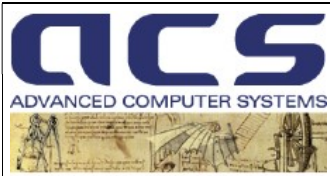
In any real product the attributes are not grouped but simply listed inside the CONFORM product.

Product Identification Information		
Attribute Name	Description	Values
product_name	Product File Name	any string
processing_stage	Processing stage code identifier.	RPRO = Reprocessing OFFL = Routine Operation NRT_ = Near Real Time TEST = Test LTA_ = Long Term Archive
reference_document	Reference DFCB Document describing the product	any string
acquisition_station	Acquisition station	Kiruna
mission	Mission	
processing_centre	Processing center	



Data Processing Information		
Attribute Name	Description	Values
creation_time	Processing Time (Product Generation Time)	
sensing_start	Sensing start	
sensing_stop	Sensing stop	
software_version	Processor Name and software version number	

Orbit Information		
Attribute Name	Description	Values
phase	Phase Code (set to X if not used)	
cycle_number	Cycle Number	
rel_orbit_number	Relative Orbit Number at sensing start time	
abs_orbit_number	Absolute Orbit Number at sensing start time	
state_vector_time	UTC state vector time	
delta_ut1	Universal Time Correction: DUT1 = UT1 – UTC	
x_position	X position in Earth Fixed Reference If not used set to +0000000.000	
y_position	Y position in Earth Fixed Reference If not used set to +0000000.000	
z_position	Z position in Earth Fixed Reference If not used set to +0000000.000	
x_velocity	X velocity in Earth Fixed Reference If not used set to +0000.000000	
y_velocity	Y velocity in Earth Fixed Reference If not used set to +0000.000000	
z_velocity	Z velocity in Earth Fixed Reference	



Orbit Information		
Attribute Name	Description	Values
	If not used set to +0000.000000	
vector_source	Source of Orbit State Vector Record	fos_predicted doris_navigator doris_precise fos_restituted doris_preliminary

Leap Second Information		
Attribute Name	Description	Values
leap_utc	UTC Time of the occurrence of the leap second. If a leap second occurred in the product window the field is set by a devoted function in the CFI EXPLORER_ORBIT library (see [EXPL_ORB-SUM] for details), otherwise it is not set. It corresponds to the time after the Leap Second occurrence (i.e. midnight of the day after the leap second)	
leap_sign	If a leap second occurred in the product window the field is set to the expected value by a devoted function in the CFI EXPLORER_ORBIT library (see [EXPL_ORB-SUM] for details), otherwise it is not set	
leap_err	This field is always not set considering that CRYOSAT products have true UTC times	

Product Confidence Data Information		
Attribute Name	Description	Values
product_err	Product Error Flag	1 errors have been reported in the Product 0 no errors



Product Time Information		
Attribute Name	Description	Values
first_record_time	TAI of the first record in the Main MDS of this product	
last_record_time	TAI of the last record in the Main MDS of this product	

Product Orbit Information		
Attribute Name	Description	Values
abs_orbit_start	Absolute Orbit Number at sensing start time.	
rel_time_asc_node_start	Relative time since crossing ascending node time relative to start time of data sensing.	
abs_orbit_stop	Absolute Orbit Number at sensing stop time.	
rel_time_asc_node_stop	Relative time since crossing ascending node time relative to stop time of data sensing.	
equator_cross_time	Time of equator crossing at the ascending node relative to the sensing start time.	
equator_cross_long	Longitude of equator crossing at the ascending node relative to the sensing start time (positive East, 0 = Greenwich) referred to WGS84.	
ascending_flag	Orbit Orientation at the sensing start time	A=Ascending D=Descending

Product Location Information		
Attribute Name	Description	Values
first_record_lat	WGS84 latitude of the first record in the Main MDS (positive north)	
first_record_lon	WGS84 longitude of the first record in the Main MDS (positive East, 0 = Greenwich)	
last_record_lat	WGS84 latitude of the last record in the Main MDS (positive north)	



Product Location Information		
Attribute Name	Description	Values
last_record_lon	WGS84 longitude of the last record in the Main MDS (positive East, 0 = Greenwich)	

SIRAL Level 0 Quality information		
Attribute Name	Description	Values
l0_proc_flag	Processing errors significance flag	1 errors (percentage of errors greater than threshold) 0 no errors
l0_processing_quality	Percentage of quality checks successfully passed during ISP processing	max allowed +10000
l0_proc_thresh	Minimum acceptable percentage of quality threshold that must be passed during ISP processing	max allowed +10000
l0_gaps_flag	Flag to indicate gaps in input data	1 gaps 0 no gaps
l0_gaps_num	Number of gaps detected during ISP processing	

SIRAL Instrument Configuration		
Attribute Name	Description	Values
instr_id	Instrument_Identifier	A = SIRAL Nominal B = SIRAL Redundant
sir_op_mode	SIRAL Operative Mode	lrm sar sarin
sir_configuration	SIRAL Rx Configuration	rx_1 rx_2 both



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SIRAL Instrument Configuration		
Attribute Name	Description	Values
		unknown

Level 1 Surface Statistics		
Attribute Name	Description	Values
open_ocean_percent	Percentage of output L1B records detected on open ocean or semi-enclosed seas	Percentage in 10 ²
close_sea_percent	Percentage of output L1B records detected on close seas or lakes	Percentage in 10 ²
continent_ice_percent	Percentage of output L1B records detected on continental ice	Percentage in 10 ²
land_percent	Percentage of output L1B records detected on land	Percentage in 10 ²

SIRAL Level 1 Processing information		
Attribute Name	Description	Values
l1b_prod_status	Complete/Incomplete Product Completion Flag (0 or 1). 1 if the product has a duration shorter than the input Level 0	
l1b_proc_flag	Processing errors significance flag 1 errors (percentage of errors greater than threshold) 0 no errors	
l1b_proc_flag_hr	HR Processing errors significance flag (Not available for IOPM, GOPM and NOPM cases) 1 errors (percentage of errors greater than threshold) 0 no errors	
l1b_processing_quality	Percentage of quality checks successfully passed during Level 1B processing (max allowed +10000)	



SIRAL Level 1 Processing information		
Attribute Name	Description	Values
l1b_processing_quality_hr	HR Percentage of quality checks successfully passed during Level 1B HR processing (Not available for IOPM, GOPM and NOPM cases) (max allowed +10000)	
l1b_proc_thresh	Minimum acceptable percentage of quality threshold that must be passed during Level 1B processing (max allowed +10000)	
l1b_proc_thresh_hr	HR Minimum acceptable percentage of quality threshold that must be passed during Level 1B HR processing (Not available for IOPM, GOPM and NOPM cases) (max allowed +10000)	

Reference DSD		
Attribute Name	Description	Values
xref_siral_l0	SIRAL L0 file name(s)	
xref_siral_l0_hr	SIRAL L0 file name(s) for HR processing (Not available for IOPM, GOPM and NOPM cases)	
xref_uso	USO file name	
xref_uso_hr	USO file name for HR processing (Not available for IOPM, GOPM and NOPM cases)	
xref_orbit	Orbit file name(s)	
xref_orbit_hr	Orbit file name(s) for HR processing (Not available for IOPM, GOPM and NOPM cases)	
xref_siral_characterisation	SIRAL IPFDB file name	
xref_siral_characterisation_hr	SIRAL IPFDB file name for HR processing (Not available for IOPM, GOPM and NOPM cases)	
xref_meteo	Meteo file name(s)	
xref_pole_location	Pole location file name	



Reference DSD		
Attribute Name	Description	Values
xref_gim	GIM file name(s)	
xref_mog2d	MOG2D file name(s)	
xref_cal1	L1B CAL1 file name	
xref_cal1_hr	L1B CAL1 file name for HR processing (Not available for IOPM, GOPM and NOPM cases)	
xref_cal_sarin	L1B CAL1 SARIN file name	
xref_cal2	L1B CAL2 file name	
xref_cal2_hr	L1B CAL2 file name for HR processing (Not available for IOPM, GOPM and NOPM cases)	
xref_constants	Constants File	
xref_earth_tide	Cartwright File	
xref_long_period_tide	FES File	
xref_mean_pressure	Mean Pressure File for Meteo Correction generated by using either analysis or forecast data	
xref_ocean_tide_sol1	Sol1 File for Ocean Tide	
xref_ocean_tide_sol2	Sol2 File for Ocean Tide	
xref_pconf	Processor Configuration Parameters File	
xref_orbit_scenario	Orbit scenario file name	
xref_surf_pressure	Surface Pressure File for Meteo Correction generated by using either analysis or forecast data	
xref_surf_type	Surface Type Map File	
xref_tidal_load_sol1	Solution 1 File for Tidal Loading	
xref_tidal_load_sol2	Solution 2 File for Tidal Loading	
xref_u_wind	U Wind component File for Meteo Correction generated by using either analysis or forecast data	
xref_v_wind	V Wind component File for Meteo Correction generated by using either analysis or forecast data	

Reference DSD		
Attribute Name	Description	Values
xref_wet_trop	Wet Troposphere File for Meteo Correction generated by using either analysis or forecast data	
xref_star_tracker_0	Star Tracker Level 0 File	
xref_star_tracker_attcop	Star Tracker Level 1b File	

3.3 TABLE OF REFERENCE DSD VS L1B PROCESSORS

		PROCESSORS									
		L1B									
		NOP LRM	NOP SAR	NOP SRN	IOP LRM	IOP SAR	IOP SRN	GOP LRM	GOP SAR	GOP SRN	
Input Data File	File Type										
xref_siral_I0/ xref_siral_I0_hr	SIR1LRM_0_ SIR2LRM_0_	M			M			M			
	SIR1SAR_0_ SIR2SAR_0_		M			M			M		
	SIR1SIN_0_ SIR2SIN_0_			M			M			M	
	SIR1TKSA0_ SIR2TKSA0_		M			M			M		
	SIR1TKSIO_ SIR2TKSIO_			M			M			M	
	xref_pconf	None	M	M	M	M	M	M	M	M	M
	xref_siral_characterisation/ xref_siral_characterisation_hr	AUX_IPFDBA AUX_IPFDBB	M	M	M	M	M	M	M	M	M
xref_orbit_scenario	MPL_ORBREF	M	M	M	M	M	M	M	M	M	
xref_orbit/xref_orbit_hr	DOR_NAV_0	M	M	M							
	AUX_ORBDOP				M	M	M				
	AUX_ORBDOR							M	M	M	
	MPL_ORBPREF	M	M	M	M	M	M	M	M	M	
xref_uso	DOR_USO_0_	M	M	M	M	M	M	M	M	M	
xref_surf_pressure	AUX_SURFPS				M	M	M	M	M	M	
	AUXISURFPS	O	O	O							



		PROCESSORS								
		L1B								
		NOP LRM	NOP SAR	NOP SRN	IOP LRM	IOP SAR	IOP SRN	GOP LRM	GOP SAR	GOP SRN
xref_mean_pressure	AUX_SEAMPS				M	M	M	M	M	M
	AUXISEAMPS	O	O	O						
xref_wet_trop	AUX_WETTRP				M	M	M	M	M	M
	AUXIWETTRP	O	O	O						
xref_u_wind	AUX_U_WIND				M	M	M	M	M	M
	AUXIU_WIND	O	O	O						
xref_v_wind	AUX_V_WIND				M	M	M	M	M	M
	AUXIV_WIND	O	O	O						
xref_meteo	AUX_ALTGRD	M	M	M	M	M	M	M	M	M
xref_mog2d	AUX_MOG_2D							M	M	M
	AUXIMOG_2D	O	O	O	O	O	O			
xref_pole_location	AUX_POLLOC	M	M	M	M	M	M	M	M	M
xref_gim	AUX_IONGIM				M	M	M	M	M	M
	AUXIIONGIM	O	O	O						
xref_cal1/xref_cal1_hr	SIR1LRC11B	M			M			M		
	SIR2LRC11B									
	SIR1SAC11B		M	M		M	M		M	M
	SIR2SAC11B									
	SIR_SIC11B			M			M			M
xref_cal2/xref_cal2_hr	SIR1SAC21B	M	M		M	M		M	M	
	SIR2SAC21B									



		PROCESSORS								
		L1B								
		NOP LRM	NOP SAR	NOP SRN	IOP LRM	IOP SAR	IOP SRN	GOP LRM	GOP SAR	GOP SRN
	SIR1SIC21B SIR2SIC21B			M			M			M
xref_star_tracker_0	STR_		O	O						
xref_star_tracker_attcop	STR_ATT COP					M	M		M	M
xref_constants	None	M	M	M	M	M	M	M	M	M
xref_earth_tide	None	M	M	M	M	M	M	M	M	M
xref_ocean_tide_sol1	None	M	M	M	M	M	M	M	M	M
xref_ocean_tide_sol2	None	M	M	M	M	M	M	M	M	M
xref_long_period_tide	None	M	M	M	M	M	M	M	M	M
xref_surf_type	None	M	M	M	M	M	M	M	M	M
xref_tidal_load_sol1	None	M	M	M	M	M	M	M	M	M
xref_tidal_load_sol2	None	M	M	M	M	M	M	M	M	M



3.4 L1B PRODUCT FORMAT SPECIFICATION – CDL DUMP

3.4.1 agc_01_ku(time_01)

```
short agc_01_ku(time_01) ;  
    agc_01_ku:_FillValue = -32768s;  
    agc_01_ku:long_name = "corrected AGC: 1 Hz" ;  
    agc_01_ku:units = "dB" ;  
    agc_01_ku:add_offset = 0. ;  
    agc_01_ku:scale_factor = 0.01 ;  
    agc_01_ku:coordinates = "lon_01 lat_01" ;  
    agc_01_ku:comment = "AGC corrected for instrumental errors [agc_cor_01]"  
;
```

3.4.2 agc_20_ku(time_20_ku)

```
short agc_20_ku(time_20_ku) ;  
    agc_20_ku:_FillValue = -32768s;  
    agc_20_ku:long_name = "corrected AGC: 20 Hz" ;  
    agc_20_ku:units = "dB" ;  
    agc_20_ku:add_offset = 0. ;  
    agc_20_ku:scale_factor = 0.01 ;  
    agc_20_ku:coordinates = "lon_20_ku lat_20_ku" ;  
    agc_20_ku:comment = "AGC corrected for instrumental errors [agc_cor_01]"  
;
```

3.4.3 agc_ch1_20_hr_ku(time_20_hr_ku)

```
int agc_ch1_20_hr_ku(time_20_hr_ku) ;  
    agc_ch1_20_hr_ku:_FillValue = -2147483648;  
    agc_ch1_20_hr_ku:units = "dB" ;  
    agc_ch1_20_hr_ku:long_name = "agc gain applied on rx channel 1 HR. Gain  
                                calibration corrections are applied" ;  
    agc_ch1_20_hr_ku:comment = "Calibrated AGC gain applied on Rx channel 1.  
                                This is the sum of AGC stages 1 and 2 plus  
                                the corresponding corrections given in the  
                                variable instr_cor_gain_tx_rx_20_ku." ;  
    agc_ch1_20_hr_ku:add_offset = 0.0 ;  
    agc_ch1_20_hr_ku:scale_factor = 0.01 ;
```

3.4.4 agc_ch2_20_hr_ku(time_20_hr_ku)

```
int agc_ch2_20_hr_ku(time_20_hr_ku) ;  
    agc_ch2_20_hr_ku:_FillValue = -2147483648 ;  
    agc_ch2_20_hr_ku:units = "dB" ;  
    agc_ch2_20_hr_ku:long_name = "agc gain applied on rx channel 2 HR. gain  
                                calibration corrections are applied" ;  
    agc_ch2_20_hr_ku:comment = "Calibrated AGC gain applied on Rx channel 2.  
                                This is the sum of AGC stages 1 and 2 plus the corresponding corrections given  
                                in the variable instr_cor_gain_rx_20_ku." ;  
    agc_ch2_20_hr_ku:add_offset = 0.0 ;  
    agc_ch2_20_hr_ku:scale_factor = 0.01 ;
```



3.4.5 agc_cor_01(time_01)

```
short agc_cor_01(time_01) ;
    agc_cor_01: FillValue = -32768s;
    agc_cor_01:long_name = "correction for instrumental errors on AGC: 1 Hz"
;
    agc_cor_01:units = "dB" ;
    agc_cor_01:add_offset = 0. ;
    agc_cor_01:scale_factor = 0.01 ;
    agc_cor_01:coordinates = "lon_01 lat_01" ;
    agc_cor_01:comment = "AGC correction determined from the values provided
in the IPF data base." ;
```

3.4.6 alt_01(time_01)

```
int alt_01(time_01) ;
    alt_01: FillValue = -2147483648;
    alt_01:long_name = "altitude of CoM above reference ellipsoid [WGS84]: 1
Hz" ;
    alt_01:units = "m" ;
    alt_01:standard_name = "height_above_reference_ellipsoid" ;
    alt_01:scale_factor = 0.001 ;
    alt_01:coordinates = "lon_01 lat_01" ;
    alt_01:comment = "Altitude of satellite center of mass above the reference
ellipsoid." ;
```

3.4.7 alt_20_hr_ku(time_20_hr_ku)

```
int alt_20_hr_ku(time_20_hr_ku) ;
    alt_20_hr_ku: FillValue = -2147483648 ;
    alt_20_hr_ku:units = "m" ;
    alt_20_hr_ku:long_name = "altitude of CoM above reference ellipsoid
[WGS84]: 20 Hz from HR data" ;
    alt_20_hr_ku:standard_name = "height_above_reference_ellipsoid" ;
    alt_20_hr_ku:comment = "Altitude of the Satellite CoM above reference
ellipsoid [WGS84]." ;
    alt_20_hr_ku:add_offset = 0.0 ;
    alt_20_hr_ku:scale_factor = 0.001 ;
```

3.4.8 alt_20_ku(time_20_ku)

```
int alt_20_ku(time_20_ku) ;
    alt_20_ku: FillValue = -2147483648;
    alt_20_ku:long_name = "altitude of CoM above reference ellipsoid [WGS84]:
20 Hz" ;
    alt_20_ku:units = "m" ;
    alt_20_ku:standard_name = "height_above_reference_ellipsoid" ;
    alt_20_ku:scale_factor = 0.001 ;
    alt_20_ku:coordinates = "lon_20_ku lat_20_ku" ;
    alt_20_ku:comment = "Altitude of satellite center of mass above the
reference ellipsoid." ;
```



3.4.9 beam_dir_vec_20_hr_ku(time_20_hr_ku,space_3d)

```
int beam_dir_vec_20_hr_ku(time_20_hr_ku, space_3d) ;  
beam_dir_vec_20_hr_ku:FillValue = -2147483648 ;  
beam_dir_vec_20_hr_ku:units = "m" ;  
beam_dir_vec_20_hr_ku:long_name = "real beam direction vector in crf" ;  
beam_dir_vec_20_hr_ku:comment = "Real beam direction vector described in  
the CryoSat Reference Frame, components: [1] x, [2]  
y, [3] z." ;  
beam_dir_vec_20_hr_ku:add_offset = 0.0 ;  
beam_dir_vec_20_hr_ku:scale_factor = 1.e-06 ;
```

3.4.10 cog_cor_01(time_01)

```
short cog_cor_01(time_01) ;  
cog_cor_01:FillValue = -32768s ;  
cog_cor_01:long_name = "distance antenna-CoM correction on altimeter  
range: 1 Hz" ;  
cog_cor_01:units = "m" ;  
cog_cor_01:add_offset = 0. ;  
cog_cor_01:scale_factor = 0.001 ;  
cog_cor_01:coordinates = "lon_01 lat_01" ;  
cog_cor_01:comment = "Distance antenna-CoM determined from the value  
provided in the IPF data base." ;
```

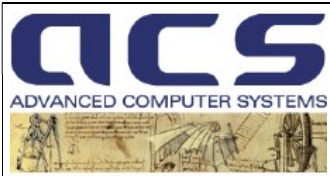
3.4.11 coherence_waveform_20_hr_ku(time_20_hr_ku, ns_20_hr_ku)

```
short coherence_waveform_20_hr_ku(time_20_hr_ku, ns_20_hr_ku) ;  
coherence_waveform_20_hr_ku:FillValue = -32768s ;  
coherence_waveform_20_hr_ku:units = "count" ;  
coherence_waveform_20_hr_ku:long_name = "l1b coherence waveform from HR  
data " ;  
coherence_waveform_20_hr_ku:comment = "The L1b 20Hz coherence waveform is  
a fully-calibrated, high resolution, multilooked  
coherence computed from the complex echoes on the  
two receiving channels (SARin only)." ;  
coherence_waveform_20_hr_ku:add_offset = 0.0 ;  
coherence_waveform_20_hr_ku:scale_factor = 0.001 ;
```

3.4.12 cor2_applied_20_ku(time_20_ku)

```
int cor2_applied_20_ku(time_20_ku) ;  
cor2_applied_20_ku:FillValue = -2147483648 ;  
cor2_applied_20_ku:long_name = "range height rate initial word (3.05 ps):  
20 Hz" ;  
cor2_applied_20_ku:units = "count" ;  
cor2_applied_20_ku:coordinates = "lon_20_ku lat_20_ku" ;  
cor2_applied_20_ku:comment = "COR2 is the on-board tracker height rate  
over the radar cycle, forwarded from telemetry." ;
```

3.4.13 cor2_applied_20_hr_ku(time_20_hr_ku)



```
int cor2_applied_20_hr_ku(time_20_hr_ku) ;
cor2_applied_20_hr_ku: FillValue = -2147483648 ;
cor2_applied_20_hr_ku:units = "seconds/rc" ;
cor2_applied_20_hr_ku:long_name = " range height rate initial word: 20 Hz
cor2 height rate " ;
cor2_applied_20_hr_ku:comment = "COR2 is the on-board tracker height rate
over the radar cycle, forwarded from telemetry." ;
cor2_applied_20_hr_ku:add_offset = 0.0 ;
cor2_applied_20_hr_ku:scale_factor = 3.05e-12 ;
```

3.4.14 dop_angle_start_20_hr_ku(time_20_hr_ku)

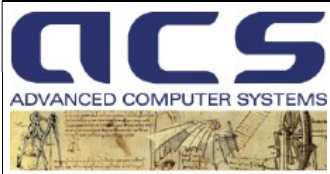
```
int dop_angle_start_20_hr_ku(time_20_hr_ku) ;
dop_angle_start_20_hr_ku: FillValue = -2147483648 ;
dop_angle_start_20_hr_ku:units = "rad" ;
dop_angle_start_20_hr_ku:long_name = "doppler angle start from HR data"
;
dop_angle_start_20_hr_ku:add_offset = 0.0 ;
dop_angle_start_20_hr_ku:scale_factor = 1.e-07 ;
dop_angle_start_20_hr_ku:comment = "Value of Doppler Angle for the first
single look echo in the stack. It is the angle
between: (a) perpendicular to the velocity vector,
(b) direction satellite - surface location. The
Doppler angle depends on velocity vector and on
geometry." ;
```

3.4.15 dop_angle_stop_20_hr_ku(time_20_hr_ku)

```
int dop_angle_stop_20_hr_ku(time_20_hr_ku) ;
dop_angle_stop_20_hr_ku: FillValue = -2147483648 ;
dop_angle_stop_20_hr_ku:units = "rad" ;
dop_angle_stop_20_hr_ku:long_name = "doppler angle stop from HR data" ;
dop_angle_stop_20_hr_ku:add_offset = 0.0;
dop_angle_stop_20_hr_ku:scale_factor = 1.e-07 ;
dop_angle_stop_20_hr_ku:comment = "Value of Doppler Angle for the last
single look echo in the stack. It is the angle
between: (a) perpendicular to the velocity vector,
(b) direction satellite - surface location. The
Doppler angle depends on velocity vector and on
geometry." ;
```

3.4.16 dop_cor_01_ku(time_01)

```
short dop_cor_01_ku(time_01) ;
dop_cor_01_ku: FillValue = -32768s;
dop_cor_01_ku:long_name = "doppler correction on the altimeter range: 1
Hz" ;
dop_cor_01_ku:units = "m" ;
dop_cor_01_ku:add_offset = 0. ;
dop_cor_01_ku:scale_factor = 0.001 ;
dop_cor_01_ku:coordinates = "lon_01 lat_01" ;
dop_cor_01_ku:comment = "This is the Doppler range correction due to the
satellite altitude rate. It is computed from the component of the satellite
velocity in the nadir direction." ;
```



3.4.17 dop_cor_20_hr_ku(time_20_hr_ku)

```
int dop_cor_20_hr_ku(time_20_hr_ku) ;
dop_cor_20_hr_ku: FillValue = -2147483648 ;
dop_cor_20_hr_ku:units = "m" ;
dop_cor_20_hr_ku:long_name = "doppler correction on altimeter range: 20
Hz from HR data" ;
dop_cor_20_hr_ku:comment = "This is the Doppler range correction due to
the satellite altitude rate. It is computed for the
component of satellite velocity in the nadir
direction. Correction applied to L1B LRM waveforms
only." ;
dop_cor_20_hr_ku:add_offset = 0.0 ;
dop_cor_20_hr_ku:scale_factor = 0.001 ;
```

3.4.18 dop_cor_20_ku(time_20_ku)

```
short dop_cor_20_ku(time_20_ku) ;
dop_cor_20_ku: FillValue = -32768s;
dop_cor_20_ku:long_name = "doppler correction on the altimeter range: 20
Hz" ;
dop_cor_20_ku:units = "m" ;
dop_cor_20_ku:add_offset = 0. ;
dop_cor_20_ku:scale_factor = 0.001 ;
dop_cor_20_ku:coordinates = "lon_20_ku lat_20_ku" ;
dop_cor_20_ku:comment = "This is the Doppler range correction due to the
satellite altitude rate. It is computed from the component of the satellite
velocity in the nadir direction." ;
```

3.4.19 echo_numval_20_hr_ku(time_20_hr_ku)

```
short echo_numval_20_hr_ku(time_20_hr_ku) ;
echo_numval_20_hr_ku: FillValue = -32768s ;
echo_numval_20_hr_ku:units = "count" ;
echo_numval_20_hr_ku:long_name = "number of echoes averaged: 20 Hz from
HR data" ;
echo_numval_20_hr_ku:add_offset = 0s ;
echo_numval_20_hr_ku:scale_factor = 1s ;
echo_numval_20_hr_ku:comment = "For LRM is the number of echoes averaged
to compute the corresponding L1B 20Hz power waveform.
For SAR/SARin is the number of single look echoes in
the Surface Sample Stack that have been multilooked
to compute the corresponding L1B 20Hz power waveform
This variable only include one receiveing channel
however, In SARin, single looks from both channels
are averaged in order to reduce the SNR.." ;
```

3.4.20 echo_numval_20_ku(time_20_ku)

```
short echo_numval_20_ku(time_20_ku) ;
echo_numval_20_ku: FillValue = -32768s;
echo_numval_20_ku:long_name = "number of echoes averaged: 20 Hz" ;
echo_numval_20_ku:units = "count" ;
echo_numval_20_ku:coordinates = "lon_20_ku lat_20_ku" ;
```




```
echo_numval_20_ku:comment = "Number of individual echoes averaged to  
compute the corresponding 20 Hz power waveform [pwr_waveform_20_ku]." ;
```

3.4.21 echo_scale_20_ku(time_20_ku)

```
short echo_scale_20_ku(time_20_ku) ;  
    echo_scale_20_ku:long_name = "echo scale factor: 20 Hz" ;  
    echo_scale_20_ku:units = "count" ;  
    echo_scale_20_ku:add_offset = 32768. ;  
    echo_scale_20_ku:scale_factor = 1. ;  
    echo_scale_20_ku:coordinates = "lon_20_ku lat_20_ku" ;  
    echo_scale_20_ku:comment = "The 20 Hz power waveform scaling factor,  
computed in order to best fit each waveform within 2 bytes." ;
```

3.4.22 echo_scale_20_hr_ku(time_20_hr_ku)

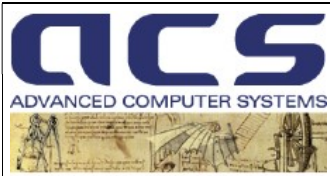
```
int echo_scale_20_hr_ku(time_20_hr_ku) ;  
    echo_scale_20_hr_ku:FillValue = -2147483648;  
    echo_scale_20_hr_ku:units = "count" ;  
    echo_scale_20_hr_ku:long_name = "echo scale factor: 20 Hz from HR  
data (to scale echo to watts)" ;  
    echo_scale_20_hr_ku:add_offset = 0.0 ;  
    echo_scale_20_hr_ku:scale_factor = 1.e-09;  
    echo_scale_20_hr_ku:comment = "The 20Hz power waveform scaling  
factor, computed in order to best fit each  
waveform within 2 bytes. The scaling, needed to  
convert the L1B 1Hz average power waveform into  
Watt, is applied as follows:  
pwr_waveform_20_ku(time_20_ku,ns_20_ku)  
*echo_scale_factor_20_ku(time_20_ku)*2^echo_s  
cale_pwr_20_ku(time_20_ku)." ;
```

3.4.23 echo_scale_pwr_20_hr_ku(time_20_hr_ku)

```
int echo_scale_pwr_20_hr_ku(time_20_hr_ku) ;  
    echo_scale_pwr_20_hr_ku:FillValue = -2147483648 ;  
    echo_scale_pwr_20_hr_ku:units = "count" ;  
    echo_scale_pwr_20_hr_ku:long_name = "echo scale power (a power of 2) from  
HR data" ;  
    echo_scale_pwr_20_hr_ku:add_offset = 0 ;  
    echo_scale_pwr_20_hr_ku:scale_factor = 1 ;  
    echo_scale_pwr_20_hr_ku:comment = "The 20Hz power waveform power scaling  
factor, computed in order to best fit each  
waveform within 2 bytes. The scaling, needed to  
convert the L1B 1Hz average power waveform into  
Watt, is applied as follows:  
pwr_waveform_20_ku(time_20_ku,ns_20_ku)  
*echo_scale_factor_20_ku(time_20_ku)*2^echo_s  
cale_pwr_20_ku(time_20_ku)." ;
```

3.4.24 flag_cor_status_01(time_01)

```
int flag_cor_status_01(time_01) ;
```



```
flag_cor_status_01:FillValue = -1 ;
flag_cor_status_01:long_name = "correction status flag: 1 Hz" ;
flag_cor_status_01:flag_masks = 2048, 1024, 512, 256, 128, 64, 32, 16, 8,
4, 2, 1 ;
flag_cor_status_01:flag_meanings = "model_dry_called model_wet_called
inv_bar_called hf_fluctuations_called iono_gim_called iono_model_called
ocean_tide_called ocean_tide_equil_called load_tide_called solid_earth_called
pole_tide_called surface_type_called" ;
flag_cor_status_01:comment = "Correction status flag- showing which
correction algorithms have been called." ;
flag_cor_status_01:coordinates = "lon_01 lat_01" ;
```

3.4.25 flag_cor_err_01(time_01)

```
int flag_cor_err_01(time_01) ;
flag_cor_err_01:FillValue = -1 ;
flag_cor_err_01:long_name = "correction error flag: 1 Hz" ;
flag_cor_err_01:flag_masks = 2048, 1024, 512, 256, 128, 64, 32, 16, 8, 4,
2, 1 ;
flag_cor_err_01:flag_meanings = "model_dry_error model_wet_error
inv_bar_error hf_fluctuations_error iono_gim_error iono_model_error
ocean_tide_equil_error long_tide_error load_tide_error solid_earth_error
pole_tide_error surface_type_error" ;
flag_cor_err_01:comment = "Correction error flag- showing if a correction
algorithm returned an error when called." ;
flag_cor_err_01:coordinates = "lon_01 lat_01" ;
```

3.4.26 flag_echo_20_hr_ku(time_20_hr_ku)

```
short flag_echo_20_hr_ku(time_20_hr_ku) ;
flag_echo_20_hr_ku:FillValue = -1s;
flag_echo_20_hr_ku:long_name = "flags for errors or information about L1b
20Hz power waveform from HR data" ;
flag_echo_20_hr_ku:flag_masks = -32768s, 16384s, 8192s, 4096s, 2048s,
1024s, 512s, 256s;
flag_echo_20_hr_ku:flag_meanings = "approx_beam_steering
exact_beam_steering
doppler_weighting_computed
doppler_weighting_applied
multi_look_incomplete
beam_angle_steering_error
anti_aliasing_power_echoes
auto_beam_steering" ;
flag_echo_20_hr_ku:comment = "Flags for errors or information about L1b
20Hz power waveform." ;
```

3.4.27 flag_instr_conf_rx_bwdt_20_ku(time_20_ku)

```
byte flag_instr_conf_rx_bwdt_20_ku(time_20_ku) ;
flag_instr_conf_rx_bwdt_20_ku:FillValue = -128b ;
flag_instr_conf_rx_bwdt_20_ku:long_name = "instrument configuration flag
- bandwidth: 20 Hz" ;
flag_instr_conf_rx_bwdt_20_ku:flag_values = 0b, 1b, 2b ;
flag_instr_conf_rx_bwdt_20_ku:flag_meanings = "unknown 320_mhz 40_mhz" ;
flag_instr_conf_rx_bwdt_20_ku:coordinates = "lon_20_ku lat_20_ku" ;
```



```
flag_instr_conf_rx_bwdt_20_ku:comment = "This flag contains the instrument acquisition band." ;
```

3.4.28 flag_instr_conf_rx_bwdt_20_hr_ku(time_20_hr_ku)

```
byte flag_instr_conf_rx_bwdt_20_hr_ku(time_20_hr_ku) ;  
flag_instr_conf_rx_bwdt_20_hr_ku: FillValue = -128b ;  
flag_instr_conf_rx_bwdt_20_hr_ku:long_name = "instrument configuration  
flag - bandwidth: 20 Hz  
from HR data" ;  
flag_instr_conf_rx_bwdt_20_hr_ku:flag_values = 0b, 1b, 2b ;  
flag_instr_conf_rx_bwdt_20_hr_ku:flag_meanings = "unknown 320_mhz  
40_mhz" ;  
flag_instr_conf_rx_bwdt_20_hr_ku:comment = "This flag contains the instrument acquisition band." ;
```

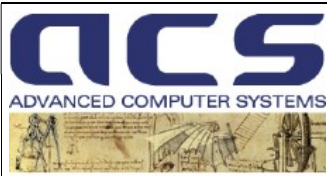
3.4.29 flag_instr_conf_rx_flags_20_ku(time_20_ku)

```
int flag_instr_conf_rx_flags_20_ku(time_20_ku) ;  
flag_instr_conf_rx_flags_20_ku: FillValue = -2147483648 ;  
flag_instr_conf_rx_flags_20_ku:long_name = "instrument configuration  
flag - flags: 20 Hz" ;  
flag_instr_conf_rx_flags_20_ku:flag_masks = -128b, 64b, 32b, 16b, 8b, 4b,  
2b, 1b ;  
flag_instr_conf_rx_flags_20_ku:flag_meanings = "siral_redundant  
external_cal open_loop loss_of_echo real_time_error echo_saturation  
rx_band_attenuated cycle_report_error" ;  
flag_instr_conf_rx_flags_20_ku:coordinates = "lon_20_ku lat_20_ku" ;  
flag_instr_conf_rx_flags_20_ku:comment = "This flag contains the status  
of the instrument acquisition." ;
```

3.4.30 flag_instr_conf_rx_flags_20_hr_ku(time_20_hr_ku)

```
byte flag_instr_conf_rx_flags_20_hr_ku(time_20_hr_ku) ;  
flag_instr_conf_rx_flags_20_hr_ku: FillValue = -128b ;  
flag_instr_conf_rx_flags_20_hr_ku:long_name = "instrument configuration  
flag - flags: 20 Hz from HR  
data" ;  
flag_instr_conf_rx_flags_20_hr_ku:flag_masks = -128b, 64b, 32b, 16b, 8b,  
4b, 2b, 1b ;  
flag_instr_conf_rx_flags_20_hr_ku:flag_meanings = "siral_redundant  
external_cal open_loop  
loss_of_echo real_time_error  
echo_saturation  
rx_band_attenuated  
cycle_report_error" ;  
flag_instr_conf_rx_flags_20_hr_ku:comment = "This flag contains the status of the instrument tracking." ;
```

3.4.31 flag_instr_conf_rx_in_use_20_ku(time_20_ku)



```
byte flag_instr_conf_rx_in_use_20_ku(time_20_ku) ;
    flag_instr_conf_rx_in_use_20_ku: FillValue = -128b ;
    flag_instr_conf_rx_in_use_20_ku:long_name = "instrument configuration
flag - rx chain in use: 20 Hz" ;
    flag_instr_conf_rx_in_use_20_ku:flag_values = 0b, 1b, 2b, 3b ;
    flag_instr_conf_rx_in_use_20_ku:flag_meanings = "unknown rx1 rx2 both" ;
    flag_instr_conf_rx_in_use_20_ku:coordinates = "lon_20_ku lat_20_ku" ;
    flag_instr_conf_rx_in_use_20_ku:comment = "This flag contains the
instrument channel in use." ;
```

3.4.32 flag_instr_conf_rx_in_use_20_hr_ku(time_20_hr_ku)

```
byte flag_instr_conf_rx_in_use_20_hr_ku(time_20_hr_ku) ;
    flag_instr_conf_rx_in_use_20_hr_ku: FillValue = -128b ;
    flag_instr_conf_rx_in_use_20_hr_ku:long_name = "instrument configuration
flag- rx chain in use: 20 Hz
from HR data" ;
    flag_instr_conf_rx_in_use_20_hr_ku:flag_values = 0b, 1b, 2b, 3b ;
    flag_instr_conf_rx_in_use_20_hr_ku:flag_meanings = "unknown rx1 rx2
both";
    flag_instr_conf_rx_in_use_20_hr_ku:comment = "This flag contains the
instrument chain in use." ;
```

3.4.33 flag_instr_conf_rx_str_in_use_20_hr_ku(time_20_hr_ku)

```
byte flag_instr_conf_rx_str_in_use_20_hr_ku(time_20_hr_ku) ;
    flag_instr_conf_rx_str_in_use_20_hr_ku: FillValue = -128b ;
    flag_instr_conf_rx_str_in_use_20_hr_ku:long_name = "instrument
configuration flags:
star tracker used: 20
Hz from HR data " ;
    flag_instr_conf_rx_str_in_use_20_hr_ku:flag_values = 0b, 1b, 2b, 3b, 4b
;
    flag_instr_conf_rx_str_in_use_20_hr_ku:flag_meanings = "no_str_tracker
tracker_1 tracker_2
tracker_3
attref_file" ;
    flag_instr_conf_rx_str_in_use_20_hr_ku:comment = "Star tracker
identification flag showing the
source of the platform pointing. 0:
No Star Tracker data used. 1: Data
from Star Tracker 1 used. 2: Data from
Star Tracker 2 used. 3: Data from Star
Tracker 3 used. 4: Data from the Star
Tracker selected on board by AOCs
used." ;
```



3.4.34 flag_instr_conf_rx_trk_mode_20_ku(time_20_ku)

```
byte flag_instr_conf_rx_trk_mode_20_ku(time_20_ku) ;
    flag_instr_conf_rx_trk_mode_20_ku: FillValue = -128b ;
    flag_instr_conf_rx_trk_mode_20_ku:long_name = "instrument configuration
flag - tracking mode: 20 Hz" ;
    flag_instr_conf_rx_trk_mode_20_ku:flag_values = 0b, 1b, 2b, 3b ;
    flag_instr_conf_rx_trk_mode_20_ku:flag_meanings = "unknown lrm sar sarin"
;

    flag_instr_conf_rx_trk_mode_20_ku:coordinates = "lon_20_ku lat_20_ku" ;
    flag_instr_conf_rx_trk_mode_20_ku:comment = "Tracking Mode." ;
```

3.4.35 flag_instr_conf_rx_trk_mode_20_hr_ku(time_20_hr_ku)

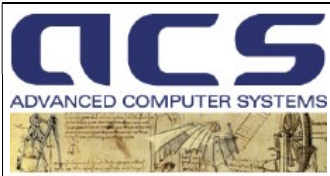
```
byte flag_instr_conf_rx_trk_mode_20_hr_ku(time_20_hr_ku) ;
    flag_instr_conf_rx_trk_mode_20_hr_ku: FillValue = -128b ;
    flag_instr_conf_rx_trk_mode_20_hr_ku:long_name = "instrument
configuration flag - tracking
mode : 20 Hz from HR data" ;
    flag_instr_conf_rx_trk_mode_20_hr_ku:flag_values = 0b, 1b, 2b, 3b ;
    flag_instr_conf_rx_trk_mode_20_hr_ku:flag_meanings = "unknown lrm sar
sarin" ;
    flag_instr_conf_rx_trk_mode_20_hr_ku:comment = "Tracking Mode." ;
```

3.4.36 flag_instr_mode_att_ctrl_20_hr_ku(time_20_hr_ku)

```
byte flag_instr_mode_att_ctrl_20_hr_ku (time_20_hr_ku) ;
    flag_instr_mode_att_ctrl_20_hr_ku: FillValue = -128b ;
    flag_instr_mode_att_ctrl_20_hr_ku:long_name = "mode id -platform attitude
control flag: 20 Hz from HR data
" ;
    flag_instr_mode_att_ctrl_20_hr_ku:flag_values = 0b, 1b, 2b ;
    flag_instr_mode_att_ctrl_20_hr_ku:flag_meanings = "unknown
local_normal_pointing
yaw_steering";
    flag_instr_mode_att_ctrl_20_hr_ku:comment = "Platform attitude control
mode." ;
```

3.4.37 flag_instr_mode_flags_20_hr_ku(time_20_hr_ku)

```
byte flag_instr_mode_flags_20_hr_ku(time_20_hr_ku) ;
    flag_instr_mode_flags_20_hr_ku: FillValue = -128b ;
    flag_instr_mode_flags_20_hr_ku:long_name = "mode id - identifies the
siral instrument measurement
mode from HR data" ;
    flag_instr_mode_flags_20_hr_ku:flag_masks = 2b, 1b ;
    flag_instr_mode_flags_20_hr_ku:flag_meanings = "sarin_degraded_case
cal4_packet_detection";
    flag_instr_mode_flags_20_hr_ku:comment = "Instrument mode derived from
configuration bits in L0." ;
```



3.4.38 flag_instr_op_mode_20_hr_ku(time_20_hr_ku)

```
byte flag_instr_op_mode_20_hr_ku(time_20_hr_ku) ;
    flag_instr_op_mode_20_hr_ku: FillValue = -128b ;
    flag_instr_op_mode_20_hr_ku:long_name = "mode id - operative mode : 20 Hz
        from HR data" ;
    flag_instr_op_mode_20_hr_ku:flag_values = "1b, 2b, 3b" ;
    flag_instr_op_mode_20_hr_ku:flag_meanings = "lrm sar sarin" ;
    flag_instr_op_mode_20_hr_ku:comment = "Mode ID - Identifies the SIRAL
instrument measurement mode." ;
```

3.4.39 flag_instr_op_mode_20_ku(time_20_ku)

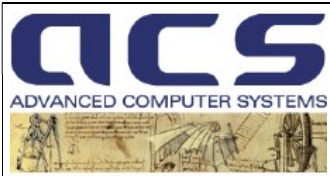
```
byte flag_instr_op_mode_20_ku(time_20_ku) ;
    flag_instr_op_mode_20_ku: FillValue = -128b;
    flag_instr_op_mode_20_ku:long_name = "mode id - operative mode: 20 Hz" ;
    flag_instr_op_mode_20_ku:flag_values = 1b, 2b, 3b ;
    flag_instr_op_mode_20_ku:flag_meanings = "lrm sar sarin" ;
    flag_instr_op_mode_20_ku:coordinates = "lon_20_ku lat_20_ku" ;
    flag_instr_op_mode_20_ku:comment = "Mode ID - Identifies the SIRAL
instrument measurement mode." ;
```

3.4.40 flag_mcd_20_ku(time_20_ku)

```
int flag_mcd_20_ku(time_20_ku) ;
    flag_mcd_20_ku:long_name = "measurement confidence data: 20 Hz" ;
    flag_mcd_20_ku:flag_masks = -2147483648, 1073741824, 536870912,
268435456, 134217728, 67108864, 33554432, 16777216, 8388608, 4194304, 2097152,
1048576, 524288, 262144, 131072, 65536, 32768, 16384, 8192, 4096, 2048, 128, 64,
32, 16, 8, 1;
    flag_mcd_20_ku:flag_meanings = "block_degraded blank_block
datation_degraded orbit_prop_error orbit_file_change orbit_gap echo_saturated
other_echo_error sarin_rx1_error sarin_rx2_error window_delay_error agc_error
call_missing call_default doris_uso_missing ccall_default trk_echo_error
echo_rx1_error echo_rx2_error npm_error azimuth_cal_missing
phase_pert_cor_missing cal2_missing cal2_default power_scale_error
attitude_cor_missing phase_pert_cor_default";
    flag_mcd_20_ku:coordinates = "lon_20_ku lat_20_ku" ;
    flag_mcd_20_ku:comment = "Measurement confidence flags. Generally the MCD
flags indicate problems when set. If the whole MCD is 0 then no problems were
detected, i.e. conditions were nominal. Serious errors are indicated by setting
bit 31 (SS bit 0), in which case the block must not be processed. Other error
settings can be regarded as warnings." ;
```

3.4.41 flag_mcd_20_hr_ku(time_20_hr_ku)

```
int flag_mcd_20_hr_ku(time_20_hr_ku) ;
    flag_mcd_20_hr_ku: FillValue = -1 ;
    flag_mcd_20_hr_ku:long_name = "measurement confidence data: 20 Hz from
HR data" ;
    flag_mcd_20_hr_ku:flag_masks = -2147483648, 1073741824, 536870912,
268435456, 134217728, 67108864, 33554432,
16777216, 8388608, 4194304, 2097152,
1048576, 524288, 262144, 131072, 65536,
```



```
32768, 16384, 8192, 4096, 2048, 128, 64, 32,
16, 8, 1 ;
flag_mcd_20_hr_ku:flag_meanings = "block_degraded blank_block
datation_degraded orbit_prop_error
orbit_file_change orbit_gap echo_saturated
other_echo_error sarin_rxl_error
sarin_rx2_error window_delay_error
agc_error call_missing call_default
doris_uso_missing ccall_default
trk_echo_error echo_rxl_error
echo_rx2_error npm_error call_pwr_corr_type
phase_pert_cor_missing cal2_missing
cal2_default power_scale_error
attitude_cor_missing
phase_pert_cor_default" ;
flag_mcd_20_hr_ku:comment = " Measurement confidence flags. Generally the
MCD flags indicate problems when set. If the
whole MCD is 0 then no problems were detected,
i.e. conditions were nominal. Serious errors are
indicated by setting the most-significant bit
i.e. block_degraded, in which case the block
must not be processed. Other error settings can
be regarded as warnings.." ;
```

3.4.42 flag_trk_cycle_20_ku(time_20_ku)

```
short flag_trk_cycle_20_ku(time_20_ku) ;
flag_trk_cycle_20_ku:FillValue = -32768s;
flag_trk_cycle_20_ku:long_name = "tracking cycle report: 20 Hz" ;
flag_trk_cycle_20_ku:flag_values = 0b, 1b, 2b, 3b, 7b;
flag_trk_cycle_20_ku:flag_meanings = "no_errors loss_of_echo
run_time_error echo_saturation_error unknown_error" ;
flag_trk_cycle_20_ku:coordinates = "lon_20_ku lat_20_ku" ;
flag_trk_cycle_20_ku:comment = "Tracking cycle report forwarded from
telemetry." ;
```

3.4.43 flag_trk_cycle_20_hr_ku(time_20_hr_ku)

```
short flag_trk_cycle_20_hr_ku(time_20_hr_ku) ;
flag_trk_cycle_20_hr_ku:long_name = " tracking cycle report: 20 Hz from
HR data" ;
flag_trk_cycle_20_hr_ku:FillValue = -32768s ;
flag_trk_cycle_20_hr_ku:flag_values = 0s, 1s, 2s, 3s, 7s ;
flag_trk_cycle_20_hr_ku:flag_meanings = "no_errors loss_of_echo
run_time_error echo_saturation_error
unknown_error" ;
flag_trk_cycle_20_hr_ku:comment = "Flags for errors or information about
L1b 20Hz power waveform for LRM/FDM case." ;
```

3.4.44 h0_applied_20_ku(time_20_ku)

```
int h0_applied_20_ku(time_20_ku) ;
h0_applied_20_ku:FillValue = -2147483648;
```



```
h0_applied_20_ku:long_name = "range height initial word (12.5/256 ns): 20 Hz" ;  
h0_applied_20_ku:units = "count" ;  
h0_applied_20_ku:coordinates = "lon_20_ku lat_20_ku" ;  
h0_applied_20_ku:comment = "The H0 (initial altitude instruction) forwarded from telemetry." ;
```

3.4.45 h0_applied_20_hr_ku(time_20_hr_ku)

```
int h0_applied_20_hr_ku(time_20_hr_ku) ;  
h0_applied_20_hr_ku: FillValue = -2147483648 ;  
h0_applied_20_hr_ku:units = "seconds" ;  
h0_applied_20_hr_ku:long_name = " range height initial word: 20 Hz from HR data" ;  
h0_applied_20_hr_ku:add_offset = 0. ;  
h0_applied_20_hr_ku:scale_factor = 4.88e-11 ;  
h0_applied_20_hr_ku:comment = "The H0 (initial altitude instruction) forwarded from telemetry." ;
```

3.4.46 h0_fai_word_20_ku(time_20_ku)

```
int h0_fai_word_20_ku(time_20_ku) ;  
h0_fai_word_20_ku: FillValue = -2147483648 ;  
h0_fai_word_20_ku:long_name = "fine range word (12.5/256 ns): 20 Hz" ;  
h0_fai_word_20_ku:units = "count" ;  
h0_fai_word_20_ku:coordinates = "lon_20_ku lat_20_ku" ;  
h0_fai_word_20_ku:comment = "This is the Fine Altitude Instruction (FAI), forwarded from telemetry." ;
```

3.4.47 h0_fai_word_20_hr_ku(time_20_hr_ku)

```
int h0_fai_word_20_hr_ku(time_20_hr_ku) ;  
h0_fai_word_20_hr_ku: FillValue = -2147483648 ;  
h0_fai_word_20_hr_ku:units = "seconds" ;  
h0_fai_word_20_hr_ku:long_name = " fine range word : 20 Hz from HR data" ;  
;  
h0_fai_word_20_hr_ku:add_offset = 0. ;  
h0_fai_word_20_hr_ku:scale_factor = 4.88e-11 ;  
h0_fai_word_20_hr_ku:comment = "This is the Fine Altitude Instruction (FAI), computed from H0 and COR2." ;
```

3.4.48 h0_lai_word_20_ku(time_20_ku)

```
int h0_lai_word_20_ku(time_20_ku) ;  
h0_lai_word_20_ku: FillValue = -2147483648 ;  
h0_lai_word_20_ku:long_name = "coarse range word (12.5 ns): 20 Hz" ;  
h0_lai_word_20_ku:units = "count" ;  
h0_lai_word_20_ku:coordinates = "lon_20_ku lat_20_ku" ;  
h0_lai_word_20_ku:comment = "This is the Coarse Altitude Instruction (LAI), forwarded from telemetry." ;
```




3.4.49 h0_lai_word_20_hr_ku(time_20_hr_ku)

```
int h0_lai_word_20_hr_ku(time_20_hr_ku) ;
h0_lai_word_20_hr_ku:FillValue = -2147483648 ;
h0_lai_word_20_hr_ku:units = "seconds" ;
h0_lai_word_20_hr_ku:long_name = "coarse range word: 20 Hz from HR data"
;

h0_lai_word_20_hr_ku:add_offset = 0. ;
h0_lai_word_20_hr_ku:scale_factor = 1.25e-08 ;
h0_lai_word_20_hr_ku:comment = "This is the Coarse Altitude Instruction
(LAI), computed from H0 and COR2." ;
```

3.4.50 hf_fluct_cor_01(time_01)

```
short hf_fluct_cor_01(time_01) ;
hf_fluct_cor_01:FillValue = -32768s;
hf_fluct_cor_01:long_name = "high frequency fluctuations of the sea
surface topography: 1 Hz" ;
hf_fluct_cor_01:units = "m" ;
hf_fluct_cor_01:standard_name =
"sea_surface_height_correction_due_to_air_pressure_and_wind_at_high_frequency" ;
hf_fluct_cor_01:add_offset = 0. ;
hf_fluct_cor_01:scale_factor = 0.001 ;
hf_fluct_cor_01:coordinates = "lon_01 lat_01" ;
hf_fluct_cor_01:comment = "Also known as DAC (Dynamical Atmospheric
Correction). Combines the high frequency fluctuations of the sea surface
topography due to high frequency air pressure and wind effect, and the low-
frequency heights from inverted barometer effect [inv_bar_cor]. High frequency
cut-off at 20 days. To be added as correction to range measurements for IOP/GOP
off line products. Not available for NOP products." ;
hf_fluct_cor_01:source = "2.1.0" ;
hf_fluct_cor_01:institution = "LEGOS/CLS/CNES" ;
```

3.4.51 ind_first_meas_20hz_01(time_01)

```
int ind_first_meas_20hz_01(time_01) ;
ind_first_meas_20hz_01:FillValue = -2147483648;
ind_first_meas_20hz_01:long_name = "index of the first 20Hz measurement:
1 Hz" ;
ind_first_meas_20hz_01:units = "count" ;
ind_first_meas_20hz_01:comment = "Index of the first 20Hz measurement of
the 1Hz packet." ;
```

3.4.52 ind_meas_1hz_20_ku(time_20_ku)

```
short ind_meas_1hz_20_ku(time_20_ku) ;
ind_meas_1hz_20_ku:FillValue = -32768s;
ind_meas_1hz_20_ku:long_name = "index of the 1Hz measurement: 20 Hz" ;
ind_meas_1hz_20_ku:units = "count" ;
ind_meas_1hz_20_ku:comment = "Index of the 1Hz measurement to which
belongs the 20Hz measurement." ;
```

3.4.53 instr_cor_gain_rx_20_hr_ku(time_20_hr_ku)

```
int instr_cor_gain_rx_20_hr_ku(time_20_hr_ku) ;
instr_cor_gain_rx_20_hr_ku: FillValue = -2147483648 ;
instr_cor_gain_rx_20_hr_ku:units = "dB" ;
instr_cor_gain_rx_20_hr_ku:long_name = "instrument gain correction (rx
only chain) from HR data" ;

instr_cor_gain_rx_20_hr_ku:add_offset = 0. ;
instr_cor_gain_rx_20_hr_ku:scale_factor = 0.01 ;
instr_cor_gain_rx_20_hr_ku:comment = "Instrument Gain Correction (Rx only
chain) - It includes the power variation from CAL1 and the
AGC calibration values." ;
```

3.4.54 instr_cor_gain_tx_rx_20_hr_ku(time_20_hr_ku)

```
int instr_cor_gain_tx_rx_20_hr_ku(time_20_hr_ku) ;
instr_cor_gain_tx_rx_20_hr_ku: FillValue = -2147483648 ;
instr_cor_gain_tx_rx_20_hr_ku:units = "dB" ;
instr_cor_gain_tx_rx_20_hr_ku:long_name = "instrument gain correction
(tx-rx chain) from HR data" ;

instr_cor_gain_tx_rx_20_hr_ku:add_offset = 0. ;
instr_cor_gain_tx_rx_20_hr_ku:scale_factor = 0.01 ;
instr_cor_gain_tx_rx_20_hr_ku:comment = "Instrument Gain Correction (Tx-
Rx chain) - It includes the power variation from CAL1 and the
AGC calibration values." ;
```

3.4.55 instr_cor_range_rx_20_hr_ku(time_20_hr_ku)

```
int instr_cor_range_rx_20_hr_ku(time_20_hr_ku) ;
instr_cor_range_rx_20_hr_ku: FillValue = -2147483648 ;
instr_cor_range_rx_20_hr_ku:units = "m" ;
instr_cor_range_rx_20_hr_ku:long_name = "2-way instrument range
correction (rx only chain) from HR
data" ;

instr_cor_range_rx_20_hr_ku:add_offset = 0. ;
instr_cor_range_rx_20_hr_ku:scale_factor = 0.001 ;
instr_cor_range_rx_20_hr_ku:comment = "2-way instrument Range Correction
(Rx only chain) - It includes (a) the internal path delay from
CAL1, (b) the external group delay from ground
characterisation and (c) the vertical component of the COM -
Antenna distance." ;
```

3.4.56 instr_cor_range_tx_rx_20_hr_ku(time_20_hr_ku)

```
int instr_cor_range_tx_rx_20_hr_ku(time_20_hr_ku) ;
instr_cor_range_tx_rx_20_hr_ku: FillValue = -2147483648 ;
instr_cor_range_tx_rx_20_hr_ku:units = "m" ;
instr_cor_range_tx_rx_20_hr_ku:long_name = "2-way instrument range
correction (tx-rx chain) from HR
data" ;

instr_cor_range_tx_rx_20_hr_ku:add_offset = 0. ;
instr_cor_range_tx_rx_20_hr_ku:scale_factor = 0.001 ;
```



```
instr_cor_range_tx_rx_20_hr_ku:comment = "2-way instrument Range  
Correction (Tx-Rx chain). It includes (a) the internal path  
delay from CAL1, (b) the external group delay from ground  
characterisation and (c) the vertical component of the COM -  
Antenna distance." ;
```

3.4.57 instr_ext_ph_cor_20_hr_ku(time_20_hr_ku)

```
int instr_ext_ph_cor_20_hr_ku(time_20_hr_ku) ;  
instr_ext_ph_cor_20_hr_ku: FillValue = -2147483648 ;  
instr_ext_ph_cor_20_hr_ku:units = "rad" ;  
instr_ext_ph_cor_20_hr_ku:long_name = "external phase correction taken  
from the ipfdb file from HR data" ;  
instr_ext_ph_cor_20_hr_ku:add_offset = 0. ;  
instr_ext_ph_cor_20_hr_ku:scale_factor = 1.e-06 ;  
instr_ext_ph_cor_20_hr_ku:comment = "External phase correction taken from  
the IPFDB file (SARin only) to be added  
to the internal phase correction term. The  
external phase correction is the  
temperature-averaged component of  
external inter-channel phase difference  
derived from phase difference sensitive  
antenna subsystem, waveguides and  
instrument waveguide switches. The  
external phase correction doesn't contain  
internal instrument effects of  
calibration coupler and duplexer which  
are included in the internal phase  
difference correction." ;
```

3.4.58 instr_int_ph_cor_20_hr_ku(time_20_hr_ku)

```
int instr_int_ph_cor_20_hr_ku(time_20_hr_ku) ;  
instr_int_ph_cor_20_hr_ku: FillValue = -2147483648 ;  
instr_int_ph_cor_20_hr_ku:units = "rad" ;  
instr_int_ph_cor_20_hr_ku:long_name = "internal phase correction computed  
from the cal-4 from HR data" ;  
instr_int_ph_cor_20_hr_ku:add_offset = 0. ;  
instr_int_ph_cor_20_hr_ku:scale_factor = 1.e-06 ;  
instr_int_ph_cor_20_hr_ku:comment = "Internal phase correction computed  
from the latest available CAL-4 packet.  
Applied in L1b SARin products only)." ;
```

3.4.59 int_path_cor_01(time_01)

```
short int_path_cor_01(time_01) ;  
int_path_cor_01: FillValue = -32768s ;  
int_path_cor_01:long_name = "internal path correction on the altimeter  
range: 1 Hz" ;  
int_path_cor_01:units = "m" ;  
int_path_cor_01:add_offset = 0. ;  
int_path_cor_01:scale_factor = 0.001 ;  
int_path_cor_01:coordinates = "lon_01 lat_01" ;  
int_path_cor_01:comment = "Internal calibration correction on the  
altimeter range" ;
```



3.4.60 `inter_base_vec_20_hr_ku(time_20_hr_ku,space_3d)`

```
int inter_base_vec_20_hr_ku(time_20_hr_ku, space_3d) ;
inter_base_vec_20_hr_ku: FillValue = -2147483648 ;
inter_base_vec_20_hr_ku:units = "m" ;
inter_base_vec_20_hr_ku:long_name = "interferometric baseline direction
vector in crf from HR data" ;

inter_base_vec_20_hr_ku:add_offset = 0. ;
inter_base_vec_20_hr_ku:scale_factor = 1.e-06 ;
inter_base_vec_20_hr_ku:comment = " Direction vector from Tx-Rx antenna
reference point to Rx only antenna
reference point defined in the CryoSat
Reference Frame, components: [1] x, [2]
y, [3] z." ;
```

3.4.61 `internal_cor_sig0_01(time_01)`

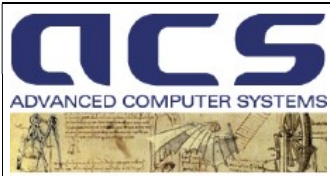
```
short internal_cor_sig0_01(time_01) ;
internal_cor_sig0_01: FillValue = -32768s ;
internal_cor_sig0_01:long_name = "internal calibration correction on the
backscatter coefficient: 1 Hz" ;
internal_cor_sig0_01:units = "dB" ;
internal_cor_sig0_01:add_offset = 0. ;
internal_cor_sig0_01:scale_factor = 0.01 ;
internal_cor_sig0_01:coordinates = "lon_01 lat_01" ;
internal_cor_sig0_01:comment = "Internal calibration correction applied
to the backscatter coefficient." ;
```

3.4.62 `inv_bar_cor_01(time_01)`

```
short inv_bar_cor_01(time_01) ;
inv_bar_cor_01: FillValue = -32768s;
inv_bar_cor_01:long_name = "inverted barometer height correction: 1 Hz"
;
inv_bar_cor_01:units = "m" ;
inv_bar_cor_01:standard_name =
"sea_surface_height_correction_due_to_air_pressure_at_low_frequency" ;
inv_bar_cor_01:add_offset = 0. ;
inv_bar_cor_01:scale_factor = 0.001 ;
inv_bar_cor_01:coordinates = "lon_01 lat_01" ;
inv_bar_cor_01:comment = "Computed at the altimeter time-tag [time_01]
from the interpolation of 2 meteorological fields that surround the altimeter
time-tag. To be added as correction to range measurements for NOP products, to
correct for the depression of the ocean surface caused by the local barometric
pressure." ;
inv_bar_cor_01:source = "European Center for Medium Range Weather
Forecasting" ;
inv_bar_cor_01:institution = "ECMWF" ;
```

3.4.63 `iono_cor_gim_01(time_01)`

```
short iono_cor_gim_01(time_01) ;
```



```
iono_cor_gim_01: FillValue = -32768s;  
iono_cor_gim_01: long_name = "GIM ionospheric correction: 1 Hz" ;  
iono_cor_gim_01: units = "m" ;  
iono_cor_gim_01: standard_name =  
"altimeter_range_correction_due_to_ionosphere" ;  
iono_cor_gim_01: add_offset = 0. ;  
iono_cor_gim_01: scale_factor = 0.001 ;  
iono_cor_gim_01: coordinates = "lon_01 lat_01" ;  
iono_cor_gim_01: comment = "To be added to range measurement to correct  
for the delay to the Radar pulse caused by free electrons in the ionosphere.  
Computed from GPS ionospheric data." ;  
iono_cor_gim_01: source = "GIM" ;  
iono_cor_gim_01: institution = "NASA/JPL" ;
```

3.4.64 lat_01(time_01)

```
int lat_01(time_01) ;  
lat_01: long_name = "latitude: 1 Hz" ;  
lat_01: FillValue = -2147483648 ;  
lat_01: units = "degrees_north" ;  
lat_01: standard_name = "latitude" ;  
lat_01: add_offset = 0. ;  
lat_01: scale_factor = 1.e-07 ;  
lat_01: comment = "Positive latitude is North latitude, negative latitude  
is South latitude" ;
```

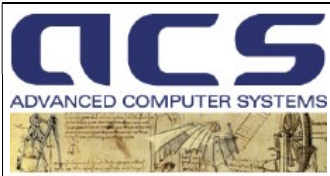
3.4.65 lat_20_ku(time_20_ku)

```
int lat_20_ku(time_20_ku) ;  
lat_20_ku: long_name = "latitude: 20 Hz" ;  
lat_20_ku: FillValue = -2147483648 ;  
lat_20_ku: units = "degrees_north" ;  
lat_20_ku: standard_name = "latitude" ;  
lat_20_ku: add_offset = 0. ;  
lat_20_ku: scale_factor = 1.e-07 ;  
lat_20_ku: comment = "Positive latitude is North latitude, negative  
latitude is South latitude" ;
```

3.4.66 lat_20_hr_ku(time_20_hr_ku)

```
int lat_20_hr_ku(time_20_hr_ku) ;  
lat_20_hr_ku: units = "degrees_north" ;  
lat_20_hr_ku: FillValue = -2147483648 ;  
lat_20_hr_ku: long_name = "latitude: 20 Hz from HR data" ;  
lat_20_hr_ku: standard_name = "latitude" ;  
lat_20_hr_ku: scale_factor = 1.e-07 ;  
lat_20_hr_ku: add_offset = 0. ;  
lat_20_hr_ku: comment = "Latitude of measurement [-90,+90]. Positive  
latitude is North latitude, negative latitude is  
South latitude. Note the scale factor." ;
```

3.4.67 load_tide_sol1_01(time_01)



```
short load_tide_sol1_01(time_01) ;
    load_tide_sol1_01:_FillValue = -32768s;
    load_tide_sol1_01:long_name = "load tide height for geocentric ocean tide
(solution 1): 1 Hz" ;
    load_tide_sol1_01:units = "m" ;
    load_tide_sol1_01:add_offset = 0. ;
    load_tide_sol1_01:scale_factor = 0.001 ;
    load_tide_sol1_01:coordinates = "lon_01 lat_01" ;
    load_tide_sol1_01:comment = "This value has already been added to the
corresponding ocean tide height value recorded in the product
[ocean_tide_sol1_01]." ;
    load_tide_sol1_01:source = "GOT4.10c" ;
    load_tide_sol1_01:institution = "GSFC" ;
```

3.4.68 load_tide_sol2_01(time_01)

```
short load_tide_sol2_01(time_01) ;
    load_tide_sol2_01:_FillValue = -32768s;
    load_tide_sol2_01:long_name = "load tide height for geocentric ocean tide
(solution 2): 1 Hz" ;
    load_tide_sol2_01:units = "m" ;
    load_tide_sol2_01:add_offset = 0. ;
    load_tide_sol2_01:scale_factor = 0.001 ;
    load_tide_sol2_01:coordinates = "lon_01 lat_01" ;
    load_tide_sol2_01:comment = "This value contains the total load tide
height (short-period and long-period) for the geocentric ocean tide (solution 2).
To get only the pure ocean tide height (solution 2), do: [ocean_tide_sol2_01] +
[ocean_tide_non_eq_01] - [load_tide_sol2_01]. This value has already been added
to the corresponding ocean tide height value recorded in the product
[ocean_tide_sol2_01]." ;
    load_tide_sol2_01:source = "FES2014b" ;
    load_tide_sol2_01:institution = "LEGOS/CNES" ;
```

3.4.69 lon_01(time_01)

```
int lon_01(time_01) ;
    lon_01:_FillValue = -2147483648;
    lon_01:long_name = "longitude: 1 Hz" ;
    lon_01:units = "degrees_east" ;
    lon_01:standard_name = "longitude" ;
    lon_01:add_offset = 0. ;
    lon_01:scale_factor = 1.e-07 ;
    lon_01:comment = "East longitude relative to Greenwich meridian" ;
```

3.4.70 lon_20_ku(time_20_ku)

```
int lon_20_ku(time_20_ku) ;
    lon_20_ku:_FillValue = -2147483648;
    lon_20_ku:long_name = "longitude: 20 Hz" ;
    lon_20_ku:units = "degrees_east" ;
    lon_20_ku:standard_name = "longitude" ;
    lon_20_ku:add_offset = 0. ;
    lon_20_ku:scale_factor = 1.e-07 ;
    lon_20_ku:comment = "East longitude relative to Greenwich meridian" ;
```



3.4.71 lon_20_hr_ku(time_20_hr_ku)

```
int lon_20_hr_ku (time_20_hr_ku) ;  
lon_20_hr_ku: FillValue = -2147483648 ;  
  
lon_20_hr_ku:units = "degrees_east" ;  
  
lon_20_hr_ku:long_name = "longitude: 20 Hz from HR data" ;  
lon_20_hr_ku:standard_name = "longitude" ;  
lon_20_hr_ku:scale_factor = 1.e-07 ;  
lon_20_hr_ku:add_offset = 0. ;  
lon_20_hr_ku:comment = "Longitude of measurement [-180,+180]. Positive at  
East. East longitude relative to Greenwich  
meridian. Note the scale factor." ;
```

3.4.72 look_angle_start_20_hr_ku(time_20_hr_ku)

```
int look_angle_start_20_hr_ku(time_20_hr_ku) ;  
look_angle_start_20_hr_ku: FillValue = -2147483648 ;  
look_angle_start_20_hr_ku:units = "rad" ;  
look_angle_start_20_hr_ku:long_name = "look angle start from HR data" ;  
look_angle_start_20_hr_ku:add_offset = 0. ;  
look_angle_start_20_hr_ku:scale_factor = 1.e-07 ;  
look_angle_start_20_hr_ku:comment = "Value of Look Angle for the first  
single look echo in the stack. It is the angle between: (a)  
perpendicular from the satellite CoM to the surface, (b)  
direction satellite - surface location. The look angle depends  
purely on geometry." ;
```

3.4.73 look_angle_stop_20_hr_ku(time_20_hr_ku)

```
int look_angle_stop_20_hr_ku(time_20_hr_ku) ;  
look_angle_stop_20_hr_ku: FillValue = -2147483648 ;  
look_angle_stop_20_hr_ku:units = "rad" ;  
look_angle_stop_20_hr_ku:long_name = " look angle stop from HR data " ;  
look_angle_stop_20_hr_ku:add_offset = 0. ;  
look_angle_stop_20_hr_ku:scale_factor = 1.e-07 ;  
look_angle_stop_20_hr_ku:comment = "Value of Look Angle for the last  
single look echo in the stack. It is the angle between: (a)  
perpendicular from the satellite CoM to the surface, (b)  
direction satellite - surface location. The look angle depends  
purely on geometry." ;
```

3.4.74 mod_dry_tropo_cor_01(time_01)

```
short mod_dry_tropo_cor_01(time_01) ;  
mod_dry_tropo_cor_01: FillValue = 32768s;  
mod_dry_tropo_cor_01:long_name = "model dry tropospheric correction: 1  
Hz" ;  
mod_dry_tropo_cor_01:units = "m" ;  
mod_dry_tropo_cor_01:standard_name = "altimeter_range_correction_due_to_dry_troposphere" ;  
mod_dry_tropo_cor_01:add_offset = 0. ;  
mod_dry_tropo_cor_01:scale_factor = 0.001 ;  
mod_dry_tropo_cor_01:coordinates = "lon_01 lat_01" ;
```



```
mod_dry_tropo_cor_01:comment = "Computed at the altimeter time-tag  
[time_01] from the interpolation of 2 meteorological fields that surround the  
altimeter time-tag. To be added to range measurement to correct for the  
propagation delay to the radar pulse, caused by the dry-gas component of the  
atmosphere of the Earth." ;  
mod_dry_tropo_cor_01:source = "European Center for Medium Range Weather  
Forecasting" ;  
mod_dry_tropo_cor_01:institution = "ECMWF" ;
```

3.4.75 mod_wet_tropo_cor_01(time_01)

```
short mod_wet_tropo_cor_01(time_01) ;  
mod_wet_tropo_cor_01:FillValue = -32768s;  
mod_wet_tropo_cor_01:long_name = "model wet tropospheric correction: 1  
Hz" ;  
mod_wet_tropo_cor_01:units = "m" ;  
mod_wet_tropo_cor_01:standard_name = "altimeter_range_correction_due_to_wet_troposphere" ;  
mod_wet_tropo_cor_01:add_offset = 0. ;  
mod_wet_tropo_cor_01:scale_factor = 0.001 ;  
mod_wet_tropo_cor_01:coordinates = "lon_01 lat_01" ;  
mod_wet_tropo_cor_01:comment = "Computed at the altimeter time-tag  
[time_01] from the interpolation of 2 meteorological fields that surround the  
altimeter time-tag. To be added to range measurement to correct for the  
propagation delay to the radar pulse, caused by the H2O component of the atmosphere  
of the Earth." ;  
mod_wet_tropo_cor_01:source = "European Center for Medium Range Weather  
Forecasting" ;  
mod_wet_tropo_cor_01:institution = "ECMWF" ;
```

3.4.76 noise_power_20_ku(time_20_ku)

```
int noise_power_20_ku(time_20_ku) ;  
noise_power_20_ku:FillValue = -2147483648 ;  
noise_power_20_ku:long_name = "noise power measurement: 20 Hz" ;  
noise_power_20_ku:units = "count" ;  
noise_power_20_ku:coordinates = "lon_20_ku lat_20_ku" ;  
noise_power_20_ku:comment = "Noise power measurement from telemetry." ;
```

3.4.77 noise_power_20_hr_ku(time_20_hr_ku)

```
int noise_power_20_hr_ku(time_20_hr_ku) ;  
noise_power_20_hr_ku:FillValue = -2147483648 ;  
noise_power_20_hr_ku:units = "dB" ;  
noise_power_20_hr_ku:long_name = "noise power measurement: 20 Hz from HR  
data" ;  
noise_power_20_hr_ku:add_offset = 0.0 ;  
noise_power_20_hr_ku:scale_factor = 0.01 ;  
noise_power_20_hr_ku:comment = "Noise power measurement. In SAR/SARin it  
is estimated on the L1b 20Hz multilooked power waveform. In LRM  
it is converted from telemetry units and scaled according to  
the proper AGC value.." ;
```




3.4.78 ns_20_ku(ns_20_ku)

```
short ns_20_ku(ns_20_ku) ;  
    ns_20_ku:long_name = "number of samples in the waveforms" ;  
    ns_20_ku:units = "count" ;  
    ns_20_ku:comment = "Set to be compliant with CF convention." ;
```

3.4.79 ns_20_hr_ku(ns_20_hr_ku)

```
short ns_20_hr_ku(ns_20_hr_ku) ;  
    ns_20_hr_ku:comment = "Set to be compliant with CF convention." ;  
    ns_20_hr_ku:long_name = "number of samples in the waveforms: 20 Hz from  
HR data" ;  
    ns_20_hr_ku:units = "count" ;  
    ns_20_hr_ku:FillValue = -1s;  
    ns_20_hr_ku:Unsigned = "true";
```

3.4.80 num_meas_20hz_01(time_01)

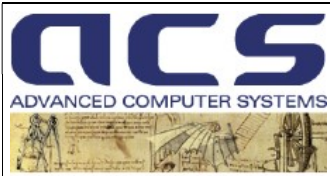
```
short num_meas_20hz_01(time_01) ;  
    num_meas_20hz_01:FillValue = -32768s;  
    num_meas_20hz_01:long_name = "number of 20Hz measurements: 1 Hz" ;  
    num_meas_20hz_01:units = "count" ;  
  
    num_meas_20hz_01:comment = "Number of 20Hz measurements used to derive  
the 1Hz measurement." ;
```

3.4.81 ocean_tide_eq_01(time_01)

```
short ocean_tide_eq_01(time_01) ;  
    ocean_tide_eq_01:FillValue = -32768s;  
    ocean_tide_eq_01:long_name = "equilibrium long-period ocean tide height:  
1 Hz" ;  
    ocean_tide_eq_01:units = "m" ;  
    ocean_tide_eq_01:standard_name =  
"sea_surface_height_amplitude_due_to_equilibrium_ocean_tide" ;  
    ocean_tide_eq_01:add_offset = 0. ;  
    ocean_tide_eq_01:scale_factor = 0.001 ;  
    ocean_tide_eq_01:coordinates = "lon_01 lat_01" ;  
    ocean_tide_eq_01:comment = "This value has already been added to the two  
geocentric ocean tide height values recorded in the product [ocean_tide_sol1_01]  
and [ocean_tide_sol2_01]. The permanent tide (zero frequency) is not included in  
this parameter because it is included in the geoid and mean sea surface." ;  
    ocean_tide_eq_01:source = "Cartwright and Edden [1973] Corrected tables  
of tidal harmonics - J. Geophys. J. R. Astr. Soc., 33, 253-264." ;
```

3.4.82 ocean_tide_non_eq_01(time_01)

```
short ocean_tide_non_eq_01(time_01) ;  
    ocean_tide_non_eq_01:FillValue = -32768s;  
    ocean_tide_non_eq_01:long_name = "non-equilibrium long-period ocean tide  
height: 1 Hz" ;  
    ocean_tide_non_eq_01:units = "m" ;
```



```
ocean_tide_non_eq_01:standard_name =
"sea_surface_height_amplitude_due_to_non_equilibrium_ocean_tide" ;
ocean_tide_non_eq_01:add_offset = 0. ;
ocean_tide_non_eq_01:scale_factor = 0.001 ;
ocean_tide_non_eq_01:coordinates = "lon_01 lat_01" ;
ocean_tide_non_eq_01:comment = "This parameter is computed as a
correction to the parameter ocean_tide_eq_01. It contains the long-period ocean
tide and the long period load tide components. This value can be added to
[ocean_tide_eq_01] (or [ocean_tide_sol1_01], [ocean_tide_sol2_01]) so that the
resulting value models the total non equilibrium ocean tide height." ;
ocean_tide_non_eq_01:source = "FES2014b" ;
ocean_tide_non_eq_01:institution = "LEGOS/CNES" ;
```

3.4.83 ocean_tide_sol1_01(time_01)

```
int ocean_tide_sol1_01(time_01) ;
ocean_tide_sol1_01: FillValue = 2147483648;
ocean_tide_sol1_01:long_name = "geocentric ocean tide height (solution
1): 1 Hz" ;
ocean_tide_sol1_01:units = "m" ;
ocean_tide_sol1_01:standard_name =
"sea_surface_height_amplitude_due_to_geocentric_ocean_tide" ;
ocean_tide_sol1_01:add_offset = 0. ;
ocean_tide_sol1_01:scale_factor = 0.001 ;
ocean_tide_sol1_01:coordinates = "lon_01 lat_01" ;
ocean_tide_sol1_01:comment = "Solution 1 corresponds to GOT model.
Includes the corresponding loading tide [ocean_tide_sol1_01] and equilibrium
long-period ocean tide height [ocean_tide_eq_01]. The permanent tide (zero
frequency) is not included in this parameter because it is included in the geoid
and mean sea surface." ;
ocean_tide_sol1_01:source = "GOT4.10c" ;
ocean_tide_sol1_01:institution = "GSFC" ;
```

3.4.84 ocean_tide_sol2_01(time_01)

```
int ocean_tide_sol2_01(time_01) ;
ocean_tide_sol2_01: FillValue = -2147483648;
ocean_tide_sol2_01:long_name = "geocentric ocean tide height (solution
2): 1 Hz" ;
ocean_tide_sol2_01:units = "m" ;
ocean_tide_sol2_01:standard_name =
"sea_surface_height_amplitude_due_to_geocentric_ocean_tide" ;
ocean_tide_sol2_01:add_offset = 0. ;
ocean_tide_sol2_01:scale_factor = 0.001 ;
ocean_tide_sol2_01:coordinates = "lon_01 lat_01" ;
ocean_tide_sol2_01:comment = "Solution 2 corresponds to FES model.
Includes the corresponding short-period part of the loading tide
[ocean_tide_sol2_01] and equilibrium long-period ocean tide 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_sol1_01], [mean_sea_surf_sol2_01])." ;
ocean_tide_sol2_01:source = "FES2014b" ;
ocean_tide_sol2_01:institution = "LEGOS/CNES" ;
```



3.4.85 off_nadir_pitch_angle_str_20_hr_ku(time_20_hr_ku)

```
int off_nadir_pitch_angle_str_20_hr_ku(time_20_hr_ku) ;
off_nadir_pitch_angle_str_20_hr_ku: FillValue = -2147483648 ;
off_nadir_pitch_angle_str_20_hr_ku:units = "degrees" ;
off_nadir_pitch_angle_str_20_hr_ku:long_name = "off nadir pitch angle
derived from star tracker data: 20 Hz
from HR data";
off_nadir_pitch_angle_str_20_hr_ku:comment = "Pitch angle with respect to
the nadir pointing, measured by the STRs and post-
processed by ground facility." ;
off_nadir_pitch_angle_str_20_hr_ku:add_offset = 0.0 ;
off_nadir_pitch_angle_str_20_hr_ku:scale_factor = 1.e-07;
```

3.4.86 off_nadir_roll_angle_str_20_hr_ku(time_20_hr_ku)

```
int off_nadir_roll_angle_str_20_hr_ku(time_20_hr_ku) ;
off_nadir_roll_angle_str_20_hr_ku: FillValue = -2147483648 ;
off_nadir_roll_angle_str_20_hr_ku:units = "degrees" ;
off_nadir_roll_angle_str_20_hr_ku:long_name = " off nadir roll angle
derived from star tracker data: 20 Hz
from HR data" ;
off_nadir_roll_angle_str_20_hr_ku:comment = "Roll angle with respect to
the nadir pointing, measured by the STRs and post-
processed by ground facility." ;
off_nadir_roll_angle_str_20_hr_ku:add_offset = 0.0 ;
off_nadir_roll_angle_str_20_hr_ku:scale_factor = 1.e-07 ;
```

3.4.87 off_nadir_yaw_angle_str_20_hr_ku(time_20_hr_ku)

```
int off_nadir_yaw_angle_str_20_hr_ku(time_20_hr_ku) ;
off_nadir_yaw_angle_str_20_hr_ku: FillValue = -2147483648 ;
off_nadir_yaw_angle_str_20_hr_ku:units = "degrees" ;
off_nadir_yaw_angle_str_20_hr_ku:long_name = "off nadir yaw angle derived
from star tracker data: 20 Hz from HR
data" ;
off_nadir_yaw_angle_str_20_hr_ku:comment = "Yaw angle with respect to the
nadir pointing, measured by the STRs and post-
processed by ground facility." ;
off_nadir_yaw_angle_str_20_hr_ku:add_offset = 0.0 ;
off_nadir_yaw_angle_str_20_hr_ku:scale_factor = 1.e-07 ;
```

3.4.88 orb_alt_rate_01(time_01)

```
short orb_alt_rate_01(time_01) ;
orb_alt_rate_01: FillValue = -32768s;
orb_alt_rate_01:long_name = "centre of mass altitude rate with respect to
the reference ellipsoid [WGS84]: 1 Hz" ; orb_alt_rate_01:units = "m/s" ;
orb_alt_rate_01:add_offset = 0. ;
orb_alt_rate_01:scale_factor = 0.001 ;
orb_alt_rate_01:coordinates = "lon_01 lat_01" ;
orb_alt_rate_01:comment = "Instantaneous altitude rate at the
Centre of Mass with respect to the reference ellipsoid." ;
```



3.4.89 orb_alt_rate_20_ku(time_20_ku)

```
short orb_alt_rate_20_ku(time_20_ku) ;
    orb_alt_rate_20_ku: FillValue = -32768s;
    orb_alt_rate_20_ku:long_name = "centre of mass altitude rate with respect
to the reference ellipsoid [WGS84]: 20 Hz" ;
orb_alt_rate_20_ku:units = "m/s" ;
    orb_alt_rate_20_ku:add_offset = 0. ;
    orb_alt_rate_20_ku:scale_factor = 0.001 ;
    orb_alt_rate_20_ku:coordinates = "lon_20_ku lat_20_ku" ;
    orb_alt_rate_20_ku:comment = "Instantaneous altitude rate at the Centre
of Mass with respect to the reference ellipsoid." ;
```

3.4.90 orb_alt_rate_20_hr_ku(time_20_hr_ku)

```
int orb_alt_rate_20_hr_ku(time_20_hr_ku) ;
    orb_alt_rate_20_hr_ku: FillValue = -2147483648 ;
    orb_alt_rate_20_hr_ku:units = "m/s" ;
    orb_alt_rate_20_hr_ku:long_name = "centre of mass altitude rate with
respect to the reference ellipsoid
[WGS84] : 20 Hz from HR data" ;
    orb_alt_rate_20_hr_ku:add_offset = 0. ;
    orb_alt_rate_20_hr_ku:scale_factor = 0.001 ;
    orb_alt_rate_20_hr_ku:comment = "Instantaneous altitude rate at the
Centre of Mass with respect to the reference ellipsoid
[WGS84]." ;
```

3.4.91 ph_diff_waveform_20_hr_ku(time_20_hr_ku, ns_20_hr_ku)

```
int ph_diff_waveform_20_hr_ku(time_20_hr_ku, ns_20_hr_ku) ;
    ph_diff_waveform_20_hr_ku: FillValue = -2147483648 ;
    ph_diff_waveform_20_hr_ku:units = "rad" ;
    ph_diff_waveform_20_hr_ku:long_name = "l1b Phase Difference waveform" ;
    ph_diff_waveform_20_hr_ku:add_offset = 0. ;
    ph_diff_waveform_20_hr_ku:scale_factor = 1.e-06 ;
    ph_diff_waveform_20_hr_ku:comment = "The L1b 20Hz phase difference
waveform is a fully-
calibrated, high resolution,
multilooked phase difference
computed from the complex
echoes on the two receiving
channels (SARin only)." ;
```

3.4.92 ph_slope_cor_20_hr_ku(time_20_hr_ku)

```
int ph_slope_cor_20_hr_ku(time_20_hr_ku) ;
    ph_slope_cor_20_hr_ku: FillValue = -2147483648 ;
    ph_slope_cor_20_hr_ku:units = "rad" ;
    ph_slope_cor_20_hr_ku:long_name = "phase slope correction from HR data"
;

    ph_slope_cor_20_hr_ku:add_offset = 0. ;
    ph_slope_cor_20_hr_ku:scale_factor = 1.e-06 ;
    ph_slope_cor_20_hr_ku:comment = "Differential group delay phase
difference slope correction across the whole bandwidth
(SARin only). It is composed by fixed contributions from
```



IPFDB and by variable contributions covering differences between the CAL-1 and CAL-4 paths. Applied in L1b SARin products."

3.4.93 pole_tide_01(time_01)

```
short pole_tide_01(time_01) ;
    pole_tide_01: FillValue = -32768s;
    pole_tide_01:long_name = "geocentric tide height: 1 Hz" ;
    pole_tide_01:units = "m" ;
    pole_tide_01:standard_name =
"sea_surface_height_amplitude_due_to_pole_tide" ;
    pole_tide_01:add_offset = 0. ;
    pole_tide_01:scale_factor = 0.001 ;
    pole_tide_01:coordinates = "lon_01 lat_01" ;
    pole_tide_01:source = "Wahr [1985] Deformation of the Earth induced by
polar motion - J. Geophys. Res. (Solid Earth), 90, 9363-9368." ;
    pole_tide_01:institution = "IERS/CNES" ;
```

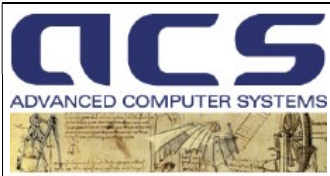
3.4.94 pwr_waveform_20_ku(time_20_ku)

```
short pwr_waveform_20_ku(time_20_ku,ns_20_ku) ;
    pwr_waveform_20_ku:long_name = "waveform samples (scaled): 20 Hz" ;
    pwr_waveform_20_ku:units = "count" ;
    pwr_waveform_20_ku:add_offset = 32768.0 ;
    pwr_waveform_20_ku:scale_factor = 1. ;
    pwr_waveform_20_ku:comment = "LRM mode: echo forwarded from
telemetry. SAR mode: echo retrieved by on-ground pseudo-LRM processing. The echo
is corrected from on-board FFT filtering effected, accounting for CAL2 gain
profile range window (CAL2). Scaled power echo waveform = real power echo * echo
scale factor (echo_scale_20_ku).The echo is corrected for the intermediate
frequency filter effect." ;
```

3.4.95 pwr_waveform_20_hr_ku(time_20_hr_ku, ns_20_hr_ku)

```
ushort pwr_waveform_20_hr_ku(time_20_hr_ku, ns_20_hr_ku) ;
    pwr_waveform_20_hr_ku:units = "count" ;
    pwr_waveform_20_hr_ku:long_name = "l1b power waveform scaled 0-65535 from
HR data" ;
    pwr_waveform_20_hr_ku:add_offset = 0us ;
    pwr_waveform_20_hr_ku:scale_factor = 1us ;
    pwr_waveform_20_hr_ku:comment = "The L1b 20Hz power waveform is a fully-
calibrated waveform. For LRM it is a low
resolution pulse limited waveform. For
SAR/SARin it is a high resolution multilooked
waveform. Units are counts scaled to fit in the
range 0-65535." ;
    pwr_waveform_20_hr_ku:Unsigned = "true";
```

3.4.96 rec_count_20_ku(time_20_ku)



```
int rec_count_20_ku(time_20_ku) ;
    rec_count_20_ku: FillValue = -2147483648;
    rec_count_20_ku:long_name = "record counter: 20 Hz" ;
    rec_count_20_ku:units = "count" ;
    rec_count_20_ku:comment = "Record counter - progressive counter
incremented by 1 for each data block." ;
```

3.4.97 **rec_count_20_hr_ku(time_20_hr_ku)**

```
int rec_count_20_hr_ku(time_20_hr_ku) ;
    rec_count_20_hr_ku:units = "count" ;
    rec_count_20_hr_ku:long_name = "record counter: 20 Hz from HR data" ;
    rec_count_20_hr_ku:comment = "Record counter - progressive counter
                                incremented by 1 for each record.
                                Surface Sample counter for SAR/SARin
                                L1B products." ;
```

3.4.98 **sat_vel_vec_20_hr_ku(time_20_hr_ku,space_3d)**

```
int sat_vel_vec_20_hr_ku(time_20_hr_ku, space_3d) ;
    sat_vel_vec_20_hr_ku: FillValue = -2147483648 ;
    sat_vel_vec_20_hr_ku:units = "m/s" ;
    sat_vel_vec_20_hr_ku:long_name = "velocity vector in itrfr" ;
    sat_vel_vec_20_hr_ku:add_offset = 0. ;
    sat_vel_vec_20_hr_ku:scale_factor = 0.001 ;
    sat_vel_vec_20_hr_ku:comment = "Satellite velocity vector in
International Terrestrial Reference
Frame in the International Earth Fixed
System. The 3 components are given
according to the 'space_3d' dimension:
[1] x, [2] y, [3] z." ;
```

3.4.99 **scale_factor_20_ku(time_20_ku)**

```
int scale_factor_20_ku(time_20_ku) ;
    scale_factor_20_ku: FillValue = -2147483648 ;
    scale_factor_20_ku:long_name = "scaling factor for backscatter
coefficient evaluation: 20 Hz" ;
    scale_factor_20_ku:units = "dB" ;
    scale_factor_20_ku:add_offset = 0. ;
    scale_factor_20_ku:scale_factor = 0.01 ;
    scale_factor_20_ku:coordinates = "lon_20_ku lat_20_ku" ;
    scale_factor_20_ku:comment = "This scaling factor represents the
backscatter coefficient for a waveform amplitude equal to 1. It is corrected for
AGC instrumental errors [agc_cor_01] and internal calibration
[internal_cor_sig0_01]" ;
```

3.4.100 **seq_count_20_ku(time_20_ku)**

```
int seq_count_20_ku(time_20_ku) ;
    seq_count_20_ku: FillValue = -2147483648 ;
    seq_count_20_ku:long_name = "source sequence counter: 20 Hz" ;
    seq_count_20_ku:units = "count" ;
```



```
seq_count_20_ku:comment = "Source Sequence Counter read from the L0 echo  
telemetry packet.";
```

3.4.101 seq_count_20_hr_ku(time_20_hr_ku)

```
short seq_count_20_hr_ku(time_20_hr_ku) ;  
seq_count_20_hr_ku:units = "count" ;  
seq_count_20_hr_ku:long_name = "source sequence counter: 20 Hz from HR  
data" ;  
seq_count_20_hr_ku:add_offset = 0s ;  
seq_count_20_hr_ku:scale_factor = 1s ;  
seq_count_20_hr_ku:comment = "Source Sequence Counter read from the L0  
echo telemetry packet." ;
```

3.4.102 solid_earth_tide_01(time_01)

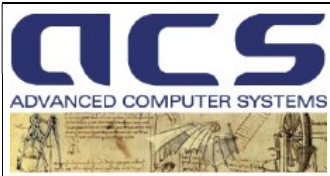
```
short solid_earth_tide_01(time_01) ;  
solid_earth_tide_01: FillValue = -32768s;  
solid_earth_tide_01:long_name = "solid earth tide height: 1 Hz" ;  
solid_earth_tide_01:units = "m" ;  
solid_earth_tide_01:standard_name = "  
"sea_surface_height_amplitude_due_to_earth_tide" ;  
solid_earth_tide_01:add_offset = 0. ;  
solid_earth_tide_01:scale_factor = 0.001 ;  
solid_earth_tide_01:coordinates = "lon_01 lat_01" ;  
solid_earth_tide_01:comment = "Solid earth tide - to be added to  
the range to remove the effect of local tidal distortion in the crust of the  
Earth." ;  
solid_earth_tide_01:source = "Cartwright and Edden [1973] Corrected  
tables of tidal harmonics - J. Geophys. J. R. Astr. Soc., 33, 253-264." ;
```

3.4.103 stack_centre_20_hr_ku(time_20_hr_ku)

```
short stack_centre_20_hr_ku(time_20_hr_ku) ;  
stack_centre_20_hr_ku:units = "count" ;  
stack_centre_20_hr_ku: FillValue = -32768s ;  
stack_centre_20_hr_ku:long_name = "gaussian power fitting: center wrt  
beam number from HR data" ;  
stack_centre_20_hr_ku:add_offset = 0. ;  
stack_centre_20_hr_ku:scale_factor = 0.01 ;  
stack_centre_20_hr_ku:comment = "Position of the centre of Gaussian that  
fits the range integrated power of the  
single look echoes within a stack. Stack  
centre as function of stack beam number."  
;
```

3.4.104 stack_centre_angle_20_hr_ku(time_20_hr_ku)

```
short stack_centre_angle_20_hr_ku(time_20_hr_ku) ;  
stack_centre_angle_20_hr_ku: FillValue = -32768s ;  
stack_centre_angle_20_hr_ku:units = "rad" ;
```



```
stack_centre_angle_20_hr_ku:long_name = "gaussian power fitting: center  
wrt boresight angle from HR data  
";  
stack_centre_angle_20_hr_ku:add_offset = 0. ;  
stack_centre_angle_20_hr_ku:scale_factor = 1.e-06 ;  
stack_centre_angle_20_hr_ku:comment = "Position of the centre of Gaussian  
that fits the range integrated power  
of the single look echoes within a  
stack. Centre as function of the  
boresight angle, that is the angle  
between: (a) antenna boresight  
direction, (b) direction satellite -  
surface location. The pointing angle  
depends on geometry and attitude  
(roll and pitch).";
```

3.4.105 **stack_kurtosis_20_hr_ku(time_20_hr_ku)**

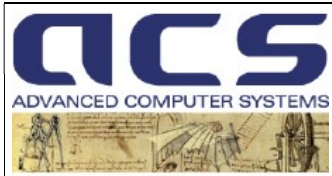
```
short stack_kurtosis_20_hr_ku(time_20_hr_ku) ;  
stack_kurtosis_20_hr_ku: FillValue = -999s ;  
stack_kurtosis_20_hr_ku:units = "count" ;  
stack_kurtosis_20_hr_ku:long_name = "gaussian power fitting: kurtosis wrt  
beam number from HR data " ;  
stack_kurtosis_20_hr_ku:add_offset = 0. ;  
stack_kurtosis_20_hr_ku:scale_factor = 0.01 ;  
stack_kurtosis_20_hr_ku:comment = "4th central moment computed on the  
range integrated power of the single  
look echoes within a stack. Kurtosis as  
function of stack beam number.";
```

3.4.106 **stack_number_after_weighting_20_hr_ku(time_20_hr_ku)**

```
short stack_number_after_weighting_20_hr_ku(time_20_hr_ku) ;  
stack_number_after_weighting_20_hr_ku: FillValue = -32768s ;  
stack_number_after_weighting_20_hr_ku:units = "count" ;  
stack_number_after_weighting_20_hr_ku:long_name = "number of  
contributing beams in the stack after  
weighting from HR data " ;  
stack_number_after_weighting_20_hr_ku:add_offset = 0s ;  
stack_number_after_weighting_20_hr_ku:scale_factor = 1s ;  
stack_number_after_weighting_20_hr_ku:comment = "Number of contributing  
beams in the stack after weighting:  
number of single look echoes in the stack  
after the Surface Sample Stack weighting  
is applied." ;
```

3.4.107 **stack_number_before_weighting_20_hr_ku(time_20_hr_ku)**

```
short stack_number_before_weighting_20_hr_ku(time_20_hr_ku) ;  
stack_number_before_weighting_20_hr_ku: FillValue = -32768s ;  
stack_number_before_weighting_20_hr_ku:units = "count" ;  
stack_number_before_weighting_20_hr_ku:long_name = "number of  
contributing beams in the stack before  
weighting from HR data " ;  
stack_number_before_weighting_20_hr_ku:add_offset = 0s ;
```

```
stack_number_before_weighting_20_hr_ku:scale_factor = 1s ;  
stack_number_before_weighting_20_hr_ku:comment = "Number of contributing  
beams in the stack before weighting:  
number of single look echoes in the  
stack before the Surface Sample  
Stack weighting is applied." ;
```

3.4.108 **stack_scaled_amplitude_20_hr_ku(time_20_hr_ku)**

```
short stack_scaled_amplitude_20_hr_ku(time_20_hr_ku) ;  
stack_scaled_amplitude_20_hr_ku: FillValue = -32768s ;  
stack_scaled_amplitude_20_hr_ku:units = "dB" ;  
stack_scaled_amplitude_20_hr_ku:long_name = "gaussian power fitting:  
amplitude from HR data " ;  
stack_scaled_amplitude_20_hr_ku:add_offset = 0. ;  
stack_scaled_amplitude_20_hr_ku:scale_factor = 0.01 ;  
stack_scaled_amplitude_20_hr_ku:comment = "Amplitude of Gaussian that  
fits the range integrated power of the  
single look echoes within a stack." ;
```

3.4.109 **stack_skewness_20_hr_ku(time_20_hr_ku)**

```
short stack_skewness_20_hr_ku(time_20_hr_ku) ;  
stack_skewness_20_hr_ku: FillValue = -999s ;  
stack_skewness_20_hr_ku:units = "count" ;  
stack_skewness_20_hr_ku:long_name = "gaussian power fitting: skewness wrt  
beam number from HR data " ;  
stack_skewness_20_hr_ku:add_offset = 0.0 ;  
stack_skewness_20_hr_ku:scale_factor = 0.01 ;  
stack_skewness_20_hr_ku:comment = "3rd central moment computed on the  
range integrated power of the single  
look echoes within a stack. Skewness  
as function of stack beam number." ;
```

3.4.110 **stack_std_20_hr_ku(time_20_hr_ku)**

```
short stack_std_20_hr_ku(time_20_hr_ku) ;  
stack_std_20_hr_ku:units = "count" ;  
stack_std_20_hr_ku: FillValue = -32768s ;  
stack_std_20_hr_ku:long_name = "Gaussian power fitting: std wrt beam  
number from HR data " ;  
stack_std_20_hr_ku:add_offset = 0. ;  
stack_std_20_hr_ku:scale_factor = 0.01 ;  
stack_std_20_hr_ku:comment = "Standard deviation of Gaussian that fits  
the range integrated power of the single look  
echoes within a stack. Standard deviation as  
function of stack beam number." ;
```

3.4.111 **stack_std_angle_20_hr_ku(time_20_hr_ku)**

```
short stack_std_angle_20_hr_ku(time_20_hr_ku) ;  
stack_std_angle_20_hr_ku: FillValue = -32768s ;  
stack_std_angle_20_hr_ku:units = "rad" ;
```



```
stack_std_angle_20_hr_ku:long_name = "gaussian power fitting: std wrt  
                                     boresight angle from HR data " ;  
stack_std_angle_20_hr_ku:add_offset = 0. ;  
stack_std_angle_20_hr_ku:scale_factor = 1.e-06 ;  
stack_std_angle_20_hr_ku:comment = "Standard deviation of Gaussian that  
                                     fits the range integrated power of the single look  
                                     echoes within a stack. Standard deviation as  
                                     function of the boresight angle, that is the angle  
                                     between: (a) antenna boresight direction, (b)  
                                     direction satellite - surface location. The  
                                     boresight angle depends on geometry and attitude  
                                     (roll and pitch)." ;
```

3.4.112 surf_type_01(time_01)

```
byte surf_type_01(time_01) ;  
  surf_type_01: FillValue = -128b ;  
  surf_type_01:long_name = "surface type: 1 Hz" ;  
  surf_type_01:flag_values = 0b, 1b, 2b, 3b ;  
  surf_type_01:flag_meanings = "ocean_or_semi_enclosed_sea  
enclosed_sea_or_lake continental_ice land" ;  
  surf_type_01:coordinates = "lon_01 lat_01" ;  
  surf_type_01:source = "terrainbase 1.0" ;  
  surf_type_01:institution = "NOAA National Geophysical Data Center,  
Boulder, Colorado." ;  
  surf_type_01:comment = "Computed using the TERRAINBASE model: 0= open  
oceans or semi-enclosed seas; 1= enclosed seas or lakes; 2= continental ice; 3=  
land. See Row, L.W., and D.A. Hastings, 1994. TerrainBase Worldwide Digital  
Terrain Data on CD-ROM, Release 1.0." ;
```

3.4.113 time_01(time_01)

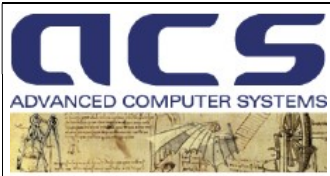
```
double time_01(time_01) ;  
  time_01:long_name = "UTC: 1 Hz" ;  
  time_01:units = "seconds since 2000-01-01 00:00:00.0" ;  
  time_01:standard_name = "time" ;  
  time_01:calendar = "gregorian" ;  
  time_01:tai_utc_difference = 37.;
```

3.4.114 time_20_ku(time_20_ku)

```
double time_20_ku(time_20_ku) ;  
  time_20_ku:long_name = "UTC: 20 Hz" ;  
  time_20_ku:units = "seconds since 2000-01-01 00:00:00.0" ;  
  time_20_ku:standard_name = "time" ;  
  time_20_ku:calendar = "gregorian" ;  
  time_20_ku:tai_utc_difference = 37.;
```

3.4.115 time_20_hr_ku(time_20_hr_ku)

```
double time_20_hr_ku(time_20_hr_ku) ;  
  time_20_hr_ku:units = "seconds since 2000-01-01 00:00:00.0" ;  
  time_20_hr_ku:long_name = "TAI: 20Hz HR" ;
```



```
time_20_hr_ku:standard_name = "time" ;  
time_20_hr_ku:calendar = "gregorian" ;  
time_20_hr_ku:comment = "Time in TAI: it contains the seconds since 1 Jan  
2000. Time refers to the instant the L1B 20Hz  
power waveform touches the surface." ;
```

3.4.116 **tot_gain_ch1_20_hr_ku(time_20_hr_ku)**

```
int tot_gain_ch1_20_hr_ku(time_20_hr_ku) ;  
tot_gain_ch1_20_hr_ku: FillValue = -2147483648 ;  
tot_gain_ch1_20_hr_ku:units = "dB" ;  
tot_gain_ch1_20_hr_ku:long_name = "total fixed gain on channel 1 HR" ;  
tot_gain_ch1_20_hr_ku:add_offset = 0. ;  
tot_gain_ch1_20_hr_ku:scale_factor = 0.01 ;  
tot_gain_ch1_20_hr_ku:comment = "Total Fixed Gain On Channel 1 - total  
fixed instrument gain applied on chain 1, this  
is the gain applied by the RF unit. Applied  
in L1B." ;
```

3.4.117 **tot_gain_ch2_20_hr_ku(time_20_hr_ku)**

```
int tot_gain_ch2_20_hr_ku(time_20_hr_ku) ;  
tot_gain_ch2_20_hr_ku: FillValue = -2147483648 ;  
tot_gain_ch2_20_hr_ku:units = "dB" ;  
tot_gain_ch2_20_hr_ku:long_name = "total fixed gain on channel 2 HR" ;  
tot_gain_ch2_20_hr_ku:add_offset = 0. ;  
tot_gain_ch2_20_hr_ku:scale_factor = 0.01 ;  
tot_gain_ch2_20_hr_ku:comment = "Total Fixed Gain On Channel 2 - total  
fixed instrument gain applied on chain 2, this  
is the gain applied by the RF unit. Applied  
in L1B." ;
```

3.4.118 **tracker_range_20_ku(time_20_ku)**

```
int tracker_range_20_ku(time_20_ku) ;  
tracker_range_20_ku: FillValue = -2147483648 ;  
tracker_range_20_ku:long_name = "corrected tracker range: 20 Hz" ;  
tracker_range_20_ku:units = "m" ;  
tracker_range_20_ku:scale_factor = 0.001 ;  
tracker_range_20_ku:coordinates = "lon_20_ku lat_20_ku" ;  
tracker_range_20_ku:comment = "Tracker range corrected for USO frequency  
drift [uso_cor_20_ku], internal path correction [int_path_cor_01] and Doppler  
correction [dop_cor_20_ku]." ;
```

3.4.119 **transmit_pwr_20_hr_ku(time_20_hr_ku)**

```
int transmit_pwr_20_hr_ku(time_20_hr_ku) ;  
transmit_pwr_20_hr_ku: FillValue = -2147483648 ;  
transmit_pwr_20_hr_ku:units = "Watt" ;  
transmit_pwr_20_hr_ku:long_name = "transmitted power from HR data" ;  
transmit_pwr_20_hr_ku:add_offset = 0. ;  
transmit_pwr_20_hr_ku:scale_factor = 1.e-06 ;  
transmit_pwr_20_hr_ku:comment = "The altimeter transmit power." ;
```



3.4.120 **uso_cor_01_ku(time_01)**

```
short uso_cor_01_ku(time_01) ;
    uso_cor_01_ku: FillValue = -32768s;
    uso_cor_01_ku:long_name = "uso correction on the altimeter range (2-way):
1 Hz" ;
    uso_cor_01_ku:units = "m" ;
    uso_cor_01_ku:add_offset = 0. ;
    uso_cor_01_ku:scale_factor = 0.001 ;
    uso_cor_01_ku:coordinates = "lon_01 lat_01" ;
    uso_cor_01_ku:comment = "Correction of the USO frequency drift on the
altimeter range" ;
```

3.4.121 **uso_cor_20_ku(time_20_ku)**

```
short uso_cor_20_ku(time_20_ku) ;
    uso_cor_20_ku: FillValue = -32768s;
    uso_cor_20_ku:long_name = "uso correction on the altimeter range
(2-way): 20 Hz" ;
    uso_cor_20_ku:units = "m" ;
    uso_cor_20_ku:add_offset = 0. ;
    uso_cor_20_ku:scale_factor = 0.001 ;
    uso_cor_20_ku:coordinates = "lon_20_ku lat_20_ku" ;
    uso_cor_20_ku:comment = "Correction of the USO frequency drift on the
altimeter range" ;
```

3.4.122 **uso_cor_20_hr_ku(time_20_hr_ku)**

```
int uso_cor_20_hr_ku(time_20_hr_ku) ;
    uso_cor_20_hr_ku: FillValue = 2147483647 ;
    uso_cor_20_hr_ku:long_name = "uso correction on the altimeter range (2-
way): 20 Hz from HR data" ;
    uso_cor_20_hr_ku:add_offset = 0. ;
    uso_cor_20_hr_ku:scale_factor = 1.e-15 ;
    uso_cor_20_hr_ku:comment = "USO correction factor defined as the ratio
between the nominal and the modelled value.
This correction accounts for the different
between the nominal frequency provided in the
IPFDB and the modelled frequency deviation
provided by the DORIS USO drift file.
Correction to be applied by the user." ;
```

3.4.123 **wind_speed_mod_u_01(time_01)**

```
short wind_speed_mod_u_01(time_01) ;
    wind_speed_mod_u_01: FillValue = -32768s;
    wind_speed_mod_u_01:long_name = "U component of the model wind vector: 1
Hz" ;
    wind_speed_mod_u_01:units = "m/s" ;
    wind_speed_mod_u_01:standard_name = "wind_speed" ;
    wind_speed_mod_u_01:add_offset = 0. ;
    wind_speed_mod_u_01:scale_factor = 0.001 ;
    wind_speed_mod_u_01:coordinates = "lon_01 lat_01" ;
```



```
wind_speed_mod_u_01:comment = "Computed at the altimeter time-tag  
[time_01] from the interpolation of 2 meteorological fields that surround the  
altimeter time-tag." ; wind_speed_mod_u_01:source = "European Center  
for Medium Range Weather Forecasting" ;  
wind_speed_mod_u_01:institution = "ECMWF" ;
```

3.4.124 **wind_speed_mod_v_01(time_01)**

```
short wind_speed_mod_v_01(time_01) ;  
wind_speed_mod_v_01: FillValue = -32768s;  
wind_speed_mod_v_01:long_name = "V component of the model wind vector: 1  
Hz" ;  
wind_speed_mod_v_01:units = "m/s" ;  
wind_speed_mod_v_01:standard_name = "wind_speed" ;  
wind_speed_mod_v_01:add_offset = 0. ;  
wind_speed_mod_v_01:scale_factor = 0.001 ;  
wind_speed_mod_v_01:coordinates = "lon_01 lat_01" ;  
wind_speed_mod_v_01:comment = "Computed at the altimeter time-tag  
[time_01] from the interpolation of 2 meteorological fields that surround the  
altimeter time-tag." ; wind_speed_mod_v_01:source = "European Center  
for Medium Range Weather Forecasting" ;  
wind_speed_mod_v_01:institution = "ECMWF" ;
```

3.4.125 **window_del_20_hr_ku(time_20_hr_ku)**

```
int64 window_del_20_hr_ku(time_20_hr_ku) ;  
window_del_20_hr_ku: FillValue = -9223372036854775808L ;  
window_del_20_hr_ku:units = "seconds" ;  
window_del_20_hr_ku:long_name = "calibrated window delay (2way) " ;  
window_del_20_hr_ku:add_offset = 0.0 ;  
window_del_20_hr_ku:scale_factor = 1.e-12 ;  
window_del_20_hr_ku:comment = "Calibrated 2-way window delay: distance  
from CoM to middle range window (at sample ns/2 from 0). It  
includes all the range corrections given in the variable  
instr_cor_range. This is a 2-way time and 2-way corrections are  
applied " ;
```



4 L2 PRODUCT FORMAT SPECIFICATION

4.1 L2 PRODUCT FORMAT SPECIFICATION – LIST OF VARIABLES

The contents of the CryoSat ocean products can be logically grouped in:

1. 1-Hz Time and Orbit
2. 1-Hz PLRM Time and Orbit
3. 1-Hz Range Measurements
4. 1-Hz PLRM Range Measurements
5. 1-Hz Range Corrections
6. 1-Hz PLRM Range Corrections
7. 1-Hz SWH and Backscatter
8. 1-Hz PLRM SWH and Backscatter
9. 1-Hz SWH and Backscatter Correction
10. 1-Hz PLRM SWH and Backscatter Correction
11. 1 Hz- Geophysical Figures

This logical classification could be implemented in the NetCDF 4.0 model by means of a specific structure called **group**, however this feature is not used in the CryoSat products in order to assure the back compatibility with previous versions of the NetCDF models.

Nevertheless the logic behind this grouping is kept in the definition of the products and the remaining of this section will follow this hierarchy for the format specification.



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4.1.1 20-Hz - Time and Orbit

20Hz-Time and Orbit				
Variable Name	Dimension	long_name	units	EE Field
time_01	time_01	UTC: 1 Hz	seconds since 2000-01-01 00:00:00.0	Data Record Time (MDSR Time Stamp)
time_1hz_20_ku	time_20_ku	UTC: 20 Hz ku band	seconds since 2000-01-01 00:00:00.0	
time_20_ku	time_20_ku	UTC: 20 Hz ku band	seconds since 2000-01-01 00:00:00.0	
ind_first_meas_20hz_01	time_01	index of the first 20Hz measurement: 1 Hz	count	
num_meas_20hz_01	time_01	number of 20Hz measurement: 1 Hz	count	
ind_meas_1hz_20_ku	time_20_ku	index of the 1Hz measurement: 20 Hz ku band	count	
seq_count_01	time_01	sequence count: 1 Hz	count	Source Sequence Counter



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20Hz-Time and Orbit				
Variable Name	Dimension	long_name	units	EE Field
lat_01	time_01	latitude: 1 Hz	degrees_north	Latitude of measurement
lat_20_ku	time_20_ku	latitude: 20 Hz ku band	degrees_north	Latitude of measurement
lon_01	time_01	longitude: 1 Hz	degrees_east	Longitude of measurement
lon_20_ku	time_20_ku	longitude: 20 Hz ku band	degrees_east	Longitude of measurement
alt_01	time_01	altitude of CoM above reference ellipsoid [WGS84]: 1 Hz	m	Altitude of CoM above reference ellipsoid
alt_20_ku	time_20_ku	altitude of CoM above reference ellipsoid [WGS84]: 20 Hz ku band	m	Altitude of CoM above reference ellipsoid
orb_alt_rate_01	time_01	center of mass altitude rate with respect to the reference ellipsoid [WGS84]: 1 Hz	m/s	Instantaneous altitude rate derived from orbit Satellite velocity vector
peakiness_01_ku	time_01	peakiness: 1 Hz Ku band	count	Peakiness
peakiness_20_ku	time_20_ku	peakiness: 20 Hz ku band	count	Peakiness



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20Hz-Time and Orbit				
Variable Name	Dimension	long_name	units	EE Field
mqe_ocean_20_ku	time_20_ku	mean quadratic error between waveform and model / ocean retracking: 20 Hz ku band	count	20 Hz MQE
retracking_ocean_qual_20_ku	time_20_ku	ocean retracking quality flag: 20 Hz ku band	FLAG	Ocean retracking quality
flag_instr_op_mode_01	time_01	mode id – operative mode: 1 Hz	FLAG	
flag_instr_op_mode_20_ku	time_20_ku	mode id - operative mode: 20 Hz	FLAG	
flag_mcd_20_ku	time_20_ku	measurement confidence data: 20 Hz	FLAG	MCD
off_nadir_roll_angle_str_20_ku	time_20_ku	off nadir roll angle derived from star tracker data: 20 Hz	degrees	/
off_nadir_pitch_angle_str_20_ku	time_20_ku	off nadir pitch angle derived from star tracker data: 20 Hz	degrees	/
off_nadir_yaw_angle_str_20_ku	time_20_ku	off nadir yaw angle derived from star tracker data: 20 Hz	degrees	/



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4.1.2 20-Hz – PLRM Time and Orbit (only filled for SAR/SARin operating modes)

20-Hz – PLRM Time and Orbit				
Variable Name	Dimension	long_name	units	EE Field
time_1hz_20_plrm_ku	time_20_plrm_ku	UTC: 20 Hz PLRM ku band	seconds since 2000-01-01 00:00:00.0	
time_20_plrm_ku	time_20_plrm_ku	UTC: 20 Hz PLRM ku band	s	/
ind_first_meas_20hz_01_plrm_ku	time_01	index of the first 20Hz PLRM measurement: 1 Hz	count	
num_meas_20hz_01_plrm_ku	time_01	number of 20Hz PLRM measurements: 1 Hz	count	
ind_meas_1hz_20_plrm_ku	time_20_plrm_ku	index of the 1Hz measurement: 20 Hz PLRM ku band	count	
lat_20_plrm_ku	time_20_plrm_ku	latitude: 20 Hz PLRM ku band	degrees_north	/
lon_20_plrm_ku	time_20_plrm_ku	longitude: 20 Hz PLRM ku band	degrees_east	/



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20-Hz – PLRM Time and Orbit				
Variable Name	Dimension	long_name	units	EE Field
alt_20_plrm_ku	time_20_plrm_ku	center of mass altitude of the satellite: 20 Hz PLRM ku band	m	/
peakiness_01_plrm_ku	time_01	peakiness: 1 Hz PLRM ku band	count	/
peakiness_20_plrm_ku	time_20_plrm_ku	peakiness: 20 Hz PLRM ku band	count	/
mqe_ocean_20_plrm_ku	time_20_plrm_ku	mean quadratic error between waveform and model / ocean retracking: 20 Hz PLRM ku band	count	/
retracking_ocean_qual_20_plrm_ku	time_20_plrm_ku	ocean retracking quality flag: 20 Hz PLRM ku band	FLAG	/
flag_instr_op_mode_20_plrm_ku	time_20_ku	mode id - operative mode: 20 Hz PLRM ku band	FLAG	



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4.1.3 20-Hz - Range Measurements

20Hz- Range Measurements				
Variable Name	Dimension	long_name	units	EE Field
range_ocean_01_ku	time_01	corrected ocean altimeter range: 1 Hz ku band	m	Ocean range to ocean surface
range_ocean_20_ku	time_20_ku	corrected ocean altimeter range: 20 Hz ku band	m	20 Hz ocean range
range_ocean_rms_01_ku	time_01	RMS of the ocean altimeter range: 1 Hz ku band	m	Standard deviation of 20 Hz ocean range
range_ocean_numval_01_ku	time_01	number of valid points used to compute the ocean altimeter range: 1 Hz ku band	count	Number of 20 Hz valid points for ocean range
range_ocean_qual_20_ku	time_20_ku	quality flag for the ocean altimeter range: 20 Hz ku band	FLAG	Ocean range averaging status flags
range_ocog_01_ku	time_01	corrected ocog altimeter range: 1 Hz ku band	m	Ice range to ocean surface
range_ocog_20_ku	time_20_ku	corrected ocog altimeter range: 20 Hz ku band	m	20 Hz Ice range
range_ocog_rms_01_ku	time_01	RMS of the ocog altimeter range: 1 Hz ku band	m	Standard deviation of 20 Hz Ice range



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20Hz- Range Measurements				
Variable Name	Dimension	long_name	units	EE Field
range_ocog_numval_01_ku	time_01	number of valid points used to compute the ocog altimeter range: 1 Hz ku band	count	Number of 20 Hz valid points for Ice range
range_ocog_qual_20_ku	time_20_ku	quality flag for the ocog altimeter range: 20 Hz ku band	FLAG	Ice range averaging status flags



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4.1.4 20-Hz – PLRM Range Measurements (only filled for SAR/SARin operating modes)

20-Hz – PLRM Range Measurements				
Variable Name	Dimension	long_name	units	EE Field
range_ocean_01_plrm_ku	time_01	corrected ocean altimeter range: 1 Hz PLRM ku band	m	/
range_ocean_20_plrm_ku	time_20_plrm_ku	corrected ocean altimeter range: 20 Hz PLRM ku band	m	/
range_ocean_rms_01_plrm_ku	time_01	RMS of the ocean altimeter range: 1 Hz PLRM ku band	m	/
range_ocean_numval_01_plrm_ku	time_01	number of valid points used to compute the ocean altimeter range: 1 Hz PLRM ku band	count	/
range_ocean_qual_20_plrm_ku	time_20_plrm_ku	quality flag for the ocean altimeter range: 20 Hz PLRM ku band	FLAG	/
range_ocog_01_plrm_ku	time_01	corrected ocog altimeter range: 1 Hz PLRM ku band	m	/
range_ocog_20_plrm_ku	time_20_plrm_ku	corrected ocog altimeter range: 20 Hz PLRM ku band	m	/



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20-Hz – PLRM Range Measurements				
Variable Name	Dimension	long_name	units	EE Field
range_ocog_rms_01_plrm_ku	time_01	RMS of the ocog' altimeter range: 1 Hz PLRM ku band	m	/
range_ocog_numval_01_plrm_ku	time_01	number of valid points used to compute the ocog altimeter range: 1 Hz PLRM ku band	count	/
range_ocog_qual_20_plrm_ku	time_20_plrm_ku	quality flag for the ocog altimeter range: 20 Hz ku band	FLAG	/



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4.1.5 1-Hz - Range Corrections

1-Hz - Range Corrections				
Variable Name	Dimension	long_name	units	EE Field
dop_cor_01_ku	time_01	doppler correction on the altimeter range: 1 Hz	m	Doppler correction
uso_cor_01_ku	time_01	uso correction on the altimeter range (2-way): 1 Hz	m	USO correction
cog_cor_01	time_01	distance antenna-CoM correction on altimeter range: 1 Hz	m	Distance antenna - CoM
int_path_cor_01	time_01	internal path correction on the altimeter range: 1 Hz	m	Range internal calibration correction
mod_instr_cor_range_01_ku	time_01	modeled instrumental correction on the altimeter range: 1 Hz ku band	m	Ocean range modeled instrumental correction
mod_dry_tropo_cor_01	time_01	model dry tropospheric correction: 1 Hz	m	Dry Tropospheric Correction
mod_wet_tropo_cor_01	time_01	model wet tropospheric correction: 1 Hz	m	Wet Tropospheric Correction
gpd_wet_tropo_cor_01	time_01	GPD+ wet tropospheric correction: 1 Hz	m	



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1-Hz - Range Corrections				
Variable Name	Dimension	long_name	units	EE Field
gpd_wet_tropo_cor_qual_01	time_01	GPD+ wet tropospheric correction quality flag: 1Hz	FLAG	
inv_bar_cor_01	time_01	inverted barometer height correction: 1 Hz	m	Inverse Barometric Correction
hf_fluct_cor_01	time_01	high frequency fluctuations of the sea surface topography: 1 Hz	m	Dynamic Atmospheric Correction
iono_cor_gim_01	time_01	GIM ionospheric correction: 1 Hz	m	GIM Ionospheric Correction
sea_state_bias_01_ku	time_01	sea state bias correction: 1 Hz ku band	m	



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4.1.6 1-Hz – PLRM Range Corrections (only filled for SAR/SARin operation modes)

1-Hz – PLRM Range Corrections				
Variable Name	Dimension	long_name	units	EE Field
mod_instr_cor_range_01_plrm_ku	time_01	modelled instrumental correction on the altimeter range: 1 Hz PLRM ku band	m	/
sea_state_bias_01_plrm_ku	time_01	sea state bias correction: 1 Hz PLRM ku band	m	/

4.1.7 20-Hz - SWH and Backscatter

20Hz- SWH and Backscatter				
Variable Name	Dimension	long_name	units	EE Field
square_swh_ocean_01_ku	time_01	corrected ocean square of the significant waveheight: 1 Hz ku band	m ²	Square of Significant Wave Height
swh_ocean_01_ku	time_01	corrected ocean significant waveheight: 1 Hz ku band	m	Significant Wave Height
swh_ocean_20_ku	time_20_ku	corrected ocean significant waveheight: 20 Hz ku band	m	20 Hz SWH



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20Hz- SWH and Backscatter				
Variable Name	Dimension	long_name	units	EE Field
swh_ocean_rms_01_ku	time_01	RMS of the ocean significant waveheight: 1 Hz ku band	m	Standard deviation of 20 Hz SWH
swh_ocean_numval_01_ku	time_01	number of valid points used to compute the ocean significant waveheight: 1 Hz ku band	count	Number of 20 Hz valid points for SWH
swh_ocean_qual_20_ku	time_20_ku	quality flag for the ocean significant waveheight: 20 Hz ku band	FLAG	SWH averaging status flags
sig0_ocean_01_ku	time_01	corrected ocean backscatter coefficient: 1 Hz ku band	dB	Corrected ocean backscatter coefficient
sig0_ocean_20_ku	time_20_ku	corrected ocean backscatter coefficient: 20 Hz ku band	dB	20-Hz ocean backscatter coefficient
sig0_ocean_rms_01_ku	time_01	RMS of the ocean backscatter coefficient: 1 Hz ku band	dB	Standard deviation of 20 Hz ocean backscatter coefficient
sig0_ocean_numval_01_ku	time_01	number of valid points used to compute the ocean backscatter coefficient: 1 Hz ku band	count	Number of 20 Hz valid points for ocean backscatter coefficient



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20Hz- SWH and Backscatter				
Variable Name	Dimension	long_name	units	EE Field
sig0_ocean_qual_20_ku	time_20_ku	quality flag for the ocean backscatter coefficient: 20 Hz ku band	FLAG	Ocean backscatter averaging status flags
sig0_ocog_01_ku	time_01	corrected ocog backscatter coefficient: 1 Hz ku band	dB	Corrected Ice backscatter coefficient
sig0_ocog_20_ku	time_20_ku	corrected ocog backscatter coefficient: 20 Hz ku band	dB	20-Hz Ice backscatter coefficient [0..19]
sig0_ocog_rms_01_ku	time_01	RMS of the ocog backscatter coefficient: 1 Hz ku band	dB	Standard deviation of 20 Hz Ice backscatter coefficient
sig0_ocog_numval_01_ku	time_01	number of valid points used to compute the ocog backscatter coefficient: 1 Hz ku band	count	Number of 20 Hz valid points for Ice backscatter coefficient
sig0_ocog_qual_20_ku	time_20_ku	quality flag for the ocog backscatter coefficient: 20 Hz ku band	FLAG	Ice backscatter coefficient averaging status flags
off_nadir_angle_wf_ocean_01_ku	time_01	square of the off nadir angle derived from waveforms: 1 Hz ku band	degrees^2	Off nadir angle of the satellite from waveforms
agc_01_ku	time_01	corrected AGC: 1 Hz ku band	dB	Corrected AGC



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20Hz- SWH and Backscatter				
Variable Name	Dimension	long_name	units	EE Field
scale_factor_20_ku	time_20_ku	scaling factor for backscatter coefficient evaluation: 20 Hz ku band	dB	Scaling factors for backscatter coefficient evaluation



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4.1.8 20-Hz – PLRM SWH and Backscatter (only filled for SAR/SARin operating modes)

20-Hz – PLRM SWH and Backscatter				
Variable Name	Dimension	long_name	units	EE Field
square_swh_ocean_01_plrm_ku	time_01	corrected ocean square of the significant waveheight: 1 Hz PLRM ku band	m ²	/
swh_ocean_01_plrm_ku	time_01	corrected ocean significant waveheight: 1 Hz PLRM ku band	m	/
swh_ocean_20_plrm_ku	time_20_plrm_ku	corrected ocean significant waveheight: 20 Hz PLRM ku band	m	/
swh_ocean_rms_01_plrm_ku	time_01	RMS of the ocean significant waveheight: 1 Hz PLRM ku band	m	/
swh_ocean_numval_01_plrm_ku	time_01	number of valid points used to compute the ocean significant waveheight: 1 Hz PLRM ku band	count	/
swh_ocean_qual_20_plrm_ku	time_20_plrm_ku	quality flag for the ocean significant waveheight: 20 Hz PLRM ku band	FLAG	/
sig0_ocean_01_plrm_ku	time_01	corrected ocean backscatter coefficient: 1 Hz PLRM ku band	dB	/



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20-Hz – PLRM SWH and Backscatter				
Variable Name	Dimension	long_name	units	EE Field
sig0_ocean_20_plrm_ku	time_20_plrm_ku	corrected ocean backscatter coefficient: 20 Hz PLRM ku band	dB	/
sig0_ocean_rms_01_plrm_ku	time_01	RMS of the ocean backscatter coefficient: 1 Hz PLRM ku band	dB	/
sig0_ocean_numval_01_plrm_ku	time_01	number of valid points used to compute the ocean backscatter coefficient: 1 Hz PLRM ku band	count	/
sig0_ocean_qual_20_plrm_ku	time_20_plrm_ku	quality flag for the ocean backscatter coefficient: 20 Hz PLRM ku band	FLAG	/
sig0_ocog_01_plrm_ku	time_01	corrected ocog backscatter coefficient: 1 Hz PLRM ku band	dB	/
sig0_ocog_20_plrm_ku	time_20_plrm_ku	corrected ocog backscatter coefficient: 20 Hz PLRM ku band	dB	/
sig0_ocog_rms_01_plrm_ku	time_01	RMS of the ocog backscatter coefficient: 1 Hz PLRM ku band	dB	/
sig0_ocog_numval_01_plrm_ku	time_01	number of valid points used to compute the ocog backscatter coefficient: 1 Hz PLRM ku band	count	/



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20-Hz – PLRM SWH and Backscatter				
Variable Name	Dimension	long_name	units	EE Field
sig0_ocog_qual_20_plrm_ku	time_20_plrm_ku	quality flag for the ocog backscatter coefficient: 20 Hz PLRM ku band	FLAG	/
off_nadir_angle_wf_ocean_01_plrm_ku	time_01	square of the off nadir angle derived from waveforms: 1 Hz PLRM ku band	degrees^2	/
scale_factor_20_plrm_ku	time_20_plrm_ku	scaling factor for backscatter coefficient evaluation: 20 Hz PLRM ku band	dB	/



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4.1.9 1-Hz SWH and Backscatter Correction

1-Hz - SWH and Backscatter Correction				
Variable Name	Dimension	long_name	units	EE Field
mod_instr_cor_swh_01_ku	time_01	modeled instrumental correction on the swh: 1 Hz ku band	m	SWH modeled instrumental correction (Ocean table)
agc_cor_01	time_01	correction for instrumental errors on AGC: 1 Hz	dB	AGC correction
internal_cor_sig0_01	time_01	internal calibration correction on the backscatter coefficient: 1 Hz	dB	Sigma0 internal calibration correction
mod_instr_cor_sig0_01_ku	time_01	modeled instrumental correction on the sig0: 1 Hz ku band	dB	Backscatter coefficient modeled instrumental correction (Ocean table)
atm_cor_sig0_01	time_01	atmospheric attenuation correction on the backscatter coefficient: 1 Hz	dB	Atmospheric attenuation



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4.1.10 1-Hz PLRM SWH and Backscatter Correction (only filled for SAR/SARin operating modes)

1-Hz – PLRM SWH and Backscatter Correction				
Variable Name	Dimension	long_name	units	EE Field
mod_instr_cor_swh_01_plrm_ku	time_01	modeled instrumental correction on the swh: 1 Hz PLRM ku band	m	/
mod_instr_cor_sig0_01_plrm_ku	time_01	modeled instrumental correction on the sig0: 1 Hz PLRM ku band	m	/

4.1.11 1-Hz - Geophysical Figures

1-Hz - Geophysical Figures				
Variable Name	Dimension	long_name	units	EE Field
mean_sea_surf_sol1_01	time_01	mean sea surface height (solution 1) above reference ellipsoid: 1 Hz	m	Mean Sea Surface height (Solution 1)
mean_sea_surf_sol2_01	time_01	mean sea surface height (solution 2) above reference ellipsoid: 1 Hz	m	Mean Sea Surface height (Solution 2)
geoid_01	time_01	geoid height: 1 Hz	m	Geoid height



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1-Hz - Geophysical Figures				
Variable Name	Dimension	long_name	units	EE Field
odle_01	time_01	ocean depth/land elevation: 1 Hz	m	Ocean Depth / Land Elevation
mean_dyn_topo_sol1_01	time_01	mean dynamic topography (solution 1) above geoid: 1 Hz	m	Mean Dynamic Topography height
mean_dyn_topo_sol2_01	time_01	mean dynamic topography (solution 2) above geoid: 1 Hz	m	/
ocean_tide_sol1_01	time_01	geocentric ocean tide height (solution 1): 1 Hz	m	Total geocentric ocean tide height (Solution 1 : GOT)
ocean_tide_sol2_01	time_01	geocentric ocean tide height (solution 2): 1 Hz	m	Total geocentric ocean tide height (Solution 2 : FES)
ocean_tide_eq_01	time_01	equilibrium long-period ocean tide height: 1 Hz	m	Long Period Tide Height
ocean_tide_non_eq_01	time_01	non-equilibrium long-period ocean tide height: 1 Hz	m	Non eq. long period ocean tide height
load_tide_sol1_01	time_01	load tide height for geocentric ocean tide (solution 1): 1 Hz	m	Ocean Loading Tide (Solution 1 : GOT)



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1-Hz - Geophysical Figures				
Variable Name	Dimension	long_name	units	EE Field
load_tide_sol2_01	time_01	load tide height for geocentric ocean tide (solution 2): 1 Hz	m	Ocean Loading Tide (Solution 2 : FES)
solid_earth_tide_01	time_01	solid earth tide height: 1 Hz	m	Solid Earth Tide
pole_tide_01	time_01	geocentric tide height: 1 Hz	m	Geocentric Polar Tide
wind_speed_alt_01_ku	time_01	altimeter wind speed: 1 Hz ku band	m/s	Altimeter wind speed
wind_speed_mod_u_01	time_01	U component of the model wind vector: 1 Hz	m/s	U-component of the model wind vector
wind_speed_mod_v_01	time_01	V component of the model wind vector: 1 Hz	m/s	V-component of the model wind vector
surf_type_01	time_01	surface type: 1 Hz	FLAG	Surface type flag

4.1.12 1-Hz – PLRM Geophysical Figures (only filled for SAR/SARin operating modes)



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1 Hz- Geophysical Figures PLRM				
Variable Name	Dimension	long_name	units	EE Field
wind_speed_alt_01_plrm_ku	time_01	altimeter wind speed: 1 Hz PLRM ku band	m/s	/

4.1.13 20-Hz - SSHA

20-Hz - SSHA				
Variable Name	Dimension	long_name	units	EE Field
ssha_01_ku	time_01	sea surface height anomaly: 1 Hz ku band	m	/
ssha_20_ku	time_20_ku	sea surface height anomaly: 20 Hz ku band	m	/
qual_ssha_01_ku	time_01	sea surface height anomaly quality flag: 1 Hz ku band	FLAG	/
qual_ssha_20_ku	time_20_ku	sea surface height anomaly quality flag: 20 Hz ku band	FLAG	/



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4.1.14 20-Hz – PLRM SSHA (only filled for SAR/SARin operating modes)

20-Hz – PLRM SSHA				
Variable Name	Dimension	long_name	units	EE Field
ssha_01_plrm_ku	time_01	sea surface height anomaly: 1 Hz PLRM ku band	m	/
ssha_20_plrm_ku	time_20_plrm_ku	sea surface height anomaly: 20 Hz PLRM ku band	m	/
qual_ssha_01_plrm_ku	time_01	sea surface height anomaly quality flag: 1 Hz PLRM ku band	FLAG	/
qual_ssha_20_plrm_ku	time_20_plrm_ku	sea surface height anomaly quality flag: 20 Hz PLRM ku band	FLAG	/



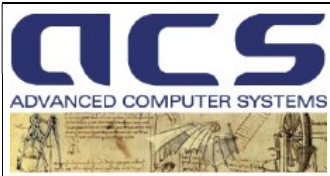
4.2 L2 PRODUCT FORMAT SPECIFICATION – GLOBAL ATTRIBUTES

The global attributes contains general information about the product and are listed in this section.

The classification of each attribute is adopted for the sake of clarity and to trace each attribute back to the EE Header field where the attribute comes from.

In any real product the attributes are not grouped but simply listed inside the CONFORM product.

Product Identification Information		
Attribute Name	Description	Values
product_name	Product File Name	any string
processing_stage	Processing stage code identifier.	RPRO = Reprocessing OFFL = Routine Operation NRT_ = Near Real Time TEST = Test LTA_ = Long Term Archive
reference_document	Reference DFCB Document describing the product	any string
acquisition_station	Acquisition Station	any string
mission	Mission name	CryoSat
processing_centre	Processing Facility	PDS



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Data Processing Information		
Attribute Name	Description	Values
creation_time	Processing Time (Product Generation Time)	
sensing_start	sensing start time	
sensing_stop	sensing stop time	
software_version	Processor Name and software version number	

Orbit Information		
Attribute Name	Description	Values
phase	Phase Code (set to X if not used)	
cycle_number	Cycle Number (set to +000 if not used)	
rel_orbit_number	Relative Orbit Number at sensing start time (set to +00000 if not used)	
abs_orbit_number	Absolute Orbit Number at sensing start time (set to +00000 if not used)	
state_vector_time	UTC state vector time	
delta_ut1	Universal Time Correction: DUT1 = UT1 – UTC	
x_position	X position in Earth Fixed Reference If not used set to +0000000.000	
y_position	Y position in Earth Fixed Reference If not used set to +0000000.000	
z_position	Z position in Earth Fixed Reference If not used set to +0000000.000	
x_velocity	X velocity in Earth Fixed Reference If not used set to +0000.000000	
y_velocity	Y velocity in Earth Fixed Reference If not used set to +0000.000000	



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Orbit Information		
Attribute Name	Description	Values
z_velocity	Z velocity in Earth Fixed Reference If not used set to +0000.000000	
vector_source	Source of Orbit State Vector Record	fos predicted doris_navigator doris_precise fos_restituted doris_preliminary

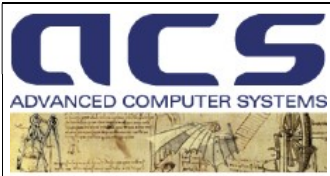


Leap Second Information		
Attribute Name	Description	Values
leap_utc	UTC Time of the occurrence of the leap second. If a leap second occurred in the product window the field is set by a devoted function in the CFI EXPLORER_ORBIT library (see [EXPL_ORB-SUM] for details), otherwise it is not set. It corresponds to the time after the Leap Second occurrence (i.e. midnight of the day after the leap second)	
leap_sign	If a leap second occurred in the product window the field is set to the expected value by a devoted function in the CFI EXPLORER_ORBIT library (see [EXPL_ORB-SUM] for details), otherwise it is not set	
leap_err	This field is always not set considering that CRYOSAT products have true UTC times	

Product Confidence Data Information		
Attribute Name	Description	Values
product_err	Product Error Flag	1 errors have been reported in the Product 0 no errors

Product Time Information		
Attribute Name	Description	Values
first_meas_time	TAI of the first record in the Main MDS of this product	
last_meas_time	TAI of the last record in the Main MDS of this product	

Product Orbit Information		
Attribute Name	Description	Values
abs_orbit_start	Absolute Orbit Number at sensing start time.	



Product Orbit Information		
Attribute Name	Description	Values
rel_time_asc_node_start	Relative time since crossing ascending node time relative to start time of data sensing.	
abs_orbit_stop	Absolute Orbit Number at sensing stop time.	
rel_time_asc_node_stop	Relative time since crossing ascending node time relative to stop time of data sensing.	
equator_cross_time	Time of equator crossing at the ascending node relative to the sensing start time.	
equator_cross_long	Longitude of equator crossing at the ascending node relative to the sensing start time (positive East, 0 = Greenwich) referred to WGS84.	
ascending_flag	Orbit Orientation at the sensing start time	A=Ascending D=Descending

Product Location Information		
Attribute Name	Description	Values
first_meas_lat	WGS84 latitude of the first record in the Main MDS (positive north)	
first_meas_lon	WGS84 longitude of the first record in the Main MDS (positive East, 0 = Greenwich)	
last_meas_lat	WGS84 latitude of the last record in the Main MDS (positive north)	
last_meas_lon	WGS84 longitude of the last record in the Main MDS (positive East, 0 = Greenwich)	

SIRAL Instrument Configuration		
Attribute Name	Description	Values
instr_id	Instrument_Identifier	A = SIRAL Nominal



SIRAL Instrument Configuration		
Attribute Name	Description	Values
		B = SIRAL Redundnant
sir_op_mode	SIRAL Operative Mode	lrm sar sarin
sir_configuration	SIRAL Rx Configuration	rx_1 rx_2 both unknown

Level 1 Surface Statistics		
Attribute Name	Description	Values
open_ocean_percent	Percentage of records detected on open ocean or semi-enclosed seas	Percentage in 10 ²
close_sea_percent	Percentage of records detected on close seas or lakes	Percentage in 10 ²
continent_ice_percent	Percentage of records detected on continental ice	Percentage in 10 ²
land_percent	Percentage of records detected on land	Percentage in 10 ²

Operative mode Statistics		
Attribute Name	Description	Values
lrm_mode_percent	Percentage of input L1B records detected in LRM mode	Percentage in 10 ²
sar_mode_percent	Percentage of input L1B records detected in SAR mode	Percentage in 10 ²
sarin_mode_percent	Percentage of input L1B records detected in SARin mode	Percentage in 10 ²



SIRAL Level 1 Processing information		
Attribute Name	Description	Values
l1b_prod_status	Complete/Incomplete Product Completion Flag (0 or 1). 1 if the product has a duration shorter than the input Level 0	
l1b_proc_flag	Processing errors significance flag 1 errors (percentage of errors greater than threshold) 0 no errors	
l1b_processing_quality	Percentage of quality checks successfully passed during Level 1B processing (max allowed +10000)	
l1b_proc_thresh	Minimum acceptable percentage of quality threshold that must be passed during Level 1B processing (max allowed +10000)	

SIRAL Level 2 Processing information		
Attribute Name	Description	Values
L2_prod_status	Complete/Incomplete Product Completion Flag (0 or 1). 1 if the product has a duration shorter than the input Level 0	
l2_proc_flag	Processing errors significance flag 1 errors (percentage of errors greater than threshold) 0 no errors	
l2_processing_quality	Percentage of quality checks successfully passed during Level 2 processing (max allowed +10000)	
l2_proc_thresh	Minimum acceptable percentage of quality threshold that must be passed during Level 2 processing (max allowed +10000)	

Reference DSD		
Attribute Name	Description	Values
xref_siral_l0	SIRAL L0 file name(s) – from L1B processing	

Reference DSD		
Attribute Name	Description	Values
xref_siral_l0_hr	SIRAL L0 file name(s) for HR processing (Not available for IOPM, GOPM and NOPM cases) – from L1B processing	
xref_siral_l1b	SIRAL L1b file name(s)	
xref_uso	USO file name	
xref_uso_hr	USO file name for HR processing (Not available for IOPM, GOPM and NOPM cases) – from L1B processing	
xref_orbit	Orbit file name(s)	
xref_orbit_hr	Orbit file name(s) for HR processing (Not available for IOPM, GOPM and NOPM cases) – from L1B processing	
xref_siral_characterisation	SIRAL IPFDB file name	
xref_siral_characterisation_hr	SIRAL IPFDB file name for HR processing (Not available for IOPM, GOPM and NOPM cases) – from L1B processing	
xref_meteo	Meteo file name(s) – from L1B processing	
xref_pole_location	Pole location file name – from L1B processing	
xref_gim	GIM file name(s) – from L1B processing	
xref_mog2d	MOG2D file name(s) – from L1B processing	
xref_cal1	L1B CAL1 file name – from L1B processing	
xref_cal1_hr	L1B CAL1 file name for HR processing (Not available for IOPM, GOPM and NOPM cases) – from L1B processing	
xref_cal_sarin	L1B CAL1 SARIN file name – from L1B processing	
xref_cal2	L1B CAL2 file name – from L1B processing	
xref_cal2_hr	L1B CAL2 file name for HR processing (Not available for IOPM, GOPM and NOPM cases) – from L1B processing	
xref_constants	Constants File	
xref_earth_tide	Cartwright File	
xref_long_period_tide	FES File	



Reference DSD		
Attribute Name	Description	Values
xref_mean_pressure	Mean Pressure File for Meteo Correction generated by using either analysis or forecast data – from L1B processing	
xref_ocean_tide_sol1	Sol1 File for Ocean Tide	
xref_ocean_tide_sol2	Sol2 File for Ocean Tide	
xref_pconf	Processor Configuration Parameters File	
xref_orbit_scenario	Orbit scenario file name	
xref_surf_pressure	Surface Pressure File for Meteo Correction generated by using either analysis or forecast data – from L1B processing	
xref_surf_type	Surface Type Map File	
xref_tidal_load_sol1	Solution 1 File for Tidal Loading	
xref_tidal_load_sol2	Solution 2 File for Tidal Loading	
xref_u_wind	U Wind component File for Meteo Correction generated by using either analysis or forecast data – from L1B processing	
xref_v_wind	V Wind component File for Meteo Correction generated by using either analysis or forecast data – from L1B processing	
xref_wet_trop	Wet Troposphere File for Meteo Correction generated by using either analysis or forecast data – from L1B processing	
xref_geoid	Geoid File	
xref_mean_surface_sol1	Sol1 Mean Surface File	
xref_mean_surface_sol2	Sol2 Mean Surface File	
xref_mtd_sol1	Sol1 Mtd File	
xref_mtd_sol2	Sol2 Mtd File	
xref_sea_state_bias	Sea State Bias File	

Reference DSD		
Attribute Name	Description	Values
xref_odle	Ocean Depth/Land Elevation File	
xref_gpd_wtc	GPD+ - Wet tropospheric correction File	
xref_star_tracker_0	Star Tracker Level 0 File – from L1B processing	
xref_star_tracker_attcop	Star Tracker Level 1b File – from L1B processing	

4.3 TABLE OF REFERENCE DSD VS L2 PROCESSORS

		PROCESSORS								
		L2								
		NOP LRM	NOP SAR	NOP SRN	IOP LRM	IOP SAR	IOP SRN	GOP LRM	GOP SAR	GOP SRN
Input Data File	File Type									
xref_siral_l1b	SIR_NOPM1B	M								
	SIR_NOPR1B		M							
	SIR_NOPN1B			M						
	SIR_IOPM1B				M					
	SIR_IOPR1B					M				
	SIR_IOPN1B						M			
	SIR_GOPM1B							M		
	SIR_GOPR1B								M	
	SIR_GOPN1B									M
xref_pconf	None	M	M	M	M	M	M	M	M	M
xref_siral_characterisation	AUX_IPFDBA	M	M	M	M	M	M	M	M	M



		PROCESSORS								
		L2								
		NOP LRM	NOP SAR	NOP SRN	IOP LRM	IOP SAR	IOP SRN	GOP LRM	GOP SAR	GOP SRN
	AUX_IPFDBB									
xref_orbit_scenario	MPL_ORBREF	M	M	M	M	M	M	M	M	M
xref_orbit	DOR_NAV_0	M	M	M						
	AUX_ORBDOP				M	M	M			
	AUX_ORBDOR							M	M	M
	MPL_ORBPREF	M	M	M	M	M	M	M	M	M
xref_gpd_wtc	AUX_GPDWTC							M	M	M
xref_geoid	None	M	M	M	M	M	M	M	M	M
xref_mtd_sol1	None	M	M	M	M	M	M	M	M	M
xref_mtd_sol2	None	M	M	M	M	M	M	M	M	M
xref_odle	None	M	M	M	M	M	M	M	M	M
xref_sea_state_bias	None	M	M	M	M	M	M	M	M	M

		PROCESSORS	
		Pole-to-Pole	
		IOP	GOP
xref_siral_l2	SIR_IOPM2_	M	
	SIR_IOPR2_	M	
	SIR_IOPN2_	M	
	SIR_GOPM2_		M
	SIR_GOPR2_		M
	SIR_GOPN2_		M
xref_orbit	AUX_ORBDOR		M
	AUX_ORBDOP	M	
	MPL_ORBPREF	M	M
	MPL_ORBREF	M	M
xref_siral_characterisation	AUX_IPFDBA		
	AUX_IPFDBB	M	M



4.4 L2 PRODUCT FORMAT SPECIFICATION – CDL DUMP

4.4.1 agc_01_ku(time_01)

```
short agc_01_ku(time_01) ;
    agc_01_ku:_FillValue = -32768s;
    agc_01_ku:long_name = "corrected AGC: 1 Hz ku band" ;
    agc_01_ku:units = "dB" ;
    agc_01_ku:add_offset = 0. ;
    agc_01_ku:scale_factor = 0.01 ;
    agc_01_ku:coordinates = "lon_01 lat_01" ;
    agc_01_ku:comment = "AGC corrected for instrumental errors [agc_cor_01]"
;
;
```

4.4.2 agc_cor_01 (time_01)

```
short agc_cor_01 (time_01) ;
    agc_cor_01:_FillValue = -32768s;
    agc_cor_01:long_name = "correction for instrumental errors on AGC: 1 Hz
ku band" ;
    agc_cor_01:units = "dB" ;
    agc_cor_01:add_offset = 0. ;
    agc_cor_01:scale_factor = 0.01 ;
    agc_cor_01:coordinates = "lon_01 lat_01" ;
    agc_cor_01:comment = "AGC correction determined from the values provided
in the IPF data base." ;
;
```

4.4.3 alt_01(time_01)

```
int alt_01(time_01) ;
    alt_01:_FillValue = -2147483648;
    alt_01:long_name = "altitude of CoM above reference ellipsoid [WGS84]: 1
Hz" ;
    alt_01:units = "m" ;
    alt_01:standard_name = "height_above_reference_ellipsoid" ;
    alt_01:scale_factor = 0.001 ;
    alt_01:coordinates = "lon_01 lat_01" ;
    alt_01:comment = "Altitude of satellite center of mass above the reference
ellipsoid." ;
;
```

4.4.4 alt_20_ku(time_20_ku)

```
int alt_20_ku(time_20_ku) ;
    alt_20_ku:_FillValue = -2147483648;
    alt_20_ku:long_name = "altitude of CoM above reference ellipsoid [WGS84]:
20 Hz ku band" ;
    alt_20_ku:units = "m" ;
    alt_20_ku:standard_name = "height_above_reference_ellipsoid" ;
    alt_20_ku:scale_factor = 0.001 ;
    alt_20_ku:coordinates = "lon_20_ku lat_20_ku" ;
    alt_20_ku:comment = "Altitude of satellite center of mass above the
reference ellipsoid." ;
;
```



4.4.5 alt_20_plrm_ku(time_20_plrm_ku)

```
int alt_20_plrm_ku(time_20_plrm_ku) ;
    alt_20_plrm_ku: FillValue = -2147483648;
alt_20_plrm_ku:long_name = "center of mass altitude of the satellite: 20 Hz PLRM
ku band" ;
    alt_20_plrm_ku:units = "m" ;
    alt_20_plrm_ku:standard_name = "height_above_reference_ellipsoid" ;
    alt_20_plrm_ku:scale_factor = 0.001 ;
    alt_20_plrm_ku:coordinates = "lon_20_plrm_ku lat_20_plrm_ku" ;
alt_20_plrm_ku:comment = "Not provided in LRM mode. Altitude of satellite center
of mass above the reference ellipsoid." ;
```

4.4.1 atm_cor_sig0_01(time_01)

```
short atm_cor_sig0_01(time_01) ;
    atm_cor_sig0_01: FillValue = -32768s;
    atm_cor_sig0_01:long_name = "atmospheric attenuation correction on the
backscatter coefficient: 1 Hz" ;
    atm_cor_sig0_01:units = "dB" ;
    atm_cor_sig0_01:add_offset = 0. ;
    atm_cor_sig0_01:scale_factor = 0.01 ;
    atm_cor_sig0_01:coordinates = "lon_01 lat_01" ;
    atm_cor_sig0_01:comment = "Computed from model wet tropospheric
correction [mod_wet_tropo_cor_01]" ;
```

4.4.2 cog_cor_01(time_01)

```
short cog_cor_01(time_01) ;
    cog_cor_01: FillValue = -32768s;
    cog_cor_01:long_name = "distance antenna-CoM correction on
altimeter range: 1 Hz" ;
    cog_cor_01:units = "m" ;
    cog_cor_01:add_offset = 0. ;
    cog_cor_01:scale_factor = 0.001 ;
    cog_cor_01:coordinates = "lon_01 lat_01" ;
    cog_cor_01:comment = "Distance antenna-CoM determined from the value
provided in the IPF data base." ;
```

4.4.3 dop_cor_01_ku(time_01)

```
short dop_cor_01_ku(time_01) ;
    dop_cor_01_ku: FillValue = -32768s;
    dop_cor_01_ku:long_name = "doppler correction on the altimeter range: 1
Hz" ;
    dop_cor_01_ku:units = "m" ;
    dop_cor_01_ku:add_offset = 0. ;
    dop_cor_01_ku:scale_factor = 0.001 ;
    dop_cor_01_ku:coordinates = "lon_01 lat_01" ;
    dop_cor_01_ku:comment = "This is the Doppler range correction due to the
satellite altitude rate. It is computed from the component of the satellite velocity
in the nadir direction." ;
```



4.4.4 flag_instr_op_mode_01(time_01)

```
byte flag_instr_op_mode_01(time_01) ;
    flag_instr_op_mode_01: FillValue = -128b;
    flag_instr_op_mode_01: long_name = "mode id - operative mode: 1 Hz" ;
flag_instr_op_mode_01: flag_values = 1b, 2b, 3b ;
    flag_instr_op_mode_01: flag_meanings = "lrm sar sarin" ;
    flag_instr_op_mode_01: coordinates = "lon_01 lat_01" ;
    flag_instr_op_mode_01: comment = "Mode ID - Identifies the SIRAL
instrument measurement mode." ;
```

4.4.5 flag_instr_op_mode_20_ku(time_20_ku)

```
byte flag_instr_op_mode_20_ku(time_20_ku) ;
    flag_instr_op_mode_20_ku: FillValue = -128b ;
    flag_instr_op_mode_20_ku: comment = "Mode ID - Identifies the SIRAL
instrument measurement mode." ;
    flag_instr_op_mode_20_ku: coordinates = "lon_20_ku lat_20_ku" ;
    flag_instr_op_mode_20_ku: flag_meanings = "lrm sar sarin" ;
    flag_instr_op_mode_20_ku: flag_values = 1b, 2b, 3b ;
    flag_instr_op_mode_20_ku: long_name = "mode id - operative mode: 20 Hz" ;
```

4.4.6 flag_instr_op_mode_20_plrm_ku(time_20_plrm_ku)

```
byte flag_instr_op_mode_20_plrm_ku (time_20_plrm_ku) ;
    flag_instr_op_mode_20_plrm_ku: FillValue = -128b;
    flag_instr_op_mode_20_plrm_ku: long_name = "mode id - operative mode: 20
Hz PLRM ku band" ;
    flag_instr_op_mode_20_plrm_ku: flag_values = 1b, 2b, 3b ;
    flag_instr_op_mode_20_plrm_ku: flag_meanings = "lrm sar sarin" ;
    flag_instr_op_mode_20_plrm_ku: coordinates = "lon_20_ku_plrm
lat_20_ku_plrm" ;
    flag_instr_op_mode_20_plrm_ku: comment = "Not provided in LRM mode. Mode
ID - Identifies the SIRAL instrument measurement mode." ;
```

4.4.7 flag_mcd_20_ku(time_20_ku)

```
int flag_mcd_20_ku(time_20_ku) ;
    flag_mcd_20_ku: FillValue = -1 ;
    flag_mcd_20_ku: long_name = "measurement confidence data: 20 Hz" ;
    flag_mcd_20_ku: flag_masks = -2147483648, 1073741824, 536870912,
268435456, 134217728, 67108864, 33554432, 16777216, 8388608, 4194304, 2097152, 1048576,
524288, 262144, 131072, 65536, 32768, 16384, 8192, 4096, 2048, 128, 64, 32, 16, 8, 1;
    flag_mcd_20_ku: flag_meanings = "block_degraded blank_block
datation_degraded orbit_prop_error orbit_file_change orbit_gap echo_saturated
other_echo_error sarin_rx1_error sarin_rx2_error window_delay_error agc_error
call_missing call_default doris_uso_missing ccall_default trk_echo_error
echo_rx1_error echo_rx2_error npm_error azimuth_cal_missing phase_pert_cor_missing
cal2_missing cal2_default power_scale_error attitude_cor_missing
phase_pert_cor_default";
    flag_mcd_20_ku: coordinates = "lon_20_ku lat_20_ku" ;
    flag_mcd_20_ku: comment = "Measurement confidence flags. Generally the MCD
flags indicate problems when set. If the whole MCD is 0 then no problems or non-nominal
conditions were detected. Serious errors are indicated by setting bit 31 (SS bit 0),
```



in which case the block must not be processed. Other error settings can be regarded as warnings." ;

4.4.8 geoid_01(time_01)

```
int geoid_01(time_01) ;
    geoid_01:FillValue = -2147483648;
    geoid_01:long_name = "geoid height: 1 Hz" ;
    geoid_01:units = "m" ;
    geoid_01:standard_name = "geoid_height_above_reference_ellipsoid" ;
    geoid_01:add_offset = 0. ;
    geoid_01:scale_factor = 0.001 ;
    geoid_01:coordinates = "lon_01 lat_01" ;
    geoid_01:comment = "Computed from the geoid model with a correction to
refer the value to the mean tide system i.e. includes the permanent tide (zero
frequency)" ;
    geoid_01:source = "EGM2008" ;
    geoid_01:institution = "GSFC" ;
```

4.4.9 gpd_wet_tropo_cor_01(time_01)

```
short gpd_wet_tropo_cor_01(time_01) ;
    gpd_wet_tropo_cor_01:FillValue = -32768s ;
    gpd_wet_tropo_cor_01:long_name = "GPD+ wet tropospheric correction: 1 Hz"
;
    gpd_wet_tropo_cor_01:units = "m" ;
    gpd_wet_tropo_cor_01:standard_name =
"altimeter_range_correction_due_to_wet_troposphere" ;
    gpd_wet_tropo_cor_01:add_offset = 0. ;
    gpd_wet_tropo_cor_01:scale_factor = 0.001 ;
    gpd_wet_tropo_cor_01:coordinates = "lon_01 lat_01" ;
    gpd_wet_tropo_cor_01:comment = "Computed at the altimeter time-tag
[time_01] through OA space-time analysis using the GPD+ algorithm, by combining
all available observations. The correction has been calibrated with respect to
the SSM/I and SSM/IS imaging radiometers. A wet tropospheric correction must be
added (negative value) to the instrument range to correct this range measurement
for wet tropospheric range delays of the radar pulse. This correction is valid
over ocean surfaces only.";
    gpd_wet_tropo_cor_01:institution = "UPorto" ;
```

4.4.10 gpd_wet_tropo_cor_qual_01(time_01)

```
byte gpd_wet_tropo_cor_qual_01(time_01) ;
    gpd_wet_tropo_cor_qual_01:FillValue = -128b ;
    gpd_wet_tropo_cor_qual_01:long_name = "GPD+ wet tropospheric correction
quality flag: 1Hz" ;
    gpd_wet_tropo_cor_qual_01:flag_values = 0b, 1b, 2b ;
    gpd_wet_tropo_cor_qual_01:flag_meanings = "from_obs invalid from_model"
;
    gpd_wet_tropo_cor_qual_01:coordinates = "lon_01 lat_01" ;
```

4.4.11 hf_fluct_cor_01(time_01)



```
short hf_fluct_cor_01(time_01) ;
    hf_fluct_cor_01: FillValue = -32768s;
    hf_fluct_cor_01:long_name = "high frequency fluctuations of the sea
surface topography: 1 Hz" ;
    hf_fluct_cor_01:units = "m" ;
    hf_fluct_cor_01:standard_name =
"sea_surface_height_correction_due_to_air_pressure_and_wind_at_high_frequency" ;
    hf_fluct_cor_01:add_offset = 0. ;
    hf_fluct_cor_01:scale_factor = 0.001 ;
    hf_fluct_cor_01:coordinates = "lon_01 lat_01" ;
    hf_fluct_cor_01:comment = "Also known as DAC (Dynamical Atmospheric
Correction). Combines the high frequency fluctuations of the sea surface topography
due to high frequency air pressure and wind effect, and the low-frequency heights from
inverted barometer effect [inv_bar_cor]. High frequency cut-off at 20 days. To be added
as correction to range measurements for IOP/GOP off line products. Not available for
NOP products." ;
    hf_fluct_cor_01:source = "2.1.0" ;
    hf_fluct_cor_01:institution = "LEGOS/CLS/CNES" ;
```

4.4.12 ind_first_meas_20hz_01(time_01)

```
int ind_first_meas_20hz_01(time_01) ;
    ind_first_meas_20hz_01: FillValue = -2147483648;

    ind_first_meas_20hz_01:long_name = "index of the first 20Hz measurement:
1 Hz" ;
    ind_first_meas_20hz_01:units = "count" ;

    ind_first_meas_20hz_01:comment = "Index of the first 20Hz measurement of
the 1Hz packet." ;
```

4.4.13 ind_first_meas_20hz_01_plrm_ku(time_01)

```
short ind_first_meas_20hz_01_plrm_ku(time_01) ;
    ind_first_meas_20hz_01_plrm_ku: FillValue = -32768s;
    ind_first_meas_20hz_01_plrm_ku:long_name = "index of the first 20Hz PLRM
measurement: 1 Hz" ;
    ind_first_meas_20hz_01_plrm_ku:units = "count" ;

    ind_first_meas_20hz_01_plrm_ku:comment = "Set to FillValue in LRM mode.
Index of the first 20Hz PLRM measurement of the 1Hz packet." ;
```

4.4.14 ind_meas_1hz_20_ku(time_20_ku)

```
short ind_meas_1hz_20_ku(time_20_ku) ;
    ind_meas_1hz_20_ku: FillValue = -32768s;
    ind_meas_1hz_20_ku:long_name = "index of the 1Hz measurement: 20 Hz ku
band" ;
    ind_meas_1hz_20_ku:units = "count" ;

    ind_meas_1hz_20_ku:comment = "Index of the 1Hz measurement to which
belongs the 20Hz measurement." ;
```



4.4.15 ind_meas_1hz_20_plrm_ku(time_20_plrm_ku)

```
short ind_meas_1hz_20_plrm_ku(time_20_plrm_ku) ;
    ind_meas_1hz_20_plrm_ku: FillValue = -32768s;
    ind_meas_1hz_20_plrm_ku:long_name = "index of the 1Hz measurement: 20 Hz
PLRM ku band" ;
    ind_meas_1hz_20_plrm_ku:units = "count" ;

    ind_meas_1hz_20_plrm_ku:comment = " Not provided in LRM mode. Index of
the 1Hz measurement to which belongs the 20Hz PLRM measurement." ;
```

4.4.16 int_path_cor_01(time_01)

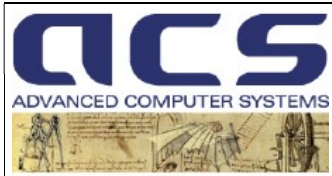
```
short int_path_cor_01(time_01) ;
    int_path_cor_01: FillValue = -32768s;
    int_path_cor_01:long_name = "internal path correction on the altimeter
range: 1 Hz" ;
    int_path_cor_01:units = "m" ;
    int_path_cor_01:add_offset = 0. ;
    int_path_cor_01:scale_factor = 0.001 ;
    int_path_cor_01:coordinates = "lon_01 lat_01" ;
    int_path_cor_01:comment = "Internal calibration correction on the
altimeter range" ;
```

4.4.17 internal_cor_sig0_01 (time_01)

```
short internal_cor_sig0_01(time_01) ;
    internal_cor_sig0_01: FillValue = -32768s ;
    internal_cor_sig0_01:long_name = "internal calibration correction on the
backscatter coefficient: 1 Hz" ;
    internal_cor_sig0_01:units = "dB" ;
    internal_cor_sig0_01:add_offset = 0. ;
    internal_cor_sig0_01:scale_factor = 0.01 ;
    internal_cor_sig0_01:coordinates = "lon_01 lat_01" ;
    internal_cor_sig0_01:comment = "Internal calibration correction applied
to the backscatter coefficient." ;
```

4.4.18 inv_bar_cor_01(time_01)

```
short inv_bar_cor_01(time_01) ;
    inv_bar_cor_01: FillValue = -32768s;
    inv_bar_cor_01:long_name = "inverted barometer height correction: 1 Hz"
;
    inv_bar_cor_01:units = "m" ;
    inv_bar_cor_01:standard_name =
"sea_surface_height_correction_due_to_air_pressure_at_low_frequency" ;
    inv_bar_cor_01:add_offset = 0. ;
    inv_bar_cor_01:scale_factor = 0.001 ;
    inv_bar_cor_01:coordinates = "lon_01 lat_01" ;
    inv_bar_cor_01:comment = "Computed at the altimeter time-tag [time_01]
from the interpolation of 2 meteorological fields that surround the altimeter
time-tag To be added as correction to range measurements for NOP products,
to correct for the depression of the ocean surface caused by the local
barometric pressure." ;
```

```
inv_bar_cor_01:source = "European Center for Medium Range Weather  
Forecasting" ;  
inv_bar_cor_01:institution = "ECMWF" ;
```

4.4.19 iono_cor_gim_01(time_01)

```
short iono_cor_gim_01(time_01) ;  
iono_cor_gim_01:FillValue = -32768s;  
iono_cor_gim_01:long_name = "GIM ionospheric correction: 1 Hz" ;  
iono_cor_gim_01:units = "m" ;  
iono_cor_gim_01:standard_name =  
"altimeter_range_correction_due_to_ionosphere" ;  
iono_cor_gim_01:add_offset = 0. ;  
iono_cor_gim_01:scale_factor = 0.001 ;  
iono_cor_gim_01:coordinates = "lon_01 lat_01" ;  
iono_cor_gim_01:comment = "To be added to range measurement to correct  
for the delay to the Radar pulse caused by free electrons in the ionosphere. Computed  
from GPS ionospheric data." ;  
iono_cor_gim_01:source = "GIM" ;  
iono_cor_gim_01:institution = "NASA/JPL" ;
```

4.4.20 lat_01(time_01)

```
int lat_01(time_01) ;  
lat_01:long_name = "latitude: 1 Hz" ;  
lat_01:FillValue = -2147483648;  
lat_01:units = "degrees_north" ;  
lat_01:standard_name = "latitude" ;  
lat_01:add_offset = 0. ;  
lat_01:scale_factor = 1.e-07 ;  
lat_01:comment = "Positive latitude is North latitude, negative latitude  
is South latitude" ;
```

4.4.21 lat_20_ku(time_20_ku)

```
int lat_20_ku(time_20_ku) ;  
lat_20_ku:long_name = "latitude: 20 Hz ku band" ;  
lat_20_ku:FillValue = -2147483648;  
lat_20_ku:units = "degrees_north" ;  
lat_20_ku:standard_name = "latitude" ;  
lat_20_ku:add_offset = 0. ;  
lat_20_ku:scale_factor = 1.e-07 ;  
lat_20_ku:comment = "Positive latitude is North latitude, negative  
latitude is South latitude" ;
```

4.4.22 lat_20_plrm_ku(time_20_plrm_ku)

```
int lat_20_plrm_ku(time_20_plrm_ku) ;  
lat_20_plrm_ku:long_name = "latitude: 20 Hz PLRM ku band" ;  
lat_20_plrm_ku:FillValue = -2147483648;  
lat_20_plrm_ku:units = "degrees_north" ;  
lat_20_plrm_ku:standard_name = "latitude" ;
```



```
lat_20_plrm_ku:add_offset = 0. ;  
lat_20_plrm_ku:scale_factor = 1.e-07 ;  
lat_20_plrm_ku:comment = "Not provided in LRM mode. Positive latitude is  
North latitude, negative latitude is South latitude" ;
```

4.4.23 load_tide_sol1_01(time_01)

```
short load_tide_sol1_01(time_01) ;  
load_tide_sol1_01: FillValue = -32768s;  
load_tide_sol1_01:long_name = "load tide height for geocentric ocean tide  
(solution 1): 1 Hz" ;  
load_tide_sol1_01:units = "m" ;  
load_tide_sol1_01:add_offset = 0. ;  
load_tide_sol1_01:scale_factor = 0.001 ;  
load_tide_sol1_01:coordinates = "lon_01 lat_01" ;  
load_tide_sol1_01:comment = "This value has already been added to the  
corresponding ocean tide height value recorded in the product [ocean_tide_sol1_01]."  
;  
load_tide_sol1_01:source = "GOT4.10c" ;  
load_tide_sol1_01:institution = "GSFC" ;
```

4.4.24 load_tide_sol2_01(time_01)

```
short load_tide_sol2_01(time_01) ;  
load_tide_sol2_01: FillValue = -32768s;  
load_tide_sol2_01:long_name = "load tide height for geocentric ocean tide  
(solution 2): 1 Hz" ;  
load_tide_sol2_01:units = "m" ;  
load_tide_sol2_01:add_offset = 0. ;  
load_tide_sol2_01:scale_factor = 0.001 ;  
load_tide_sol2_01:coordinates = "lon_01 lat_01" ;  
load_tide_sol2_01:comment = "This value contains the total load  
tide height (short-period and long-period) for the geocentric ocean tide (solution 2).  
To get only the pure ocean tide height (solution 2), do: [ocean_tide_sol2_01] +  
[ocean_tide_non_eq_01] - [load_tide_sol2_01]. This value has already been added to the  
corresponding ocean tide height value recorded in the product [ocean_tide_sol2_01]."  
;  
load_tide_sol2_01:source = "FES2014b" ;  
load_tide_sol2_01:institution = "LEGOS/CNES" ;
```

4.4.25 lon_01(time_01)

```
int lon_01(time_01) ;  
lon_01: FillValue = -2147483648; lon_01:long_name = "longitude: 1  
Hz" ;  
lon_01:units = "degrees_east" ;  
lon_01:standard_name = "longitude" ;  
lon_01:add_offset = 0. ;  
lon_01:scale_factor = 1.e-07 ;  
lon_01:comment = "East longitude relative to Greenwich meridian" ;
```

4.4.26 lon_20_ku(time_20_ku)



```
int lon_20_ku(time_20_ku) ;
lon_20_ku:_FillValue = -2147483648;
lon_20_ku:long_name = "longitude: 20 Hz ku band" ;

lon_20_ku:units = "degrees_east" ;
lon_20_ku:standard_name = "longitude" ;
lon_20_ku:add_offset = 0. ;
lon_20_ku:scale_factor = 1.e-07 ;
lon_20_ku:comment = "East longitude relative to Greenwich meridian" ;
```

4.4.27 lon_20_plrm_ku(time_20_plrm_ku)

```
int lon_20_plrm_ku(time_20_plrm_ku) ;
lon_20_plrm_ku:_FillValue = -2147483648;
lon_20_plrm_ku:long_name = "longitude: 20 Hz PLRM ku band" ;

lon_20_plrm_ku:units = "degrees_east" ;
lon_20_plrm_ku:standard_name = "longitude" ;
lon_20_plrm_ku:add_offset = 0. ;
lon_20_plrm_ku:scale_factor = 1.e-07 ;
lon_20_plrm_ku:comment = "Not provided in LRM mode. East longitude
relative to Greenwich meridian" ;
```

4.4.28 mean_dyn_topo_sol1_01(time_01)

```
int mean_dyn_topo_sol1_01(time_01) ;
mean_dyn_topo_sol1_01:_FillValue = -2147483648;
mean_dyn_topo_sol1_01:long_name = "mean dynamic topography (solution 1)
above geoid: 1 Hz" ;
mean_dyn_topo_sol1_01:units = "m" ;
mean_dyn_topo_sol1_01:add_offset = 0. ;
mean_dyn_topo_sol1_01:scale_factor = 0.001 ;
mean_dyn_topo_sol1_01:coordinates = "lon_01 lat_01" ;
mean_dyn_topo_sol1_01:source = "CNES/CLS 13" ;
mean_dyn_topo_sol1_01:institution = "CNES/CLS" ;
```

4.4.29 mean_dyn_topo_sol2_01(time_01)

```
int mean_dyn_topo_sol2_01(time_01) ;
mean_dyn_topo_sol2_01:_FillValue = -2147483648;
mean_dyn_topo_sol2_01:long_name = "mean dynamic topography (solution 2)
above geoid: 1 Hz" ;
mean_dyn_topo_sol2_01:units = "m" ;
mean_dyn_topo_sol2_01:add_offset = 0. ;
mean_dyn_topo_sol2_01:scale_factor = 0.001 ;
mean_dyn_topo_sol2_01:coordinates = "lon_01 lat_01" ;
mean_dyn_topo_sol2_01:source = "DTU13" ;
mean_dyn_topo_sol2_01:institution = "DNESC" ;
```

4.4.30 mean_sea_surf_sol1_01(time_01)

```
int mean_sea_surf_sol1_01(time_01) ;
mean_sea_surf_sol1_01:_FillValue = -2147483648;
```



```
mean_sea_surf_sol1_01:long_name = "mean sea surface height (solution 1)
above reference ellipsoid: 1 Hz" ;
mean_sea_surf_sol1_01:units = "m" ;
mean_sea_surf_sol1_01:add_offset = 0. ;
mean_sea_surf_sol1_01:scale_factor = 0.001 ;
mean_sea_surf_sol1_01:coordinates = "lon_01 lat_01" ;
mean_sea_surf_sol1_01:source = "CNES-CLS-15" ;
mean_sea_surf_sol1_01:institution = "CNES/CLS" ;
```

4.4.31 mean_sea_surf_sol2_01(time_01)

```
int mean_sea_surf_sol2_01(time_01) ;
mean_sea_surf_sol2_01:_FillValue = -2147483648;
mean_sea_surf_sol2_01:long_name = "mean sea surface height (solution 2)
above reference ellipsoid: 1 Hz" ;
mean_sea_surf_sol2_01:units = "m" ;
mean_sea_surf_sol2_01:add_offset = 0. ;
mean_sea_surf_sol2_01:scale_factor = 0.001 ;
mean_sea_surf_sol2_01:coordinates = "lon_01 lat_01" ;
mean_sea_surf_sol2_01:source = "DTU13" ;
mean_sea_surf_sol2_01:institution = "DNSC" ;
```

4.4.32 mod_dry_tropo_cor_01(time_01)

```
short mod_dry_tropo_cor_01(time_01) ;
mod_dry_tropo_cor_01:_FillValue = -32768s;
mod_dry_tropo_cor_01:long_name = "model dry tropospheric correction: 1
Hz" ;
mod_dry_tropo_cor_01:units = "m" ;
mod_dry_tropo_cor_01:standard_name =
"altimeter_range_correction_due_to_dry_troposphere" ;
mod_dry_tropo_cor_01:add_offset = 0. ;
mod_dry_tropo_cor_01:scale_factor = 0.001 ;
mod_dry_tropo_cor_01:coordinates = "lon_01 lat_01" ;
mod_dry_tropo_cor_01:comment = "Computed at the altimeter time-tag
[time_01] from the interpolation of 2 meteorological fields that surround the altimeter
time-tag. To be added to range measurement to correct for the propagation delay to the
radar pulse, caused by the dry-gas component of the atmosphere of the Earth." ;
mod_dry_tropo_cor_01:source = "European Center for Medium Range Weather
Forecasting" ;
mod_dry_tropo_cor_01:institution = "ECMWF" ;
```

4.4.33 mod_instr_cor_range_01_ku(time_01)

```
short mod_instr_cor_range_01_ku(time_01) ;
mod_instr_cor_range_01_ku:_FillValue = -32768s;
mod_instr_cor_range_01_ku:long_name = "modeled instrumental correction on
the altimeter range: 1 Hz ku band" ;
mod_instr_cor_range_01_ku:units = "m" ;
mod_instr_cor_range_01_ku:add_offset = 0. ;
mod_instr_cor_range_01_ku:scale_factor = 0.001 ;
mod_instr_cor_range_01_ku:coordinates = "lon_01 lat_01" ;
mod_instr_cor_range_01_ku:source = "Cryosat-2 2015" ;
mod_instr_cor_range_01_ku:institution = "CLS" ;
```



```
mod_instr_cor_range_01_ku:comment = "Issued from instrumental look-up  
tables correcting geophysical estimates from the approximation of the instrument  
impulse response in the estimation step." ;
```

4.4.34 mod_instr_cor_range_01_plrm_ku(time_01)

```
short mod_instr_cor_range_01_plrm_ku(time_01) ;  
  mod_instr_cor_range_01_plrm_ku:FillValue = -32768s;  
  mod_instr_cor_range_01_plrm_ku:long_name = "modeled instrumental  
correction on the altimeter range: 1 Hz PLRM ku band" ;  
  mod_instr_cor_range_01_plrm_ku:units = "m" ;  
  mod_instr_cor_range_01_plrm_ku:add_offset = 0. ;  
  mod_instr_cor_range_01_plrm_ku:scale_factor = 0.001 ;  
  mod_instr_cor_range_01_plrm_ku:coordinates = "lon_01 lat_01" ;  
  mod_instr_cor_range_01_plrm_ku:source = "Cryosat-2 2015" ;  
  mod_instr_cor_range_01_plrm_ku:institution = "CLS" ;  
  mod_instr_cor_range_01_plrm_ku:comment = "Set to FillValue in LRM mode.  
Issued from instrumental look-up tables correcting geophysical estimates from the  
approximation of the instrument impulse response in the estimation step." ;
```

4.4.35 mod_instr_cor_sig0_01_ku(time_01)

```
short mod_instr_cor_sig0_01_ku(time_01) ;  
  mod_instr_cor_sig0_01_ku:FillValue = -32768s;  
  mod_instr_cor_sig0_01_ku:long_name = "modeled instrumental correction on  
the sig0: 1 Hz ku band" ;  
  mod_instr_cor_sig0_01_ku:units = "dB" ;  
  mod_instr_cor_sig0_01_ku:add_offset = 0. ;  
  mod_instr_cor_sig0_01_ku:scale_factor = 0.01 ;  
  mod_instr_cor_sig0_01_ku:coordinates = "lon_01 lat_01" ;  
  mod_instr_cor_sig0_01_ku:source = "Cryosat-2 2015" ;  
  mod_instr_cor_sig0_01_ku:institution = "CLS" ;  
  mod_instr_cor_sig0_01_ku:comment = "Issued from instrumental look-up  
tables correcting geophysical estimates from the approximation of the instrument  
impulse response in the estimation step." ;
```

4.4.36 mod_instr_cor_sig0_01_plrm_ku(time_01)

```
short mod_instr_cor_sig0_01_plrm_ku(time_01) ;  
  mod_instr_cor_sig0_01_plrm_ku:FillValue = -32768s;  
  mod_instr_cor_sig0_01_plrm_ku:long_name = "modeled instrumental  
correction on the sig0: 1 Hz PLRM ku band" ;  
  mod_instr_cor_sig0_01_plrm_ku:units = "dB" ;  
  mod_instr_cor_sig0_01_plrm_ku:add_offset = 0. ;  
  mod_instr_cor_sig0_01_plrm_ku:scale_factor = 0.01 ;  
  mod_instr_cor_sig0_01_plrm_ku:coordinates = "lon_01 lat_01" ;  
  mod_instr_cor_sig0_01_plrm_ku:source = "Cryosat-2 2015" ;  
  mod_instr_cor_sig0_01_plrm_ku:institution = "CLS" ;  
  mod_instr_cor_sig0_01_plrm_ku:comment = "Set to FillValue in LRM mode. Issued  
from instrumental look-up tables correcting geophysical estimates from the  
approximation of the instrument impulse response in the estimation step." ;
```

4.4.37 mod_instr_cor_swh_01_ku(time_01)



```
short mod_instr_cor_swh_01_ku(time_01) ;
    mod_instr_cor_swh_01_ku: FillValue = -32768s;
    mod_instr_cor_swh_01_ku:long_name = "modeled instrumental correction on
the swh: 1 Hz ku band" ;
    mod_instr_cor_swh_01_ku:units = "m" ;
    mod_instr_cor_swh_01_ku:add_offset = 0. ;
    mod_instr_cor_swh_01_ku:scale_factor = 0.001 ;
    mod_instr_cor_swh_01_ku:coordinates = "lon_01 lat_01" ;
    mod_instr_cor_swh_01_ku:source = "Cryosat-2 2015" ;
    mod_instr_cor_swh_01_ku:institution = "CLS" ;
    mod_instr_cor_swh_01_ku:comment = "Issued from instrumental look-up
tables correcting geophysical estimates from the approximation of the instrument
impulse response in the estimation step." ;
```

4.4.38 mod_instr_cor_swh_01_plrm_ku(time_01)

```
short mod_instr_cor_swh_01_plrm_ku(time_01) ;
    mod_instr_cor_swh_01_plrm_ku: FillValue = -32768s;
    mod_instr_cor_swh_01_plrm_ku:long_name = "modeled instrumental
correction on the swh: 1 Hz PLRM ku band" ;
    mod_instr_cor_swh_01_plrm_ku:units = "m" ;
    mod_instr_cor_swh_01_plrm_ku:add_offset = 0. ;
    mod_instr_cor_swh_01_plrm_ku:scale_factor = 0.001 ;
    mod_instr_cor_swh_01_plrm_ku:coordinates = "lon_01 lat_01" ;
    mod_instr_cor_swh_01_plrm_ku:institution = "CLS" ;
    mod_instr_cor_swh_01_plrm_ku:source = "Cryosat-2 2015" ;
    mod_instr_cor_swh_01_plrm_ku:comment = "Set to FillValue in LRM
mode. Issued from instrumental look-up tables correcting geophysical estimates from
the approximation of the instrument impulse response in the estimation step." ;
```

4.4.39 mod_wet_tropo_cor_01(time_01)

```
short mod_wet_tropo_cor_01(time_01) ;
    mod_wet_tropo_cor_01: FillValue = -32768s;
    mod_wet_tropo_cor_01:long_name = "model wet tropospheric correction: 1
Hz" ;
    mod_wet_tropo_cor_01:units = "m" ;
    mod_wet_tropo_cor_01:standard_name =
"altimeter_range_correction_due_to_wet_troposphere" ;
    mod_wet_tropo_cor_01:add_offset = 0. ;
    mod_wet_tropo_cor_01:scale_factor = 0.001 ;
    mod_wet_tropo_cor_01:coordinates = "lon_01 lat_01" ;
    mod_wet_tropo_cor_01:comment = "Computed at the altimeter time-tag
[time_01] from the interpolation of 2 meteorological fields that surround the altimeter
time-tag. To be added to range measurement to correct for the propagation delay to the
radar pulse, caused by the H2O component of the atmosphere of the Earth." ;
    mod_wet_tropo_cor_01:source = "European Center for Medium Range Weather
Forecasting" ;
    mod_wet_tropo_cor_01:institution = "ECMWF" ;
```

4.4.40 mqe_ocean_20_ku(time_20_ku)

```
int mqe_ocean_20_ku(time_20_ku) ;
    mqe_ocean_20_ku: FillValue = -2147483648;
```



```
mqe_ocean_20_ku:long_name = "mean quadratic error between waveform and  
model / ocean retracking: 20 Hz ku band" ;  
mqe_ocean_20_ku:units = "count" ;  
mqe_ocean_20_ku:add_offset = 0. ;  
mqe_ocean_20_ku:scale_factor = 1.e-05 ;  
mqe_ocean_20_ku:coordinates = "lon_20_ku lat_20_ku" ;  
mqe_ocean_20_ku:source = "LRM: MLE4 retracking, SAR: SAMOSA v2.3  
retracking." ;
```

4.4.41 mqe_ocean_20_plrm_ku(time_20_plrm_ku)

```
int mqe_ocean_20_plrm_ku(time_20_plrm_ku) ;  
mqe_ocean_20_plrm_ku: FillValue = -2147483648;  
mqe_ocean_20_plrm_ku:long_name = "mean quadratic error between waveform  
and model / ocean retracking: 20 Hz PLRM ku band" ;  
mqe_ocean_20_plrm_ku:units = "count" ;  
mqe_ocean_20_plrm_ku:add_offset = 0. ;  
mqe_ocean_20_plrm_ku:scale_factor = 1.e-05 ;  
mqe_ocean_20_plrm_ku:coordinates = "lon_20_plrm_ku lat_20_plrm_ku" ;  
mqe_ocean_20_plrm_ku:source = "MLE4 retracking" ;  
mqe_ocean_20_plrm_ku:comment = "Not provided in LRM mode. Set to FillValue  
in LRM mode." ;
```

4.4.42 num_meas_20hz_01(time_01)

```
short num_meas_20hz_01(time_01) ;  
num_meas_20hz_01: FillValue = -32768s;  
num_meas_20hz_01:long_name = "number of 20Hz measurements: 1 Hz" ;  
num_meas_20hz_01:units = "count" ;  
  
num_meas_20hz_01:comment = "Number of 20Hz measurements used to derive  
the 1Hz measurement." ;
```

4.4.43 num_meas_20hz_01_plrm_ku(time_01)

```
short num_meas_20hz_01_plrm_ku (time_01) ;  
num_meas_20hz_01_plrm_ku: FillValue = -32768s;  
num_meas_20hz_01_plrm_ku:long_name = "number of 20Hz PLRM measurements:  
1 Hz" ;  
num_meas_20hz_01_plrm_ku:units = "count" ;  
  
num_meas_20hz_01_plrm_ku:comment = "Set to FillValue in LRM mode.  
Number of 20Hz PLRM measurements used to derive the 1Hz measurement." ;
```

4.4.44 ocean_tide_eq_01(time_01)

```
short ocean_tide_eq_01(time_01) ;  
ocean_tide_eq_01: FillValue = -32768s;  
ocean_tide_eq_01:long_name = "equilibrium long-period ocean tide height:  
1 Hz" ;  
ocean_tide_eq_01:units = "m" ;  
ocean_tide_eq_01:standard_name = "  
"sea_surface_height_amplitude_due_to_equilibrium_ocean_tide" ;
```



```
ocean_tide_eq_01:add_offset = 0. ;
ocean_tide_eq_01:scale_factor = 0.001 ;
ocean_tide_eq_01:coordinates = "lon_01 lat_01" ;
ocean_tide_eq_01:comment = "This value has already been added to
the two geocentric ocean tide height values recorded in the product
([ocean_tide_sol1_01] and [ocean_tide_sol2_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_sol1_01], [mean_sea_surf_sol2_01])." ;
ocean_tide_eq_01:source = "Cartwright and Edden [1973] Corrected tables
of tidal harmonics - J. Geophys. J. R. Astr. Soc., 33, 253-264." ;
```

4.4.45 ocean_tide_non_eq_01(time_01)

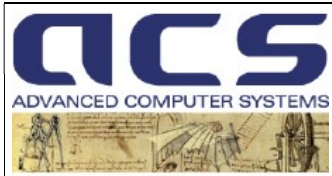
```
short ocean_tide_non_eq_01(time_01) ;
ocean_tide_non_eq_01: FillValue = -32768s;
ocean_tide_non_eq_01:long_name = "non-equilibrium long-period ocean tide
height: 1 Hz" ;
ocean_tide_non_eq_01:units = "m" ;
ocean_tide_non_eq_01:standard_name =
"sea_surface_height_amplitude_due_to_non_equilibrium_ocean_tide" ;
ocean_tide_non_eq_01:add_offset = 0. ;
ocean_tide_non_eq_01:scale_factor = 0.001 ;
ocean_tide_non_eq_01:comment = "This parameter is computed as a
correction to the parameter ocean_tide_eq_01. It contains the long-period ocean tide
and the long period load tide components. This value can be added to [ocean_tide_eq_01]
(or [ocean_tide_sol1_01], [ocean_tide_sol2_01]) so that the resulting value models the
total non equilibrium ocean tide height." ;
ocean_tide_non_eq_01:source =
"FES2014b" ;
ocean_tide_non_eq_01:coordinates = "lon_01 lat_01" ;
ocean_tide_non_eq_01:institution = "LEGOS/CNES" ;
```

4.4.46 ocean_tide_sol1_01(time_01)

```
int ocean_tide_sol1_01(time_01) ;
ocean_tide_sol1_01: FillValue = -2147483648;
ocean_tide_sol1_01:long_name = "geocentric ocean tide height (solution
1): 1 Hz" ;
ocean_tide_sol1_01:units = "m" ;
ocean_tide_sol1_01:standard_name =
"sea_surface_height_amplitude_due_to_geocentric_ocean_tide" ;
ocean_tide_sol1_01:add_offset = 0. ;
ocean_tide_sol1_01:scale_factor = 0.001 ;
ocean_tide_sol1_01:coordinates = "lon_01 lat_01" ;
ocean_tide_sol1_01:comment = "Solution 1 corresponds to GOT model.
Includes the corresponding loading tide [ocean_tide_sol1_01] and equilibrium long-
period ocean tide 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_sol1_01], [mean_sea_surf_sol2_01])." ;
ocean_tide_sol1_01:source = "GOT4.10c" ;
ocean_tide_sol1_01:institution = "GSFC" ;
```

4.4.47 ocean_tide_sol2_01(time_01)

```
int ocean_tide_sol2_01(time_01) ;
ocean_tide_sol2_01: FillValue = -2147483648;
```

```
ocean_tide_sol2_01:long_name = "geocentric ocean tide height (solution
2): 1 Hz" ;
ocean_tide_sol2_01:units = "m" ;
ocean_tide_sol2_01:standard_name =
"sea_surface_height_amplitude_due_to_geocentric_ocean_tide" ;
ocean_tide_sol2_01:add_offset = 0. ;
ocean_tide_sol2_01:scale_factor = 0.001 ;
ocean_tide_sol2_01:coordinates = "lon_01 lat_01" ;
ocean_tide_sol2_01:comment = "Solution 2 corresponds to FES model.
Includes the corresponding short-period part of the loading tide [ocean_tide_sol2_01]
and equilibrium long-period ocean tide 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_sol1_01], [mean_sea_surf_sol2_01])." ;
ocean_tide_sol2_01:source = "FES2014b" ;
ocean_tide_sol2_01:institution = "LEGOS/CNES" ;
```

4.4.48 odle_01(time_01)

```
int odle_01(time_01) ;
odle_01: FillValue = -2147483648;
odle_01:long_name = "ocean depth/land elevation: 1 Hz" ;
odle_01:units = "m" ;
odle_01:add_offset = 0. ;
odle_01:scale_factor = 0.001 ;
odle_01:coordinates = "lon_01 lat_01" ;
odle_01:source = "ACE-2" ;
odle_01:institution = "ESA" ;
```

4.4.49 off_nadir_angle_wf_ocean_01_ku(time_01)

```
short off_nadir_angle_wf_ocean_01_ku(time_01) ;
off_nadir_angle_wf_ocean_01_ku: FillValue = -32768s;
off_nadir_angle_wf_ocean_01_ku:long_name = "square of the off nadir angle
derived from waveforms: 1 Hz ku band" ;
off_nadir_angle_wf_ocean_01_ku:units = "degrees^2" ;
off_nadir_angle_wf_ocean_01_ku:add_offset = 0. ;
off_nadir_angle_wf_ocean_01_ku:scale_factor = 0.0001 ;
off_nadir_angle_wf_ocean_01_ku:coordinates = "lon_01 lat_01" ;
off_nadir_angle_wf_ocean_01_ku:source = "MLE4 retracking" ;
off_nadir_angle_wf_ocean_01_ku:comment = "Set to FillValue in SAR mode"
;
```

4.4.50 off_nadir_angle_wf_ocean_01_plrm_ku(time_01)

```
short off_nadir_angle_wf_ocean_01_plrm_ku(time_01) ;
off_nadir_angle_wf_ocean_01_plrm_ku: FillValue = -32768s;
off_nadir_angle_wf_ocean_01_plrm_ku:long_name = "square of the off nadir
angle derived from waveforms: 1 Hz PLRM ku band" ;
off_nadir_angle_wf_ocean_01_plrm_ku:units = "degrees^2" ;
off_nadir_angle_wf_ocean_01_plrm_ku:add_offset = 0. ;
off_nadir_angle_wf_ocean_01_plrm_ku:scale_factor = 0.0001 ;
off_nadir_angle_wf_ocean_01_plrm_ku:coordinates = "lon_01 lat_01" ;
off_nadir_angle_wf_ocean_01_plrm_ku:source = "MLE4 retracking" ;
off_nadir_angle_wf_ocean_01_plrm_ku:comment = "Set to FillValue in LRM
mode." ;
```



4.4.51 off_nadir_pitch_angle_str_20_ku(time_20_ku)

```
int off_nadir_pitch_angle_str_20_ku(time_20_ku) ;
    off_nadir_pitch_angle_str_20_ku:FillValue = -2147483648;
    off_nadir_pitch_angle_str_20_ku:long_name = "off nadir pitch angle
derived from star tracker data: 20 Hz" ;
    off_nadir_pitch_angle_str_20_ku:units = "degrees" ;
    off_nadir_pitch_angle_str_20_ku:comment = "Set to FillValue in LRM
mode.";
    off_nadir_pitch_angle_str_20_ku:add_offset = 0. ;
    off_nadir_pitch_angle_str_20_ku:scale_factor = 1.e-07 ;
    off_nadir_pitch_angle_str_20_ku:coordinates = "lon_20_ku lat_20_ku" ;
```

4.4.52 off_nadir_roll_angle_str_20_ku(time_20_ku)

```
int off_nadir_roll_angle_str_20_ku(time_20_ku) ;
    off_nadir_roll_angle_str_20_ku:FillValue = -2147483648;
    off_nadir_roll_angle_str_20_ku:long_name = "off nadir roll angle derived
from star tracker data: 20 Hz" ;
    off_nadir_roll_angle_str_20_ku:units = "degrees" ;
    off_nadir_roll_angle_str_20_ku:comment = "Set to FillValue in LRM mode.";
    off_nadir_roll_angle_str_20_ku:add_offset = 0. ;
    off_nadir_roll_angle_str_20_ku:scale_factor = 1.e-07 ;
    off_nadir_roll_angle_str_20_ku:coordinates = "lon_20_ku lat_20_ku" ;
```

4.4.53 off_nadir_yaw_angle_str_20_ku(time_20_ku)

```
int off_nadir_yaw_angle_str_20_ku(time_20_ku) ;
    off_nadir_yaw_angle_str_20_ku:FillValue = -2147483648;
    off_nadir_yaw_angle_str_20_ku:long_name = "off nadir yaw angle derived
from star tracker data: 20 Hz" ;
    off_nadir_yaw_angle_str_20_ku:units = "degrees" ;
    off_nadir_yaw_angle_str_20_ku:comment = "Set to FillValue in LRM mode."
;
    off_nadir_yaw_angle_str_20_ku:add_offset = 0. ;
    off_nadir_yaw_angle_str_20_ku:scale_factor = 1.e-07 ;
    off_nadir_yaw_angle_str_20_ku:coordinates = "lon_20_ku lat_20_ku" ;
```

4.4.54 orb_alt_rate_01(time_01)

```
short orb_alt_rate_01(time_01) ;
    orb_alt_rate_01:FillValue = -32768s;
    orb_alt_rate_01:comment = "Instantaneous altitude rate at the
Centre of Mass with respect to the reference ellipsoid." ;
    orb_alt_rate_01:long_name = "centre of mass altitude rate with respect to
the reference ellipsoid [WGS84]: 1 Hz" ;
    orb_alt_rate_01:units = "m/s" ;
    orb_alt_rate_01:add_offset = 0. ;
    orb_alt_rate_01:scale_factor = 0.001 ;
    orb_alt_rate_01:coordinates = "lon_01 lat_01" ;
```

4.4.55 peakiness_01_ku(time_01)



```
int peakiness_01_ku(time_01) ;
    peakiness_01_ku: FillValue = -2147483648;
    peakiness_01_ku:long_name = "peakiness: 1 Hz Ku band" ;
    peakiness_01_ku:units = "count" ;
    peakiness_01_ku:add_offset = 0. ;
    peakiness_01_ku:scale_factor = 0.001 ;
    peakiness_01_ku:coordinates = "lon_01 lat_01" ;
    peakiness_01_ku:comment = "This is the ratio of the maximum power in the
waveform to the average of the waveform power to the right hand side of the expected
waveform leading edge location." ;
```

4.4.56 peakiness_01_plrm_ku(time_01)

```
int peakiness_01_plrm_ku(time_01) ;
    peakiness_01_plrm_ku: FillValue = -2147483648;
    peakiness_01_plrm_ku:long_name = "peakiness: 1 Hz PLRM ku band" ;
    peakiness_01_plrm_ku:units = "count" ;
    peakiness_01_plrm_ku:add_offset = 0. ;
    peakiness_01_plrm_ku:scale_factor = 0.001 ;
    peakiness_01_plrm_ku:coordinates = "lon_01 lat_01" ;
    peakiness_01_plrm_ku:comment = "Set to FillValue in LRM mode. This is the
ratio of the maximum power in the waveform to the average of the waveform power to the
right hand side of the expected waveform leading edge location." ;
```

4.4.57 peakiness_20_ku(time_20_ku)

```
int peakiness_20_ku(time_20_ku) ;
    peakiness_20_ku: FillValue = -2147483648;
    peakiness_20_ku:long_name = "peakiness: 20 Hz ku band" ;
    peakiness_20_ku:units = "count" ;
    peakiness_20_ku:add_offset = 0. ;
    peakiness_20_ku:scale_factor = 0.001 ;
    peakiness_20_ku:coordinates = "lon_20_ku lat_20_ku" ;
    peakiness_20_ku:comment = "This is the ratio of the maximum power in the
waveform to the average of the waveform power to the right hand side of the expected
waveform leading edge location." ;
```

4.4.58 peakiness_20_plrm_ku(time_20_plrm_ku)

```
int peakiness_20_plrm_ku(time_20_plrm_ku) ;
    peakiness_20_plrm_ku: FillValue = -2147483648;
    peakiness_20_plrm_ku:long_name = "peakiness: 20 Hz PLRM ku band" ;
    peakiness_20_plrm_ku:units = "count" ;
    peakiness_20_plrm_ku:add_offset = 0. ;
    peakiness_20_plrm_ku:scale_factor = 0.001 ;
    peakiness_20_plrm_ku:coordinates = "lon_20_plrm_ku lat_20_plrm_ku" ;
    peakiness_20_plrm_ku:comment = "Not provided in LRM mode. This is the
ratio of the maximum power in the waveform to the average of the waveform power to the
right hand side of the expected waveform leading edge location." ;
```

4.4.59 pole_tide_01(time_01)

```
short pole_tide_01(time_01) ;
```



```
pole_tide_01: FillValue = -32768s;  
pole_tide_01:long_name = "geocentric tide height: 1 Hz" ;  
pole_tide_01:units = "m" ;  
pole_tide_01:standard_name =  
"sea_surface_height_amplitude_due_to_pole_tide" ;  
pole_tide_01:add_offset = 0. ;  
pole_tide_01:scale_factor = 0.001 ;  
pole_tide_01:coordinates = "lon_01 lat_01" ;  
pole_tide_01:source = "Wahr [1985] Deformation of the Earth induced by  
polar motion - J. Geophys. Res. (Solid Earth), 90, 9363-9368." ;  
pole_tide_01:institution = "IERS/CNES" ;
```

4.4.60 qual_ssha_01_ku(time_01)

```
byte qual_ssha_01_ku(time_01) ;  
qual_ssha_01_ku: FillValue = -128b ;  
qual_ssha_01_ku:long_name = "sea surface height anomaly quality flag: 1  
Hz ku band" ;  
qual_ssha_01_ku:flag_values = 0b, 1b ;  
qual_ssha_01_ku:flag_meanings = "good bad" ;  
qual_ssha_01_ku:coordinates = "lon_01 lat_01" ;  
qual_ssha_01_ku:source = "LRM: MLE4 retracking, SAR: SAMOSA v2.3  
retracking." ;
```

4.4.61 qual_ssha_01_plrm_ku(time_01)

```
byte qual_ssha_01_plrm_ku(time_01) ;  
qual_ssha_01_plrm_ku: FillValue = -128b ;  
qual_ssha_01_plrm_ku:long_name = "sea surface height anomaly quality  
flag: 1 Hz PLRM ku band" ;  
qual_ssha_01_plrm_ku:flag_values = 0b, 1b ;  
qual_ssha_01_plrm_ku:flag_meanings = "good bad" ;  
qual_ssha_01_plrm_ku:coordinates = "lon_01 lat_01" ;  
qual_ssha_01_plrm_ku:source = "MLE4 retracking" ;  
qual_ssha_01_plrm_ku:comment = "Set to FillValue in LRM mode." ;
```

4.4.62 qual_ssha_20_ku(time_20_ku)

```
byte qual_ssha_20_ku(time_20_ku) ;  
qual_ssha_20_ku: FillValue = -128b ;  
qual_ssha_20_ku:long_name = "sea surface height anomaly quality flag: 20  
Hz ku band" ;  
qual_ssha_20_ku:flag_values = 0b, 1b ;  
qual_ssha_20_ku:flag_meanings = "good bad" ;  
qual_ssha_20_ku:coordinates = "lon_20_ku lat_20_ku" ;  
qual_ssha_20_ku:source = "LRM: MLE4 retracking, SAR: SAMOSA v2.3  
retracking." ;
```

4.4.63 qual_ssha_20_plrm_ku(time_20_plrm_ku)

```
byte qual_ssha_20_plrm_ku(time_20_plrm_ku) ;  
qual_ssha_20_plrm_ku: FillValue = -128b ;
```



```
qual_ssha_20_plrm_ku:long_name = "sea surface height anomaly quality  
flag: 20 Hz PLRM ku band" ;  
qual_ssha_20_plrm_ku:flag_values = 0b, 1b ;  
qual_ssha_20_plrm_ku:flag_meanings = "good bad" ;  
qual_ssha_20_plrm_ku:coordinates = "lon_20_plrm_ku lat_20_plrm_ku";  
qual_ssha_20_plrm_ku:source = "MLE4 retracking" ;  
qual_ssha_20_plrm_ku:comment = "Not provided in LRM mode." ;
```

4.4.64 range_ocean_01_ku(time_01)

```
int range_ocean_01_ku(time_01) ;  
range_ocean_01_ku:FillValue = -2147483648;  
range_ocean_01_ku:long_name = "corrected ocean altimeter range: 1 Hz ku  
band" ;  
range_ocean_01_ku:units = "m" ;  
range_ocean_01_ku:scale_factor = 0.001 ;  
range_ocean_01_ku:coordinates = "lon_01 lat_01" ;  
range_ocean_01_ku:comment = "Instrumental corrections included: USO drift  
correction [uso_cor_01_ku], internal path correction [int_path_cor_01], distance  
antenna-CoM [cog_cor_01], Doppler correction [dop_cor_01_ku], modeled instrumental  
errors correction [mod_instr_cor_range_01_ku] and system bias" ;  
range_ocean_01_ku:source = "LRM: MLE4 retracking, SAR: SAMOSA v2.3  
retracking" ;
```

4.4.65 range_ocean_01_plrm_ku(time_01)

```
int range_ocean_01_plrm_ku(time_01) ;  
range_ocean_01_plrm_ku:FillValue = -2147483648;  
range_ocean_01_plrm_ku:long_name = "corrected ocean altimeter range: 1 Hz  
PLRM ku band" ;  
range_ocean_01_plrm_ku:units = "m" ;  
range_ocean_01_plrm_ku:scale_factor = 0.001 ;  
range_ocean_01_plrm_ku:coordinates = "lon_01 lat_01" ;  
range_ocean_01_plrm_ku:comment = "Set to FillValue in LRM mode.  
Instrumental corrections included: USO drift correction [uso_cor_01_ku], internal path  
correction [int_path_cor_01], distance antenna-CoM [cog_cor_01], Doppler correction  
[dop_cor_01_ku], modeled instrumental errors correction  
[mod_instr_cor_range_01_plrm_ku] and system bias" ;  
range_ocean_01_plrm_ku:source = "MLE4 retracking" ;
```

4.4.66 range_ocean_20_ku(time_20_ku)

```
int range_ocean_20_ku(time_20_ku) ;  
range_ocean_20_ku:FillValue = -2147483648;  
range_ocean_20_ku:long_name = "corrected ocean altimeter range: 20 Hz ku  
band" ;  
range_ocean_20_ku:units = "m" ;  
range_ocean_20_ku:scale_factor = 0.001 ;  
range_ocean_20_ku:coordinates = "lon_20_ku lat_20_ku" ;  
range_ocean_20_ku:comment = "Instrumental corrections included: USO drift  
correction [uso_cor_01_ku], internal path correction [int_path_cor_01], distance  
antenna-CoM [cog_cor_01], Doppler correction [dop_cor_01_ku], modeled instrumental  
errors correction [mod_instr_cor_range_01_ku] and system bias" ;
```



```
range_ocean_20_ku:source = "LRM: MLE4 retracking, SAR: SAMOSA v2.3  
retracking" ;
```

4.4.67 range_ocean_20_plrm_ku(time_20_plrm_ku)

```
int range_ocean_20_plrm_ku(time_20_plrm_ku) ;  
range_ocean_20_plrm_ku: FillValue = -2147483648;  
range_ocean_20_plrm_ku:long_name = "corrected ocean altimeter range: 20  
Hz PLRM ku band" ;  
range_ocean_20_plrm_ku:units = "m" ;  
range_ocean_20_plrm_ku:scale_factor = 0.001 ;  
range_ocean_20_plrm_ku:coordinates = "lon_20_plrm_ku lat_20_plrm_ku" ;  
range_ocean_20_plrm_ku:comment = "Not provided in LRM mode.  
Instrumental corrections included: USO drift correction [uso_cor_01_ku], internal path  
correction [int_path_cor_01], distance antenna-CoM [cog_cor_01], Doppler correction  
[dop_cor_01_ku], modeled instrumental errors correction  
[mod_instr_cor_range_01_plrm_ku] and system bias" ;  
range_ocean_20_plrm_ku:source = "MLE4 retracking" ;
```

4.4.68 range_ocean_numval_01_ku(time_01)

```
byte range_ocean_numval_01_ku(time_01) ;  
range_ocean_numval_01_ku: FillValue = -128b ;  
range_ocean_numval_01_ku:long_name = "number of valid points used to  
compute the ocean altimeter range: 1 Hz ku band" ;  
range_ocean_numval_01_ku:units = "count" ;  
range_ocean_numval_01_ku:coordinates = "lon_01 lat_01" ;  
range_ocean_numval_01_ku:source = "LRM: MLE4 retracking, SAR:  
SAMOSA v2.3 retracking" ;
```

4.4.69 range_ocean_numval_01_plrm_ku(time_01)

```
byte range_ocean_numval_01_plrm_ku(time_01) ;  
range_ocean_numval_01_plrm_ku: FillValue = -128b ;  
range_ocean_numval_01_plrm_ku:long_name = "number of valid points used to  
compute the ocean altimeter range: 1 Hz PLRM ku band" ;  
range_ocean_numval_01_plrm_ku:units = "count" ;  
range_ocean_numval_01_plrm_ku:coordinates = "lon_01 lat_01" ;  
range_ocean_numval_01_plrm_ku:source = "MLE4 retracking" ;  
range_ocean_numval_01_plrm_ku:comment = "Set to FillValue in LRM mode."  
;
```

4.4.70 range_ocean_qual_20_ku(time_20_ku)

```
byte range_ocean_qual_20_ku(time_20_ku) ;  
range_ocean_qual_20_ku: FillValue = -128b ;  
range_ocean_qual_20_ku:long_name = "quality flag for the ocean altimeter  
range: 20 Hz ku band" ;  
range_ocean_qual_20_ku:flag_values = 0b, 1b ;  
range_ocean_qual_20_ku:flag_meanings = "yes no" ;  
range_ocean_qual_20_ku:coordinates = "lon_20_ku lat_20_ku" ;  
range_ocean_qual_20_ku:comment = "Flag indicating the use or not of the  
20-Hz estimate of the ocean retracking in the computation of 1Hz estimate" ;
```



```
range_ocean_qual_20_ku:source = "LRM: MLE4 retracking, SAR: SAMOSA  
v2.3 retracking" ;
```

4.4.71 range_ocean_qual_20_plrm_ku(time_20_plrm_ku)

```
byte range_ocean_qual_20_plrm_ku(time_20_plrm_ku) ;  
    range_ocean_qual_20_plrm_ku: FillValue = -128b ;  
    range_ocean_qual_20_plrm_ku:long_name = "quality flag for the ocean  
altimeter range: 20 Hz PLRM ku band" ;  
    range_ocean_qual_20_plrm_ku:flag_values = 0b, 1b ;  
    range_ocean_qual_20_plrm_ku:flag_meanings = "yes no" ;  
    range_ocean_qual_20_plrm_ku:coordinates = "lon_20_plrm_ku  
lat_20_plrm_ku" ;  
    range_ocean_qual_20_plrm_ku:comment = "Not provided in LRM mode. Flag  
indicating the use or not of the 20-Hz estimate of the ocean retracking in the  
computation of 1Hz estimate" ;  
    range_ocean_qual_20_plrm_ku:source = "MLE4 retracking" ;
```

4.4.72 range_ocean_rms_01_ku(time_01)

```
short range_ocean_rms_01_ku(time_01) ;  
    range_ocean_rms_01_ku: FillValue = -32768s ;  
    range_ocean_rms_01_ku:long_name = "RMS of the ocean altimeter range: 1 Hz  
ku band" ;  
    range_ocean_rms_01_ku:units = "m" ;  
    range_ocean_rms_01_ku:add_offset = 0. ;  
    range_ocean_rms_01_ku:scale_factor = 0.001 ;  
    range_ocean_rms_01_ku:coordinates = "lon_01 lat_01" ;  
    range_ocean_rms_01_ku:comment = "Compression of high rate elements is  
preceded by a detection of outliers. Only valid high-rate values are used to compute  
this element" ;  
    range_ocean_rms_01_ku:source = "LRM: MLE4 retracking, SAR: SAMOSA v2.3  
retracking" ;
```

4.4.73 range_ocean_rms_01_plrm_ku(time_01)

```
short range_ocean_rms_01_plrm_ku(time_01) ;  
    range_ocean_rms_01_plrm_ku: FillValue = -32768s ;  
    range_ocean_rms_01_plrm_ku:long_name = "RMS of the ocean altimeter range:  
1 Hz PLRM ku band" ;  
    range_ocean_rms_01_plrm_ku:units = "m" ;  
    range_ocean_rms_01_plrm_ku:add_offset = 0. ;  
    range_ocean_rms_01_plrm_ku:scale_factor = 0.001 ;  
    range_ocean_rms_01_plrm_ku:coordinates = "lon_01 lat_01" ;  
    range_ocean_rms_01_plrm_ku:comment = "Set to FillValue in LRM mode.  
Compression of high rate elements is preceded by a detection of outliers. Only valid  
high-rate values are used to compute this element" ;  
    range_ocean_rms_01_plrm_ku:source = "MLE4 retracking" ;
```

4.4.74 range_ocog_01_ku(time_01)

```
int range_ocog_01_ku(time_01) ;  
    range_ocog_01_ku: FillValue = -2147483648;
```



```
band" ;
    range_ocog_01_ku:long_name = "corrected ocog altimeter range: 1 Hz ku
range_ocog_01_ku:units = "m" ;
range_ocog_01_ku:scale_factor = 0.001 ;
range_ocog_01_ku:coordinates = "lon_01 lat_01" ;
    range_ocog_01_ku:comment = "Set to FillValue in SAR mode.
Instrumental corrections included: USO drift correction [uso_cor_01_ku], internal path
correction [int_path_cor_01], distance antenna-CoM [cog_cor_01]";
    range_ocog_01_ku:source = "OCOG retracking" ;
```

4.4.75 range_ocog_01_plrm_ku(time_01)

```
int range_ocog_01_plrm_ku(time_01) ;
    range_ocog_01_plrm_ku:FillValue = -2147483648;
    range_ocog_01_plrm_ku:long_name = "corrected ocog altimeter range: 1 Hz
PLRM ku band" ;
    range_ocog_01_plrm_ku:units = "m" ;
    range_ocog_01_plrm_ku:scale_factor = 0.001 ;
    range_ocog_01_plrm_ku:coordinates = "lon_01 lat_01" ;
    range_ocog_01_plrm_ku:comment = "Set to FillValue in LRM mode.
Instrumental corrections included: USO drift correction [uso_cor_01_ku], internal path
correction [int_path_cor_01], distance antenna-CoM [cog_cor_01]";
    range_ocog_01_plrm_ku:source = "OCOG retracking" ;
```

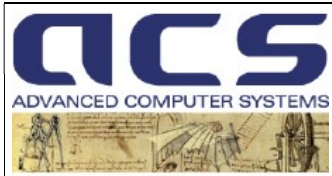
4.4.76 range_ocog_20_ku(time_20_ku)

```
int range_ocog_20_ku(time_20_ku) ;
    range_ocog_20_ku:FillValue = -2147483648;
    range_ocog_20_ku:long_name = "corrected ocog altimeter range: 20 Hz ku
band" ;
    range_ocog_20_ku:units = "m" ;
    range_ocog_20_ku:scale_factor = 0.001 ;
    range_ocog_20_ku:comment = "Set to FillValue in SAR mode. Instrumental
corrections included: USO drift correction [uso_cor_01_ku], internal path correction
[int_path_cor_01], distance antenna-CoM [cog_cor_01]";
    range_ocog_20_ku:coordinates = "lon_20_ku lat_20_ku" ;
    range_ocog_20_ku:source = "OCOG retracking" ;
```

4.4.77 range_ocog_20_plrm_ku(time_20_plrm_ku)

```
int range_ocog_20_plrm_ku(time_20_plrm_ku) ;
    range_ocog_20_plrm_ku:FillValue = -2147483648;
    range_ocog_20_plrm_ku:long_name = "corrected ocog altimeter range: 20 Hz
PLRM ku band" ;
    range_ocog_20_plrm_ku:units = "m" ;
    range_ocog_20_plrm_ku:scale_factor = 0.001 ;
    range_ocog_20_plrm_ku:coordinates = "lon_20_plrm_ku lat_20_plrm_ku" ;
    range_ocog_20_plrm_ku:comment = "Not provided in LRM mode. Instrumental
corrections included: USO drift correction [uso_cor_01_ku], internal path correction
[int_path_cor_01], distance antenna-CoM [cog_cor_01]";
    range_ocog_20_plrm_ku:source = "OCOG retracking" ;
```

4.4.78 range_ocog_numval_01_ku(time_01)



```
byte range_ocog_numval_01_ku(time_01) ;
    range_ocog_numval_01_ku: FillValue = -128b;
    range_ocog_numval_01_ku:long_name = "number of valid points used to
compute the ocog altimeter range: 1 Hz ku band" ;
    range_ocog_numval_01_ku:comment = "Set to FillValue in SAR mode." ;
range_ocog_numval_01_ku:units = "count" ;
    range_ocog_numval_01_ku:coordinates = "lon_01 lat_01" ;
    range_ocog_numval_01_ku:source = "OCOG retracking" ;
```

4.4.79 range_ocog_numval_01_plrm_ku(time_01)

```
byte range_ocog_numval_01_plrm_ku(time_01) ;
    range_ocog_numval_01_plrm_ku: FillValue = -128b;
    range_ocog_numval_01_plrm_ku:long_name = "number of valid points used to
compute the ocog altimeter range: 1 Hz PLRM ku band" ;
    range_ocog_numval_01_plrm_ku:units = "count" ;
    range_ocog_numval_01_plrm_ku:coordinates = "lon_01 lat_01" ;
    range_ocog_numval_01_plrm_ku:comment = "Set to FillValue in LRM mode." ;
    range_ocog_numval_01_plrm_ku:source = "OCOG retracking" ;
```

4.4.80 range_ocog_qual_20_ku(time_20_ku)

```
byte range_ocog_qual_20_ku(time_20_ku) ;
    range_ocog_qual_20_ku: FillValue = -128b ;
    range_ocog_qual_20_ku:long_name = "quality flag for the ocog altimeter
range: 20 Hz ku band" ;
    range_ocog_qual_20_ku:flag_values = 0b, 1b ;
    range_ocog_qual_20_ku:flag_meanings = "yes no" ;
    range_ocog_qual_20_ku:coordinates = "lon_20_ku lat_20_ku" ;
    range_ocog_qual_20_ku:comment = "Set to FillValue in SAR mode. Flag
indicating the use or not of the 20-Hz estimate of the ocean retracking in the
computation of 1Hz estimate" ;
    range_ocog_qual_20_ku:source = "OCOG retracking" ;
```

4.4.81 range_ocog_qual_20_plrm_ku(time_20_plrm_ku)

```
byte range_ocog_qual_20_plrm_ku(time_20_plrm_ku) ;
    range_ocog_qual_20_plrm_ku: FillValue = -128b;
    range_ocog_qual_20_plrm_ku:long_name = "quality flag for the ocog
altimeter range: 20 Hz PLRM ku band" ;
    range_ocog_qual_20_plrm_ku:flag_values = 0b, 1b ;
    range_ocog_qual_20_plrm_ku:flag_meanings = "yes no" ;
    range_ocog_qual_20_plrm_ku:coordinates = "lon_20_plrm_ku lat_20_plrm_ku"
;
    range_ocog_qual_20_plrm_ku:comment = "Not provided in LRM mode.
Flag indicating the use or not of the 20-Hz estimate of the ocean retracking in the
computation of 1Hz estimate" ;
    range_ocog_qual_20_plrm_ku:source = "OCOG
retracking" ;
```

4.4.82 range_ocog_rms_01_ku(time_01)

```
short range_ocog_rms_01_ku(time_01) ;
    range_ocog_rms_01_ku: FillValue = -32768s;
```



```
ku band" ;
    range_ocog_rms_01_ku:long_name = "RMS of the ocog altimeter range: 1 Hz
range_ocog_rms_01_ku:units = "m" ;
range_ocog_rms_01_ku:add_offset = 0. ;
range_ocog_rms_01_ku:scale_factor = 0.001 ;
range_ocog_rms_01_ku:coordinates = "lon_01 lat_01" ;
range_ocog_rms_01_ku:comment = "Set to FillValue in SAR mode. Compression
of high rate elements is preceded by a detection of outliers. Only valid high-rate
values are used to compute this element" ;
range_ocog_rms_01_ku:source = "OCOG retracking" ;
```

4.4.83 range_ocog_rms_01_plrm_ku(time_01)

```
short range_ocog_rms_01_plrm_ku(time_01) ;
    range_ocog_rms_01_plrm_ku: FillValue = -32768s;
    range_ocog_rms_01_plrm_ku:long_name = "RMS of the ocog altimeter range:
1 Hz PLRM ku band" ;
    range_ocog_rms_01_plrm_ku:units = "m" ;
    range_ocog_rms_01_plrm_ku:add_offset = 0. ;
    range_ocog_rms_01_plrm_ku:scale_factor = 0.001 ;
    range_ocog_rms_01_plrm_ku:coordinates = "lon_01 lat_01" ;
    range_ocog_rms_01_plrm_ku:comment = "Set to FillValue in LRM mode.
Compression of high rate elements is preceded by a detection of outliers. Only valid
high-rate values are used to compute this element" ;
    range_ocog_rms_01_plrm_ku:source = "OCOG retracking" ;
```

4.4.84 retracking_ocean_qual_20_ku(time_20_ku)

```
byte retracking_ocean_qual_20_ku(time_20_ku) ;
    retracking_ocean_qual_20_ku: FillValue = -128b;
    retracking_ocean_qual_20_ku:long_name = "ocean retracking quality flag:
20 Hz ku band" ;
    retracking_ocean_qual_20_ku:flag_values = 0b, 1b ;
    retracking_ocean_qual_20_ku:flag_meanings = "yes no" ;
    retracking_ocean_qual_20_ku:coordinates = "lon_20_ku lat_20_ku" ;
    retracking_ocean_qual_20_ku:comment = "Flag indicating the use or not of
the 20-Hz estimate of the ocean retracking in the computation of 1Hz estimate" ;
    retracking_ocean_qual_20_ku:source = "LRM: MLE4 retracking, SAR: SAMOSA
v2.3 retracking." ;
```

4.4.85 retracking_ocean_qual_20_plrm_ku(time_20_plrm_ku)

```
byte retracking_ocean_qual_20_plrm_ku(time_20_plrm_ku) ;
    retracking_ocean_qual_20_plrm_ku: FillValue = -128b ;
    retracking_ocean_qual_20_plrm_ku:long_name = "ocean retracking quality
flag: 20 Hz PLRM ku band" ;
    retracking_ocean_qual_20_plrm_ku:flag_values = 0b, 1b ;
    retracking_ocean_qual_20_plrm_ku:flag_meanings = "yes no" ;
    retracking_ocean_qual_20_plrm_ku:coordinates = "lon_20_plrm_ku
lat_20_plrm_ku" ;
    retracking_ocean_qual_20_plrm_ku:comment = "Not provided in LRM mode.
Flag indicating the use or not of the 20-Hz estimate of the ocean retracking in the
computation of 1Hz estimate" ;
    retracking_ocean_qual_20_plrm_ku:source = "MLE4 retracking" ;
```



4.4.86 **scale_factor_20_ku(time_20_ku)**

```
int scale_factor_20_ku(time_20_ku) ;
    scale_factor_20_ku: FillValue = -2147483648;
    scale_factor_20_ku:long_name = "scaling factor for backscatter
coefficient evaluation: 20 Hz ku band" ;
    scale_factor_20_ku:units = "dB" ;
    scale_factor_20_ku:add_offset = 0. ;
    scale_factor_20_ku:scale_factor = 0.01 ;
    scale_factor_20_ku:coordinates = "lon_20_ku lat_20_ku" ;
    scale_factor_20_ku:comment = "This scaling factor represents the
backscatter coefficient for a waveform amplitude equal to 1. It is corrected for AGC
instrumental errors [agc_cor_01] and internal calibration [internal_cor_sig0_01]" ;
```

4.4.87 **scale_factor_20_plrm_ku(time_20_plrm_ku)**

```
int scale_factor_20_plrm_ku(time_20_plrm_ku) ;
    scale_factor_20_plrm_ku: FillValue = -2147483648 ;
    scale_factor_20_plrm_ku:long_name = "scaling factor for backscatter
coefficient evaluation: 20 Hz PLRM ku band" ;
    scale_factor_20_plrm_ku:units = "dB" ;
    scale_factor_20_plrm_ku:add_offset = 0. ;
    scale_factor_20_plrm_ku:scale_factor = 0.01 ;
    scale_factor_20_plrm_ku:coordinates = "lon_20_plrm_ku lat_20_plrm_ku" ;
    scale_factor_20_plrm_ku:comment = "Not provided in LRM mode. This scaling
factor represents the backscatter coefficient for a waveform amplitude equal to 1. It
is corrected for AGC instrumental errors [agc_cor_01] and internal calibration
[internal_cor_sig0_01]" ;
```

4.4.88 **sea_state_bias_01_ku(time_01)**

```
short sea_state_bias_01_ku(time_01) ;
    sea_state_bias_01_ku: FillValue = -32768s;
    sea_state_bias_01_ku:long_name = "sea state bias correction: 1 Hz ku band"
;
    sea_state_bias_01_ku:units = "m" ;
    sea_state_bias_01_ku:standard_name =
"sea_surface_height_bias_due_to_sea_surface_roughness" ;
    sea_state_bias_01_ku:add_offset = 0. ;
    sea_state_bias_01_ku:scale_factor = 0.001 ;
    sea_state_bias_01_ku:coordinates = "lon_01 lat_01" ;
    sea_state_bias_01_ku:comment = "A sea state bias correction must be added
(negative value) to the instrument range to correct this range measurement for sea
state delays of the radar pulse." ;
    sea_state_bias_01_ku:source = "NTran 2015 empirical solution fitted on
Cryosat GOP Baseline-B data" ;
    sea_state_bias_01_ku:institution = "ESA/CLS" ;
```

4.4.89 **sea_state_bias_01_plrm_ku(time_01)**

```
short sea_state_bias_01_plrm_ku(time_01) ;
    sea_state_bias_01_plrm_ku: FillValue = -32768s;
    sea_state_bias_01_plrm_ku:long_name = "sea state bias correction: 1 Hz
PLRM ku band" ;
```



```
sea_state_bias_01_plrm_ku:units = "m" ;
sea_state_bias_01_plrm_ku:standard_name =
"sea_surface_height_bias_due_to_sea_surface_roughness" ;
sea_state_bias_01_plrm_ku:add_offset = 0. ;
sea_state_bias_01_plrm_ku:scale_factor = 0.001 ;
sea_state_bias_01_plrm_ku:coordinates = "lon_01 lat_01" ;
sea_state_bias_01_plrm_ku:comment = "Set to FillValue in LRM mode. A sea
state bias correction must be added (negative value) to the instrument range to correct
this range measurement for sea state delays of the radar pulse." ;
sea_state_bias_01_plrm_ku:source = "NTran 2015 empirical solution fitted
on Cryosat GOP Baseline-B data" ;
sea_state_bias_01_plrm_ku:institution = "ESA/CLS" ;
```

4.4.90 seq_count_01(time_01)

```
int seq_count_01(time_01) ;
seq_count_01: FillValue = -2147483648;
seq_count_01:long_name = "sequence counter: 1 Hz" ;
seq_count_01:units = "count" ;
seq_count_01:comment = "Record counter from the L1b product." ;
```

4.4.91 sig0_ocean_01_ku(time_01)

```
short sig0_ocean_01_ku(time_01) ;
sig0_ocean_01_ku: FillValue = -32768s;
sig0_ocean_01_ku:long_name = "corrected ocean backscatter coefficient: 1
Hz ku band" ;
sig0_ocean_01_ku:units = "dB" ;
sig0_ocean_01_ku:standard_name =
"surface_backwards_scattering_coefficient_of_radar_wave" ;
sig0_ocean_01_ku:add_offset = 0. ;
sig0_ocean_01_ku:scale_factor = 0.01 ;
sig0_ocean_01_ku:coordinates = "lon_01 lat_01" ;
sig0_ocean_01_ku:comment = "Instrumental corrections included: AGC
instrumental errors correction [agc_cor_01], internal calibration correction
[internal_cor_sig0_01], modeled instrumental errors correction
[mod_instr_cor_sig0_01_ku], atmospheric attenuation correction [atm_cor_sig0_01] and
system bias" ;
sig0_ocean_01_ku:source = "LRM: MLE4 retracking, SAR: SAMOSA v2.3
retracking" ;
```

4.4.92 sig0_ocean_01_plrm_ku(time_01)

```
short sig0_ocean_01_plrm_ku(time_01) ;
sig0_ocean_01_plrm_ku: FillValue = -32768s ;
sig0_ocean_01_plrm_ku:long_name = "corrected ocean backscatter
coefficient: 1 Hz PLRM ku band" ;
sig0_ocean_01_plrm_ku:units = "dB" ;
sig0_ocean_01_plrm_ku:standard_name =
"surface_backwards_scattering_coefficient_of_radar_wave" ;
sig0_ocean_01_plrm_ku:add_offset = 0. ;
sig0_ocean_01_plrm_ku:scale_factor = 0.01 ;
sig0_ocean_01_plrm_ku:coordinates = "lon_01 lat_01" ;
sig0_ocean_01_plrm_ku:comment = "Set to FillValue in LRM mode.
Instrumental corrections included: AGC instrumental errors correction [agc_cor_01],
```



internal calibration correction [internal_cor_sig0_01], modeled instrumental errors correction [mod_instr_cor_sig0_01_plrm_ku], atmospheric attenuation correction [atm_cor_sig0_01] and system bias" ;
sig0_ocean_01_plrm_ku:source = "MLE4 retracking" ;

4.4.93 sig0_ocean_20_ku(time_20_ku)

```
short sig0_ocean_20_ku(time_20_ku) ;  
sig0_ocean_20_ku: FillValue = -32768s;  
sig0_ocean_20_ku:long_name = "corrected ocean backscatter coefficient: 20  
Hz ku band" ;  
sig0_ocean_20_ku:units = "dB" ;  
sig0_ocean_20_ku:standard_name =  
"surface_backwards_scattering_coefficient_of_radar_wave" ;  
sig0_ocean_20_ku:add_offset = 0. ;  
sig0_ocean_20_ku:scale_factor = 0.01 ;  
sig0_ocean_20_ku:coordinates = "lon_20_ku lat_20_ku" ;  
sig0_ocean_20_ku:comment = "Instrumental corrections included: AGC  
instrumental errors correction [agc_cor_01], internal calibration correction  
[internal_cor_sig0_01], atmospheric attenuation correction [atm_cor_sig0_01] and  
system bias" ;  
sig0_ocean_20_ku:source = "LRM: MLE4 retracking, SAR: SAMOSA v2.3  
retracking" ;
```

4.4.94 sig0_ocean_20_plrm_ku(time_20_plrm_ku)

```
short sig0_ocean_20_plrm_ku(time_20_plrm_ku) ;  
sig0_ocean_20_plrm_ku: FillValue = -32768s;  
sig0_ocean_20_plrm_ku:long_name = "corrected ocean backscatter  
coefficient: 20 Hz PLRM ku band" ;  
sig0_ocean_20_plrm_ku:units = "dB" ;  
sig0_ocean_20_plrm_ku:standard_name =  
"surface_backwards_scattering_coefficient_of_radar_wave" ;  
sig0_ocean_20_plrm_ku:add_offset = 0. ;  
sig0_ocean_20_plrm_ku:scale_factor = 0.01 ;  
sig0_ocean_20_plrm_ku:coordinates = "lon_20_plrm_ku lat_20_plrm_ku" ;  
sig0_ocean_20_plrm_ku:comment = "Not provided in LRM mode. Instrumental  
corrections included: AGC instrumental errors correction [agc_cor_01], internal  
calibration correction [internal_cor_sig0_01], atmospheric attenuation correction  
[atm_cor_sig0_01] and system bias" ;  
sig0_ocean_20_plrm_ku:source = "MLE4 retracking" ;
```

4.4.95 sig0_ocean_numval_01_ku(time_01)

```
byte sig0_ocean_numval_01_ku(time_01) ;  
sig0_ocean_numval_01_ku: FillValue = -128b;  
sig0_ocean_numval_01_ku:long_name = "number of valid points used to  
compute the ocean backscatter coefficient: 1 Hz ku band" ;  
sig0_ocean_numval_01_ku:units = "count" ;  
sig0_ocean_numval_01_ku:coordinates = "lon_01 lat_01" ;  
sig0_ocean_numval_01_ku:source = "LRM: MLE4 retracking, SAR: SAMOSA v2.3  
retracking" ;
```



4.4.96 sig0_ocean_numval_01_plrm_ku(time_01)

```
byte sig0_ocean_numval_01_plrm_ku(time_01) ;
    sig0_ocean_numval_01_plrm_ku: FillValue = -128b;
    sig0_ocean_numval_01_plrm_ku:long_name = "number of valid points used to
compute the ocean backscatter coefficient: 1 Hz PLRM ku band" ;
    sig0_ocean_numval_01_plrm_ku:units = "count" ;
    sig0_ocean_numval_01_plrm_ku:coordinates = "lon_01 lat_01" ;
    sig0_ocean_numval_01_plrm_ku:comment = "Set to FillValue in LRM mode." ;
    sig0_ocean_numval_01_plrm_ku:source = "MLE4 retracking" ;
```

4.4.97 sig0_ocean_qual_20_ku(time_20_ku)

```
byte sig0_ocean_qual_20_ku(time_20_ku) ;
    sig0_ocean_qual_20_ku: FillValue = -128b;
    sig0_ocean_qual_20_ku:long_name = "quality flag for the ocean backscatter
coefficient: 20 Hz ku band" ;
    sig0_ocean_qual_20_ku:flag_values = 0b, 1b ;
    sig0_ocean_qual_20_ku:flag_meanings = "yes no" ;
    sig0_ocean_qual_20_ku:coordinates = "lon_20_ku lat_20_ku" ;
    sig0_ocean_qual_20_ku:comment = "Flag indicating the use or not of the
20-Hz estimate of the ocean retracking in the computation of 1Hz estimate" ;
    sig0_ocean_qual_20_ku:source = "LRM: MLE4 retracking, SAR: SAMOSA v2.3
retracking" ;
```

4.4.98 sig0_ocean_qual_20_plrm_ku(time_20_plrm_ku)

```
byte sig0_ocean_qual_20_plrm_ku(time_20_plrm_ku) ;
    sig0_ocean_qual_20_plrm_ku: FillValue = -128b ;
    sig0_ocean_qual_20_plrm_ku:long_name = "quality flag for the ocean
backscatter coefficient: 20 Hz PLRM ku band" ;
    sig0_ocean_qual_20_plrm_ku:flag_values = 0b, 1b ;
    sig0_ocean_qual_20_plrm_ku:flag_meanings = "yes no" ;
    sig0_ocean_qual_20_plrm_ku:coordinates = "lon_20_plrm_ku lat_20_plrm_ku"
;
    sig0_ocean_qual_20_plrm_ku:comment = "Not provided in LRM mode. Flag
indicating the use or not of the 20-Hz estimate of the ocean retracking in the
computation of 1Hz estimate" ;
    sig0_ocean_qual_20_plrm_ku:source = "MLE4 retracking" ;
```

4.4.99 sig0_ocean_rms_01_ku(time_01)

```
short sig0_ocean_rms_01_ku(time_01) ;
    sig0_ocean_rms_01_ku: FillValue = -32768s;
    sig0_ocean_rms_01_ku:long_name = "RMS of the ocean backscatter
coefficient: 1 Hz ku band" ;
    sig0_ocean_rms_01_ku:units = "dB" ;
    sig0_ocean_rms_01_ku:add_offset = 0. ;
    sig0_ocean_rms_01_ku:scale_factor = 0.01 ;
    sig0_ocean_rms_01_ku:coordinates = "lon_01 lat_01" ;
    sig0_ocean_rms_01_ku:comment = "Compression of high rate elements is
preceded by a detection of outliers. Only valid high-rate values are used to compute
this element" ;
```



```
sig0_ocean_rms_01_ku:source = "LRM: MLE4 retracking, SAR: SAMOSA v2.3  
retracking" ;
```

4.4.100 sig0_ocean_rms_01_plrm_ku(time_01)

```
short sig0_ocean_rms_01_plrm_ku(time_01) ;  
sig0_ocean_rms_01_plrm_ku: FillValue = -32768s;  
sig0_ocean_rms_01_plrm_ku:long_name = "RMS of the ocean backscatter  
coefficient: 1 Hz PLRM ku band" ;  
sig0_ocean_rms_01_plrm_ku:units = "dB" ;  
sig0_ocean_rms_01_plrm_ku:add_offset = 0. ;  
sig0_ocean_rms_01_plrm_ku:scale_factor = 0.01 ;  
sig0_ocean_rms_01_plrm_ku:coordinates = "lon_01 lat_01" ;  
sig0_ocean_rms_01_plrm_ku:comment = "Set to FillValue in LRM mode.  
Compression of high rate elements is preceded by a detection of outliers. Only valid  
high-rate values are used to compute this element" ;  
sig0_ocean_rms_01_plrm_ku:source = "MLE4 retracking" ;
```

4.4.101 sig0_ocog_01_ku(time_01)

```
short sig0_ocog_01_ku(time_01) ;  
sig0_ocog_01_ku: FillValue = -32768s;  
sig0_ocog_01_ku:long_name = "corrected ocog backscatter coefficient: 1 Hz  
ku band" ;  
sig0_ocog_01_ku:units = "dB" ;  
sig0_ocog_01_ku:standard_name = "surface_backwards_scattering_coefficient_of_radar_wave" ;  
sig0_ocog_01_ku:add_offset = 0. ;  
sig0_ocog_01_ku:scale_factor = 0.01 ;  
sig0_ocog_01_ku:coordinates = "lon_01 lat_01" ;  
sig0_ocog_01_ku:comment = "Set to FillValue in SAR mode. Instrumental  
corrections included: AGC instrumental errors correction [agc_cor_01] and internal  
calibration correction [internal_cor_sig0_01]" ;  
sig0_ocog_01_ku:source = "OCOg retracking" ;
```

4.4.102 sig0_ocog_01_plrm_ku(time_01)

```
short sig0_ocog_01_plrm_ku(time_01) ;  
sig0_ocog_01_plrm_ku: FillValue = -32768s;  
sig0_ocog_01_plrm_ku:long_name_plrm_ku = "corrected ocog backscatter  
coefficient: 1 Hz PLRM ku band" ;  
sig0_ocog_01_plrm_ku:units = "dB" ;  
sig0_ocog_01_plrm_ku:standard_name = "surface_backwards_scattering_coefficient_of_radar_wave" ;  
sig0_ocog_01_plrm_ku:add_offset = 0. ;  
sig0_ocog_01_plrm_ku:scale_factor = 0.01 ;  
sig0_ocog_01_plrm_ku:coordinates = "lon_01 lat_01" ;  
sig0_ocog_01_plrm_ku:comment = "Set to FillValue in LRM mode.  
Instrumental corrections included: AGC instrumental errors correction [agc_cor_01] and  
internal calibration correction [internal_cor_sig0_01]" ;  
sig0_ocog_01_plrm_ku:source = "OCOg retracking" ;
```

4.4.103 sig0_ocog_20_ku(time_20_ku)



```
short sig0_ocog_20_ku(time_20_ku) ;
    sig0_ocog_20_ku: FillValue = -32768s;
    sig0_ocog_20_ku:long_name = "corrected ocog backscatter coefficient: 20
Hz ku band" ;
    sig0_ocog_20_ku:units = "dB" ;
    sig0_ocog_20_ku:standard_name =
"surface_backwards_scattering_coefficient_of_radar_wave" ;
    sig0_ocog_20_ku:add_offset = 0. ;
    sig0_ocog_20_ku:scale_factor = 0.01 ;
    sig0_ocog_20_ku:coordinates = "lon_20_ku lat_20_ku" ;
    sig0_ocog_20_ku:comment = "Set to FillValue in SAR mode. Instrumental
corrections included: AGC instrumental errors correction [agc_cor_01] and internal
calibration correction [internal_cor_sig0_01]" ;
    sig0_ocog_20_ku:source = "OCOG retracking" ;
```

4.4.104 sig0_ocog_20_plrm_ku(time_20_plrm_ku)

```
short sig0_ocog_20_plrm_ku(time_20_plrm_ku) ;
    sig0_ocog_20_plrm_ku: FillValue = -32768s;
    sig0_ocog_20_plrm_ku:long_name = "corrected ocog backscatter coefficient:
20 Hz PLRM ku band" ;
    sig0_ocog_20_plrm_ku:units = "dB" ;
    sig0_ocog_20_plrm_ku:standard_name =
"surface_backwards_scattering_coefficient_of_radar_wave" ;
    sig0_ocog_20_plrm_ku:add_offset = 0. ;
    sig0_ocog_20_plrm_ku:scale_factor = 0.01 ;
    sig0_ocog_20_plrm_ku:coordinates = "lon_20_plrm_ku lat_20_plrm_ku" ;
    sig0_ocog_20_plrm_ku:comment = "Not provided in LRM mode. Instrumental
corrections included: AGC instrumental errors correction [agc_cor_01] and internal
calibration correction [internal_cor_sig0_01]" ;
    sig0_ocog_20_plrm_ku:source = "OCOG retracking" ;
```

4.4.105 sig0_ocog_numval_01_ku(time_01)

```
byte sig0_ocog_numval_01_ku(time_01) ;
    sig0_ocog_numval_01_ku: FillValue = -128b;
    sig0_ocog_numval_01_ku:long_name = "number of valid points used to
compute the ocog backscatter coefficient: 1 Hz ku band" ;
    sig0_ocog_numval_01_ku:units = "count" ;
    sig0_ocog_numval_01_ku:coordinates = "lon_01 lat_01" ;
    sig0_ocog_numval_01_ku:source = "OCOG retracking" ;
    sig0_ocog_numval_01_ku:comment = "Set to FillValue in SAR mode." ;
```

4.4.106 sig0_ocog_numval_01_plrm_ku(time_01)

```
byte sig0_ocog_numval_01_plrm_ku(time_01) ;
    sig0_ocog_numval_01_plrm_ku: FillValue = -128b;
    sig0_ocog_numval_01_plrm_ku:long_name = "number of valid points used to
compute the ocog backscatter coefficient: 1 Hz PLRM ku band" ;
    sig0_ocog_numval_01_plrm_ku:units = "count" ;
    sig0_ocog_numval_01_plrm_ku:coordinates = "lon_01 lat_01" ;
    sig0_ocog_numval_01_plrm_ku:comment = "Set to FillValue in LRM mode." ;
    sig0_ocog_numval_01_plrm_ku:source = "OCOG retracking" ;
```




4.4.107 sig0_ocog_qual_20_ku(time_20_ku)

```
byte sig0_ocog_qual_20_ku(time_20_ku) ;
    sig0_ocog_qual_20_ku: FillValue = -128b;
    sig0_ocog_qual_20_ku:long_name = "quality flag for the ocog backscatter
coefficient: 20 Hz ku band" ;
    sig0_ocog_qual_20_ku:flag_values = 0b, 1b ;
    sig0_ocog_qual_20_ku:flag_meanings = "yes no" ;
    sig0_ocog_qual_20_ku:coordinates = "lon_20_ku lat_20_ku" ;
    sig0_ocog_qual_20_ku:comment = "Set to FillValue in SAR mode. Flag
indicating the use or not of the 20-Hz estimate of the ocog retracking in the computation
of 1Hz estimate" ;
    sig0_ocog_qual_20_ku:source = "OCOG retracking" ;
```

4.4.108 sig0_ocog_qual_20_plrm_ku(time_20_plrm_ku)

```
byte sig0_ocog_qual_20_plrm_ku(time_20_plrm_ku) ;
    sig0_ocog_qual_20_plrm_ku: FillValue = -128b ;
    sig0_ocog_qual_20_plrm_ku:long_name = "quality flag for the ocog
backscatter coefficient: 20 Hz PLRM ku band" ;
    sig0_ocog_qual_20_plrm_ku:flag_values = 0b, 1b ;
    sig0_ocog_qual_20_plrm_ku:flag_meanings = "yes no" ;
    sig0_ocog_qual_20_plrm_ku:coordinates = "lon_20_plrm_ku lat_20_plrm_ku"
;
    sig0_ocog_qual_20_plrm_ku:comment = "Not provided in LRM mode. Flag
indicating the use or not of the 20-Hz estimate of the ocog retracking in the computation
of 1Hz estimate" ;
    sig0_ocog_qual_20_plrm_ku:source = "OCOG retracking" ;
```

4.4.109 sig0_ocog_rms_01_ku(time_01)

```
short sig0_ocog_rms_01_ku(time_01) ;
    sig0_ocog_rms_01_ku: FillValue = -32768s;
    sig0_ocog_rms_01_ku:long_name = "RMS of the ocog backscatter coefficient:
1 Hz ku band" ;
    sig0_ocog_rms_01_ku:units = "dB" ;
    sig0_ocog_rms_01_ku:add_offset = 0. ;
    sig0_ocog_rms_01_ku:scale_factor = 0.01 ;
    sig0_ocog_rms_01_ku:coordinates = "lon_01 lat_01" ;
    sig0_ocog_rms_01_ku:comment = "Set to FillValue in SAR mode. Compression
of high rate elements is preceded by a detection of outliers. Only valid high-rate
values are used to compute this element" ;
    sig0_ocog_rms_01_ku:source = "OCOG retracking" ;
```

4.4.110 sig0_ocog_rms_01_plrm_ku(time_01)

```
short sig0_ocog_rms_01_plrm_ku(time_01) ;
    sig0_ocog_rms_01_plrm_ku: FillValue = -32768s;
    sig0_ocog_rms_01_plrm_ku:long_name = "RMS of the ocog backscatter
coefficient: 1 Hz PLRM ku band" ;
    sig0_ocog_rms_01_plrm_ku:units = "dB" ;
    sig0_ocog_rms_01_plrm_ku:add_offset = 0. ;
    sig0_ocog_rms_01_plrm_ku:scale_factor = 0.01 ;
    sig0_ocog_rms_01_plrm_ku:coordinates = "lon_01 lat_01" ;
```



```
sig0_ocog_rms_01_plrm_ku:comment = "Set to FillValue in LRM mode.  
Compression of high rate elements is preceded by a detection of outliers. Only valid  
high-rate values are used to compute this element" ;  
sig0_ocog_rms_01_plrm_ku:source = "OCOg retracking" ;
```

4.4.111 **solid_earth_tide_01(time_01)**

```
short solid_earth_tide_01(time_01) ;  
solid_earth_tide_01: FillValue = -32768s;  
solid_earth_tide_01:long_name = "solid earth tide height: 1 Hz" ;  
solid_earth_tide_01:units = "m" ;  
solid_earth_tide_01:standard_name =  
"sea_surface_height_amplitude_due_to_earth_tide" ;  
solid_earth_tide_01:add_offset = 0. ;  
solid_earth_tide_01:scale_factor = 0.001 ;  
solid_earth_tide_01:coordinates = "lon_01 lat_01" ;  
solid_earth_tide_01:comment = "Solid earth tide - to be added to the range  
to remove the effect of local tidal distortion in the crust of the Earth." ;  
solid_earth_tide_01:source = "Cartwright and Edden [1973] Corrected  
tables of tidal harmonics - J. Geophys. J. R. Astr. Soc., 33, 253-264." ;
```

4.4.112 **square_swh_ocean_01_ku(time_01)**

```
int square_swh_ocean_01_ku(time_01) ;  
square_swh_ocean_01_ku: FillValue = -2147483648;  
square_swh_ocean_01_ku:long_name = "corrected ocean square of the  
significant waveheight: 1 Hz ku band" ;  
square_swh_ocean_01_ku:units = "m^2" ;  
square_swh_ocean_01_ku:add_offset = 0. ;  
square_swh_ocean_01_ku:scale_factor = 1.e-06 ;  
square_swh_ocean_01_ku:coordinates = "lon_01 lat_01" ;  
square_swh_ocean_01_ku:comment = "The modeled instrumental errors  
correction [mod_instr_cor_swh_01_ku] and the system bias are not included" ;  
square_swh_ocean_01_ku:source = "LRM: MLE4 retracking, SAR: SAMOSA v2.3  
retracking" ;
```

4.4.113 **square_swh_ocean_01_plrm_ku(time_01)**

```
int square_swh_ocean_01_plrm_ku(time_01) ;  
square_swh_ocean_01_plrm_ku: FillValue = -2147483648;  
square_swh_ocean_01_plrm_ku:long_name = "corrected ocean square of the  
significant waveheight: 1 Hz PLRM ku band" ;  
square_swh_ocean_01_plrm_ku:units = "m^2" ;  
square_swh_ocean_01_plrm_ku:add_offset = 0. ;  
square_swh_ocean_01_plrm_ku:scale_factor = 1.e-06 ;  
square_swh_ocean_01_plrm_ku:coordinates = "lon_01 lat_01" ;  
square_swh_ocean_01_plrm_ku:comment = "Set to FillValue in LRM mode. The  
modeled instrumental errors correction [mod_instr_cor_swh_01_plrm_ku] and the system  
bias are not included" ;  
square_swh_ocean_01_plrm_ku:source = "MLE4 retracking" ;
```

4.4.114 **ssha_01_ku(time_01)**



```
short ssh_a_01_ku(time_01) ;
    ssh_a_01_ku: FillValue = -32768s;
    ssh_a_01_ku: long_name = "sea surface height anomaly: 1 Hz ku band" ;
    ssh_a_01_ku: units = "m" ;
    ssh_a_01_ku: standard_name = "sea_surface_height_above_sea_level" ;
    ssh_a_01_ku: add_offset = 0. ;
    ssh_a_01_ku: scale_factor = 0.001 ;
    ssh_a_01_ku: coordinates = "lon_01 lat_01" ;
    ssh_a_01_ku: comment = "altitude of satellite [alt_01] - ku band corrected
ocean altimeter range [range_ocean_01_ku] - gim ionospheric correction
[iono_cor_gim_01] - model dry tropospheric correction [mod_dry_tropo_cor_01] - wet
tropospheric correction ([mod_wet_tropo_cor_01] for NOP/IOP products,
[gpd_wet_tropo_cor_01] for GOP off line products)- sea state bias correction in Ku band
[sea_state_bias_01_ku] - solid earth tide height [solid_earth_tide_01] - geocentric
ocean tide height solution 2 [ocean_tide_sol2_01] - geocentric pole tide height
[pole_tide_01] - inverted barometer height correction [inv_bar_cor_01] - dynamic
atmospheric correction ([hf_fluct_cor_01] for IOP/GOP off line product,
[inv_bar_cor_01] for NOP products) - mean sea surface solution 1
[mean_sea_surf_sol1_01]" ;
    ssh_a_01_ku: source = "LRM: MLE4 retracking, SAR: SAMOSA v2.3 retracking."
;
```

4.4.115 ssh_a_01_plrm_ku(time_01)

```
short ssh_a_01_plrm_ku(time_01) ;
    ssh_a_01_plrm_ku: FillValue = -32768s;
    ssh_a_01_plrm_ku: long_name = "sea surface height anomaly: 1 Hz PLRM ku
band" ;
    ssh_a_01_plrm_ku: units = "m" ;
    ssh_a_01_plrm_ku: standard_name = "sea_surface_height_above_sea_level" ;
    ssh_a_01_plrm_ku: add_offset = 0. ;
    ssh_a_01_plrm_ku: scale_factor = 0.001 ;
    ssh_a_01_plrm_ku: comment = "Set to FillValue in LRM mode. altitude of
satellite [alt_01] - ku band corrected ocean altimeter range [range_ocean_01_ku] - gim
ionospheric correction [iono_cor_gim_01] - model dry tropospheric correction
[mod_dry_tropo_cor_01] - wet tropospheric correction ([mod_wet_tropo_cor_01] for
NOP/IOP products, [gpd_wet_tropo_cor_01] for GOP off line products)- sea state bias
correction in Ku band [sea_state_bias_01_ku] - solid earth tide height
[solid_earth_tide_01] - geocentric ocean tide height solution 2 [ocean_tide_sol2_01] -
geocentric pole tide height [pole_tide_01] - dynamic atmospheric correction
([hf_fluct_cor_01] for IOP/GOP off line product, [inv_bar_cor_01] for NOP products) -
mean sea surface solution 1 [mean_sea_surf_sol1_01]" ;
    ssh_a_01_plrm_ku: coordinates = "lon_01 lat_01" ;
    ssh_a_01_plrm_ku: source = "MLE4 retracking" ;
```

4.4.116 ssh_a_20_ku(time_20_ku)

```
short ssh_a_20_ku(time_20_ku) ;
    ssh_a_20_ku: FillValue = -32768s;
    ssh_a_20_ku: long_name = "sea surface height anomaly: 20 Hz ku band" ;
    ssh_a_20_ku: units = "m" ;
    ssh_a_20_ku: standard_name = "sea_surface_height_above_sea_level" ;
    ssh_a_20_ku: add_offset = 0. ;
    ssh_a_20_ku: scale_factor = 0.001 ;

    ssh_a_20_ku: comment = "altitude of satellite [alt_20_ku] - ku band
corrected ocean altimeter range [range_ocean_20_ku] - gim ionospheric correction
[iono_cor_gim_01] - model dry tropospheric correction [mod_dry_tropo_cor_01] - wet
```



```
tropospheric correction ([mod_wet_tropo_cor_01] for NOP/IOP products,  
[gpd_wet_tropo_cor_01] for GOP off line products) - sea state bias correction in Ku  
band [sea_state_bias_01_ku] - solid earth tide height [solid_earth_tide_01] -  
geocentric ocean tide height solution 2 [ocean_tide_sol2_01] - geocentric pole tide  
height [pole_tide_01] - dynamic atmospheric correction ([hf_fluct_cor_01] for IOP/GOP  
off line product, [inv_bar_cor_01] for NOP products) - mean sea surface solution 1  
[mean_sea_surf_sol1_01]" ;  
    ssh_a_20_ku:coordinates = "lon_20_ku lat_20_ku" ;  
    ssh_a_20_ku:source = "LRM: MLE4 retracking, SAR: SAMOSA v2.3 retracking."  
;  
;
```

4.4.117 ssh_a_20_plrm_ku(time_20_plrm_ku)

```
short ssh_a_20_plrm_ku(time_20_plrm_ku) ;  
    ssh_a_20_plrm_ku:FillValue = -32768s;  
    ssh_a_20_plrm_ku:long_name = "sea surface height anomaly: 20 Hz PLRM ku  
band" ;  
    ssh_a_20_plrm_ku:units = "m" ;  
    ssh_a_20_plrm_ku:standard_name = "sea_surface_height_above_sea_level" ;  
    ssh_a_20_plrm_ku:add_offset = 0. ;  
    ssh_a_20_plrm_ku:scale_factor = 0.001 ;  
    ssh_a_20_plrm_ku:comment = "Not provided in LRM mode. Altitude of satellite  
[alt_20_plrm_ku] - PLRM ku band corrected ocean altimeter range  
[range_ocean_20_plrm_ku] - gim ionospheric correction [iono_cor_gim_01] - model dry  
tropospheric correction [mod_dry_tropo_cor_01] - wet tropospheric correction  
([mod_wet_tropo_cor_01] for NOP/IOP products, [gpd_wet_tropo_cor_01] for GOP off line  
products) - sea state bias correction in PLRM Ku band [sea_state_bias_01_plrm_ku] -  
solid earth tide height [solid_earth_tide_01] - geocentric ocean tide height solution  
2 [ocean_tide_sol2_01] - geocentric pole tide height [pole_tide_01] - dynamic  
atmospheric correction ([hf_fluct_cor_01] for IOP/GOP off line product,  
[inv_bar_cor_01] for NOP products) - mean sea surface solution 1  
[mean_sea_surf_sol1_01]" ;  
    ssh_a_20_plrm_ku:coordinates = "lon_20_plrm_ku lat_20_plrm_ku" ;  
    ssh_a_20_plrm_ku:source = "MLE4 retracking" ;
```

4.4.118 surf_type_01(time_01)

```
byte surf_type_01(time_01) ;  
    surf_type_01:FillValue = -128b;  
    surf_type_01:long_name = "surface type: 1 Hz" ;  
    surf_type_01:flag_values = 0b, 1b, 2b, 3b ;  
    surf_type_01:flag_meanings = "ocean_or_semi_enclosed_sea  
enclosed_sea_or_lake continental_ice land" ;  
    surf_type_01:coordinates = "lon_01 lat_01" ;  
    surf_type_01:source = "terrainbase 1.0" ;  
    surf_type_01:institution = "NOAA National Geophysical Data Center,  
Boulder, Colorado." ;  
    surf_type_01:comment = "Computed using the TERRAINBASE model: 0= open  
oceans or semi-enclosed seas; 1= enclosed seas or lakes; 2= continental ice; 3=  
land. See Row, L.W., and D.A. Hastings, 1994. TerrainBase Worldwide Digital  
Terrain Data on CD-ROM, Release 1.0." ;
```

4.4.119 sw_h_ocean_01_ku(time_01)

```
short sw_h_ocean_01_ku(time_01) ;  
    sw_h_ocean_01_ku:FillValue = -32768s;
```



```
ku band" ;
    swh_ocean_01_ku:long_name = "corrected ocean significant waveheight: 1 Hz
swh_ocean_01_ku:units = "m" ;
swh_ocean_01_ku:standard_name = "sea_surface_wave_significant_height" ;
swh_ocean_01_ku:add_offset = 0. ;
swh_ocean_01_ku:scale_factor = 0.001 ;
swh_ocean_01_ku:source = "LRM: MLE4 retracking, SAR: SAMOSA v2.3
retracking" ;
swh_ocean_01_ku:coordinates = "lon_01 lat_01" ;
swh_ocean_01_ku:comment = "Instrumental corrections included:
modeled instrumental errors correction [mod_instr_cor_swh_01_ku] and system bias." ;
```

4.4.120 swh_ocean_01_plrm_ku(time_01)

```
short swh_ocean_01_plrm_ku(time_01) ;
    swh_ocean_01_plrm_ku: FillValue = -32768s;
    swh_ocean_01_plrm_ku:long_name = "corrected ocean significant waveheight:
1 Hz PLRM ku band" ;
    swh_ocean_01_plrm_ku:units = "m" ;
    swh_ocean_01_plrm_ku:standard_name =
"sea_surface_wave_significant_height" ;
    swh_ocean_01_plrm_ku:add_offset = 0. ;
    swh_ocean_01_plrm_ku:scale_factor = 0.001 ;
    swh_ocean_01_plrm_ku:coordinates = "lon_01 lat_01" ;
    swh_ocean_01_plrm_ku:comment = "Set to FillValue in LRM mode.
Instrumental corrections included: modeled instrumental errors correction
[mod_instr_cor_swh_01_plrm_ku] and system bias." ;
    swh_ocean_01_plrm_ku:source = "MLE4 retracking" ;
```

4.4.121 swh_ocean_20_ku(time_20_ku)

```
short swh_ocean_20_ku(time_20_ku) ;
    swh_ocean_20_ku: FillValue = -32768s;
    swh_ocean_20_ku:long_name = "corrected ocean significant waveheight: 20
Hz ku band" ;
    swh_ocean_20_ku:units = "m" ;
    swh_ocean_20_ku:standard_name = "sea_surface_wave_significant_height" ;
    swh_ocean_20_ku:add_offset = 0. ;
    swh_ocean_20_ku:scale_factor = 0.001 ;
    swh_ocean_20_ku:coordinates = "lon_20_ku lat_20_ku" ;
    swh_ocean_20_ku:comment = "Instrumental corrections included: modeled
instrumental errors correction [mod_instr_cor_swh_01_ku] and system bias." ;
    swh_ocean_20_ku:source = "LRM: MLE4 retracking, SAR: SAMOSA v2.3
retracking";
```

4.4.122 swh_ocean_20_plrm_ku(time_20_plrm_ku)

```
short swh_ocean_20_plrm_ku(time_20_plrm_ku) ;
    swh_ocean_20_plrm_ku: FillValue = -32768s;
    swh_ocean_20_plrm_ku:long_name = "corrected ocean significant waveheight:
20 Hz PLRM ku band" ;
    swh_ocean_20_plrm_ku:units = "m" ;
    swh_ocean_20_plrm_ku:standard_name =
"sea_surface_wave_significant_height" ;
    swh_ocean_20_plrm_ku:add_offset = 0. ;
```



```
swh_ocean_20_plrm_ku:scale_factor = 0.001 ;  
swh_ocean_20_plrm_ku:coordinates = "lon_20_plrm_ku lat_20_plrm_ku" ;  
swh_ocean_20_plrm_ku:comment = "Not provided in LRM mode. Instrumental  
corrections included: modeled instrumental errors correction  
[mod_instr_cor_swh_01_plrm_ku] and system bias." ;  
swh_ocean_20_plrm_ku:source = "MLE4 retracking" ;
```

4.4.123 **swh_ocean_numval_01_ku(time_01)**

```
byte swh_ocean_numval_01_ku(time_01) ;  
swh_ocean_numval_01_ku:FillValue = -128b;  
swh_ocean_numval_01_ku:long_name = "number of valid points used to  
compute the ocean significant waveheight: 1 Hz ku band" ;  
swh_ocean_numval_01_ku:units = "count" ;  
swh_ocean_numval_01_ku:coordinates = "lon_01 lat_01" ;  
swh_ocean_numval_01_ku:source = "LRM: MLE4 retracking, SAR: SAMOSA v2.3  
retracking";
```

4.4.124 **swh_ocean_numval_01_plrm_ku(time_01)**

```
byte swh_ocean_numval_01_plrm_ku(time_01) ;  
swh_ocean_numval_01_plrm_ku:FillValue = -128b;  
swh_ocean_numval_01_plrm_ku:long_name = "number of valid points used to  
compute the ocean significant waveheight: 1 Hz PLRM ku band" ;  
swh_ocean_numval_01_plrm_ku:units = "count" ;  
swh_ocean_numval_01_plrm_ku:coordinates = "lon_01 lat_01" ;  
swh_ocean_numval_01_plrm_ku:comment = "Set to FillValue in LRM mode." ;  
swh_ocean_numval_01_plrm_ku:source = "MLE4 retracking" ;
```

4.4.125 **swh_ocean_qual_20_ku(time_20_plrm_ku)**

```
byte swh_ocean_qual_20_ku(time_20_ku) ;  
swh_ocean_qual_20_ku:FillValue = -128b;  
swh_ocean_qual_20_ku:long_name = "quality flag for the ocean significant  
waveheight: 20 Hz ku band" ;  
swh_ocean_qual_20_ku:flag_values = 0b, 1b ;  
swh_ocean_qual_20_ku:flag_meanings = "yes no" ;  
swh_ocean_qual_20_ku:coordinates = "lon_20_ku lat_20_ku" ;  
swh_ocean_qual_20_ku:comment = "Flag indicating the use or not of the 20-  
Hz estimate of the ocean retracking in the computation of 1Hz estimate" ;  
swh_ocean_qual_20_ku:source = "LRM: MLE4 retracking, SAR: SAMOSA v2.3  
retracking";
```

4.4.126 **swh_ocean_qual_20_plrm_ku(time_20_plrm_ku)**

```
byte swh_ocean_qual_20_plrm_ku(time_20_plrm_ku) ;  
swh_ocean_qual_20_plrm_ku:FillValue = -128b;  
swh_ocean_qual_20_plrm_ku:long_name = "quality flag for the ocean  
significant waveheight: 20 Hz PLRM ku band" ;  
swh_ocean_qual_20_plrm_ku:flag_values = 0b, 1b ;  
swh_ocean_qual_20_plrm_ku:flag_meanings = "yes no" ;  
swh_ocean_qual_20_plrm_ku:coordinates = "lon_20_plrm_ku lat_20_plrm_ku"  
;
```



```
sw_h_ocean_qual_20_plrm_ku:comment = "Not provided in LRM mode. Flag  
indicating the use or not of the 20-Hz estimate of the ocean retracking in the  
computation of 1Hz estimate" ;
```

```
sw_h_ocean_qual_20_plrm_ku:source = "MLE4 retracking" ;
```

4.4.127 sw_h_ocean_rms_01_ku(time_01)

```
short sw_h_ocean_rms_01_ku(time_01) ;  
sw_h_ocean_rms_01_ku: FillValue = -32768s;  
sw_h_ocean_rms_01_ku:long_name = "RMS of the ocean significant waveheight:  
1 Hz ku band" ;  
sw_h_ocean_rms_01_ku:units = "m" ;  
sw_h_ocean_rms_01_ku:add_offset = 0. ;  
sw_h_ocean_rms_01_ku:scale_factor = 0.001 ;  
sw_h_ocean_rms_01_ku:coordinates = "lon_01 lat_01" ;  
sw_h_ocean_rms_01_ku:comment = "Compression of high rate elements is  
preceded by a detection of outliers. Only valid high-rate values are used to compute  
this element" ;  
sw_h_ocean_rms_01_ku:source = "LRM: MLE4 retracking, SAR: SAMOSA v2.3  
retracking";
```

4.4.128 sw_h_ocean_rms_01_plrm_ku(time_01)

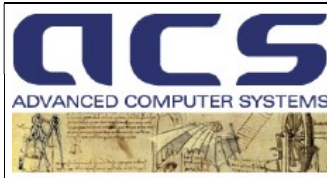
```
short sw_h_ocean_rms_01_plrm_ku(time_01) ;  
sw_h_ocean_rms_01_plrm_ku: FillValue = -32768s;  
sw_h_ocean_rms_01_plrm_ku:long_name = "RMS of the ocean significant  
waveheight: 1 Hz PLRM ku band" ;  
sw_h_ocean_rms_01_plrm_ku:units = "m" ;  
sw_h_ocean_rms_01_plrm_ku:add_offset = 0. ;  
sw_h_ocean_rms_01_plrm_ku:scale_factor = 0.001 ;  
sw_h_ocean_rms_01_plrm_ku:coordinates = "lon_01 lat_01" ;  
sw_h_ocean_rms_01_plrm_ku:comment = "Set to FillValue in LRM mode.  
Compression of high rate elements is preceded by a detection of outliers. Only valid  
high-rate values are used to compute this element" ;  
sw_h_ocean_rms_01_plrm_ku:source = "MLE4 retracking" ;
```

4.4.129 time_01(time_01)

```
double time_01(time_01) ;  
time_01:long_name = "UTC: 1 Hz" ;  
time_01:units = "seconds since 2000-01-01 00:00:00.0" ;  
time_01:standard_name = "time" ;  
time_01:calendar = "gregorian" ;  
time_01:tai_utc_difference = 37. ;
```

4.4.130 time_1hz_20_ku(time_20_ku)

```
double time_1hz_20_ku(time_20_ku) ;  
time_1hz_20_ku:long_name = "UTC time of the 1Hz measurement: 20 Hz ku  
band" ;  
time_1hz_20_ku:units = "seconds since 2000-01-01 00:00:00.0" ;  
time_1hz_20_ku:standard_name = "time" ;  
time_1hz_20_ku:calendar = "gregorian" ;
```



```
time_1hz_20_ku:comment = "UTC time of the 1Hz measurement to which belongs  
the 20Hz measurement.";
```

4.4.131 **time_1hz_20_plrm_ku(time_20_plrm_ku)**

```
double time_1hz_20_plrm_ku(time_20_plrm_ku) ;  
time_1hz_20_plrm_ku:long_name = "UTC time of the 1Hz measurement: 20 Hz  
PLRM ku band" ;  
time_1hz_20_plrm_ku:units = "seconds since 2000-01-01 00:00:00.0" ;  
time_1hz_20_plrm_ku:standard_name = "time" ;  
time_1hz_20_plrm_ku:calendar = "gregorian" ;  
time_1hz_20_plrm_ku:comment = "Not provided in LRM mode. UTC time of the  
1Hz measurement to which belongs the 20Hz measurement.";
```

4.4.132 **time_20_ku(time_20_ku)**

```
double time_20_ku(time_20_ku) ;  
time_20_ku:long_name = "UTC: 20 Hz ku band" ;  
time_20_ku:units = "seconds since 2000-01-01 00:00:00.0" ;  
time_20_ku:standard_name = "time" ;  
time_20_ku:calendar = "gregorian" ;  
time_20_ku:tai_utc_difference = 37. ;
```

4.4.133 **time_20_plrm_ku(time_20_plrm_ku)**

```
double time_20_plrm_ku(time_20_plrm_ku) ;  
time_20_plrm_ku:long_name = "UTC: 20 Hz PLRM ku band" ;  
time_20_plrm_ku:units = "seconds since 2000-01-01 00:00:00.0" ;  
time_20_plrm_ku:standard_name = "time" ;  
time_20_plrm_ku:calendar = "gregorian" ;  
time_20_plrm_ku:tai_utc_difference = 37. ;  
time_20_plrm_ku:comment = "Not provided in LRM mode" ;
```

4.4.134 **uso_cor_01_ku(time_01)**

```
short uso_cor_01_ku(time_01) ;  
uso_cor_01_ku:_FillValue = -32768s ;  
uso_cor_01_ku:long_name = "uso correction on the altimeter range (2-way):  
1 Hz" ;  
uso_cor_01_ku:units = "m" ;  
uso_cor_01_ku:add_offset = 0. ;  
uso_cor_01_ku:scale_factor = 0.001 ;  
uso_cor_01_ku:coordinates = "lon_01 lat_01" ;  
uso_cor_01_ku:comment = "Correction of the USO frequency drift on the  
altimeter range" ;
```

4.4.135 **wind_speed_alt_01_ku(time_01)**

```
short wind_speed_alt_01_ku(time_01) ;  
wind_speed_alt_01_ku:_FillValue = -32768s;
```




```
wind_speed_alt_01_ku:long_name = "altimeter wind speed: 1 Hz ku band" ;  
wind_speed_alt_01_ku:units = "m/s" ;  
wind_speed_alt_01_ku:standard_name = "wind_speed" ;  
wind_speed_alt_01_ku:add_offset = 0. ;  
wind_speed_alt_01_ku:scale_factor = 0.001 ;  
wind_speed_alt_01_ku:coordinates = "lon_01 lat_01" ;  
wind_speed_alt_01_ku:comment = "Should not be used over land" ;  
wind_speed_alt_01_ku:source = "Abdalla [2007]" ;  
wind_speed_alt_01_ku:institution = "ECMWF" ;
```

4.4.136 **wind_speed_alt_01_plrm_ku(time_01)**

```
short wind_speed_alt_01_plrm_ku(time_01) ;  
wind_speed_alt_01_plrm_ku: FillValue = -32768s;  
wind_speed_alt_01_plrm_ku:long_name = "altimeter wind speed: 1 Hz PLRM ku  
band" ;  
wind_speed_alt_01_plrm_ku:units = "m/s" ;  
wind_speed_alt_01_plrm_ku:standard_name = "wind_speed" ;  
wind_speed_alt_01_plrm_ku:add_offset = 0. ;  
wind_speed_alt_01_plrm_ku:scale_factor = 0.001 ;  
wind_speed_alt_01_plrm_ku:coordinates = "lon_01 lat_01" ;  
wind_speed_alt_01_plrm_ku:comment = "Set to FillValue in LRM mode. Should  
not be used over land" ;  
wind_speed_alt_01_plrm_ku:source = "Abdalla [2007]" ;  
wind_speed_alt_01_plrm_ku:institution = "ECMWF" ;
```

4.4.137 **wind_speed_mod_u_01(time_01)**

```
short wind_speed_mod_u_01(time_01) ;  
wind_speed_mod_u_01: FillValue = -32768s;  
wind_speed_mod_u_01:long_name = "U component of the model wind vector: 1  
Hz" ;  
wind_speed_mod_u_01:units = "m/s" ;  
wind_speed_mod_u_01:standard_name = "wind_speed" ;  
wind_speed_mod_u_01:add_offset = 0. ;  
wind_speed_mod_u_01:scale_factor = 0.001 ;  
wind_speed_mod_u_01:coordinates = "lon_01 lat_01" ;  
wind_speed_mod_u_01:comment = "Computed at the altimeter time-tag  
[time_01] from the interpolation of 2 meteorological fields that surround the altimeter  
time-tag." ;  
wind_speed_mod_u_01:source = "European Center for Medium Range Weather  
Forecasting" ;  
wind_speed_mod_u_01:institution = "ECMWF" ;
```

4.4.138 **wind_speed_mod_v_01(time_01)**

```
short wind_speed_mod_v_01(time_01) ;  
wind_speed_mod_v_01: FillValue = -32768s;  
wind_speed_mod_v_01:long_name = "V component of the model wind vector: 1  
Hz" ;  
wind_speed_mod_v_01:units = "m/s" ;  
wind_speed_mod_v_01:standard_name = "wind_speed" ;  
wind_speed_mod_v_01:add_offset = 0. ;  
wind_speed_mod_v_01:scale_factor = 0.001 ;  
wind_speed_mod_v_01:coordinates = "lon_01 lat_01" ;
```



```
wind_speed_mod_v_01:comment = "Computed at the altimeter time-tag  
[time_01] from the interpolation of 2 meteorological fields that surround the altimeter  
time-tag." ;  
wind_speed_mod_v_01:source = "European Center for Medium Range Weather  
Forecasting" ;  
wind_speed_mod_v_01:institution = "ECMWF" ;
```

5 CRYOSAT POLE TO POLE OCEAN PRODUCTS

The Pole-to-Pole products are multi-mode L2 products with a half-orbit coverage (from one pole to the other).

There are two types of P2P products:

- IOP P2P: in these products all the LRM, SAR and SARin L2 IOP products covering half an orbit (from pole to pole) are concatenated inside a single product with file type: SIR_IOP__2.
- GOP P2P: in these products all the LRM, SAR and SARin L2 GOP products covering half an orbit (from pole to pole) are concatenated inside a single product with file type: SIR_GOP__2.

No additional processing is performed in these processors and this means that:

- The geophysical contents of each portion of the P2P products are exactly the same as the contents of the single products covering that portion.
- In the transition between two modes inside the P2P products the continuity of the counters is not assured and it is up to the user to properly reconstruct the correct sequence by using the variable mode

5.1 L2 P2P – GLOBAL ATTRIBUTES

The list of attributes is identical to those specified in section 4.2 with the additional xref attribute relevant to the list of L2 IOP/GOP Products used for the Pole to Pole processing

Reference DSD		
Attribute Name	Description	Values
xref_siral_l2	Siral L2 IOP (or GOP) used for the Pole to Pole	Any valid Siral L2 Product Name

Appendix A: Variables to Products Mapping

The table below shows in which product each variable defined in section 3 and 4 can be found.

Variables to Products Mapping		
Variable Name	L1b	L2
agc_01_ku	x	x
agc_20_ku	x	
agc_ch1_20_hr_ku	x	
agc_ch2_20_hr_ku	x	
agc_cor_01	x	x
alt_01	x	x
alt_20_ku	x	x
alt_20_hr_ku	x	
alt_20_plrm_ku		x
atm_cor_sig0_01		x
beam_dir_vec_20_hr_ku	x	
cog_cor_01	x	x
coherence_waveform_20_hr_ku	x	
cor2_applied_20_ku	x	
cor2_applied_20_hr_ku	x	
dop_angle_start_20_hr_ku	x	
dop_angle_stop_20_hr_ku	x	
dop_cor_01_ku	x	x
dop_cor_20_ku	x	
dop_cor_20_hr_ku	x	
echo_numval_20_ku	x	
echo_numval_20_hr_ku	x	
echo_scale_20_ku	x	
echo_scale_20_hr_ku	x	
echo_scale_pwr_20_hr_ku	x	
flag_cor_err_01	x	
flag_cor_status_01	x	
flag_echo_20_hr_ku	x	
flag_instr_conf_rx_bwdt_20_ku	x	
flag_instr_conf_rx_bwdt_20_hr_ku	x	
flag_instr_conf_rx_flags_20_ku	x	
flag_instr_conf_rx_flags_20_hr_ku	x	
flag_instr_conf_rx_in_use_20_ku	x	
flag_instr_conf_rx_in_use_20_hr_ku	x	

Variables to Products Mapping		
Variable Name	L1b	L2
flag_instr_conf_rx_str_in_use_20_hr_ku	x	
flag_instr_conf_rx_trk_mode_20_ku	x	
flag_instr_conf_rx_trk_mode_20_hr_ku	x	
flag_instr_mode_att_ctrl_20_hr_ku	x	
flag_instr_mode_flags_20_hr_ku	x	
flag_instr_op_mode_20_plrm_ku		x
flag_instr_op_mode_01		x
flag_instr__op_mode_20_hr_ku	x	
flag_instr_op_mode_20_ku	x	x
flag_mcd_20_ku	x	x
flag_mcd_20_hr_ku	x	
flag_trk_cycle_20_ku	x	
flag_trk_cycle_20_hr_ku	x	
geoid_01		x
gpd_wet_tropo_cor_01		x
gpd_wet_tropo_cor_qual_01		x
h0_applied_20_ku	x	
h0_applied_20_hr_ku	x	
h0_fai_word_20_ku	x	
h0_fai_word_20_hr_ku	x	
h0_lai_word_20_ku	x	
h0_lai_word_20_hr_ku	x	
hf_fluct_cor_01	x	x
ind_first_meas_20hz_01	x	x
ind_first_meas_20hz_01_plrm_ku		x
ind_meas_1hz_20_ku	x	x
ind_meas_1hz_20_plrm_ku		x
instr_cor_gain_rx_20_hr_ku	x	
instr_cor_gain_tx_rx_20_hr_ku	x	
instr_cor_range_rx_20_hr_ku	x	
instr_cor_range_tx_rx_20_hr_ku	x	
instr_ext_ph_cor_20_hr_ku	x	
instr_int_ph_cor_20_hr_ku	x	
int_path_cor_01	x	x
inter_base_vec_20_hr_ku	x	
internal_cor_sig0_01	x	x
inv_bar_cor_01	x	x

Variables to Products Mapping		
Variable Name	L1b	L2
iono_cor_gim_01	x	x
lat_01	x	x
lat_20_ku	x	x
lat_20_hr_ku	x	
lat_20_plrm_ku		x
load_tide_sol1_01	x	x
load_tide_sol2_01	x	x
lon_01	x	x
lon_20_ku	x	x
lon_20_hr_ku	x	
lon_20_plrm_ku		x
look_angle_start_20_hr_ku	x	
look_angle_stop_20_hr_ku	x	
mean_dyn_topo_sol1_01		x
mean_dyn_topo_sol2_01		x
mean_sea_surf_sol1_01		x
mean_sea_surf_sol2_01		x
mod_dry_tropo_cor_01	x	x
mod_instr_cor_range_01_ku		x
mod_instr_cor_range_01_plrm_ku		x
mod_instr_cor_sig0_01_ku		x
mod_instr_cor_sig0_01_plrm_ku		x
mod_instr_cor_swh_01_ku		x
mod_instr_cor_swh_01_plrm_ku		x
mod_wet_tropo_cor_01	x	x
mqe_ocean_20_ku		x
mqe_ocean_20_plrm_ku		x
noise_power_20_ku	x	
noise_power_20_hr_ku	x	
ns_20_ku	x	
num_meas_20hz_01	x	x
num_meas_20hz_01_plrm_ku		x
ocean_tide_eq_01	x	x
ocean_tide_non_eq_01	x	x
ocean_tide_sol1_01	x	x
ocean_tide_sol2_01	x	x
odle_01		x
off_nadir_angle_wf_ocean_01_ku		x

Variables to Products Mapping		
Variable Name	L1b	L2
off_nadir_angle_wf_ocean_01_plrm_ku		x
off_nadir_pitch_angle_str_20_ku		x
off_nadir_pitch_angle_str_20_hr_ku	x	
off_nadir_roll_angle_str_20_ku		x
off_nadir_roll_angle_str_20_hr_ku	x	
off_nadir_yaw_angle_str_20_ku		x
off_nadir_yaw_angle_str_20_hr_ku	x	
orb_alt_rate_01	x	x
orb_alt_rate_20_ku	x	
orb_alt_rate_20_hr_ku	x	
peakiness_01_ku		x
peakiness_01_plrm_ku		x
peakiness_20_ku		x
peakiness_20_plrm_ku		x
ph_diff_waveform_20_hr_ku	x	
ph_slope_cor_20_hr_ku	x	
pole_tide_01	x	x
pwr_waveform_20_ku	x	
pwr_waveform_20_hr_ku	x	
qual_ssha_01_ku		x
qual_ssha_01_plrm_ku		x
qual_ssha_20_ku		x
qual_ssha_20_plrm_ku		x
range_ocean_01_ku		x
range_ocean_01_plrm_ku		x
range_ocean_20_ku		x
range_ocean_20_plrm_ku		x
range_ocean_numval_01_ku		x
range_ocean_numval_01_plrm_ku		x
range_ocean_qual_20_ku		x
range_ocean_qual_20_plrm_ku		x
range_ocean_rms_01_ku		x
range_ocean_rms_01_plrm_ku		x
range_ocog_01_ku		x
range_ocog_01_plrm_ku		x
range_ocog_20_ku		x
range_ocog_20_plrm_ku		x
range_ocog_numval_01		x

Variables to Products Mapping		
Variable Name	L1b	L2
range_ocog_numval_01_plrm_ku		x
range_ocog_qual_20_ku		x
range_ocog_qual_20_plrm_ku(time_20_plrm_ku)		x
range_ocog_rms_01		x
range_ocog_rms_01_plrm_ku		x
rec_count_20_ku	x	
rec_count_20_hr_ku	x	
retracking_ocean_qual_20_ku		x
retracking_ocean_qual_20_plrm_ku		x
sat_vel_vec_20_hr_ku	x	
scale_factor_20_ku	x	x
scale_factor_20_plrm_ku		x
sea_state_bias_01_ku		x
sea_state_bias_01_plrm_ku		x
seq_count_01		x
seq_count_20_ku	x	
seq_count_20_hr_ku	x	
sig0_ocean_01_ku		x
sig0_ocean_01_plrm_ku		x
sig0_ocean_20_ku		x
sig0_ocean_20_plrm_ku		x
sig0_ocean_numval_01_ku		x
sig0_ocean_numval_01_plrm_ku		x
sig0_ocean_qual_20_ku		x
sig0_ocean_qual_20_plrm_ku		x
sig0_ocean_rms_01_ku		x
sig0_ocean_rms_01_plrm_ku		x
sig0_ocog_01_ku		x
sig0_ocog_01_plrm_ku		x
sig0_ocog_20_ku		x
sig0_ocog_20_plrm_ku		x
sig0_ocog_numval_01_ku(x
sig0_ocog_numval_01_plrm_ku		x
sig0_ocog_qual_20_ku		x
sig0_ocog_qual_20_plrm_ku		x
sig0_ocog_rms_01_ku		x
sig0_ocog_rms_01_plrm_ku		x
solid_earth_tide_01	x	x

Variables to Products Mapping		
Variable Name	L1b	L2
square_swh_ocean_01_ku		x
square_swh_ocean_01_plrm_ku		x
ssha_01_ku		x
ssha_01_plrm_ku		x
stack_centre_20_hr_ku	x	
stack_centre_angle_20_hr_ku	x	
stack_kurtosis_20_hr_ku	x	
stack_number_after_weighting_20_hr_ku	x	
stack_number_before_weighting_20_hr_ku	x	
stack_scaled_amplitude_20_hr_ku	x	
stack_skewness_20_hr_ku	x	
stack_std_20_hr_ku	x	
stack_std_angle_20_hr_ku	x	
surf_type_01	x	x
swh_ocean_01_ku		x
swh_ocean_01_plrm_ku		x
swh_ocean_20_ku		x
swh_ocean_20_plrm_ku		x
swh_ocean_numval_01_k		x
swh_ocean_numval_01_plrm_ku		x
swh_ocean_qual_20_ku		x
swh_ocean_qual_20_plrm_ku		x
swh_ocean_rms_01_ku		x
swh_ocean_rms_01_plrm_ku		x
time_01	x	x
time_20_ku	x	x
time_20_hr_ku	x	
time_20_plrm_ku		x
tot_gain_ch1_20_hr_ku	x	
tot_gain_ch2_20_hr_ku	x	
tracker_range_20_ku	x	
transmit_pwr_20_hr_ku	x	
uso_cor_01_ku	x	x
uso_cor_20_ku	x	
uso_cor_20_hr_ku	x	
wind_speed_alt_01_ku		x
wind_speed_alt_01_plrm_ku		x
wind_speed_mod_u_01	x	x

Variables to Products Mapping		
Variable Name	L1b	L2
wind_speed_mod_v_01	x	x
window_del_20_hr_ku	x	



Appendix B: Default Setting of the Attribute: _FillValue

By design, each variable of the CONFORM products has got a _FillValue attribute, which contains the default value of that variable, i.e. the value the variable holds when its content hasn't been changed by the CryoSat processor.

The only exceptions to this rule are the variables that use the whole validity range of their types and these are:

Variables with no <u>_FillValue</u>			
Name	Type	Units	Comment
echo_scale_20_ku(time_20_ku)	short	count	Echo scale factor
seq_count_20_hr_ku(time_20_hr_ku)	short	count	Source Sequence Counter read from the L0 echo telemetry packet
pwr_waveform_20_ku(time_20_ku, ns_20_ku)	short	count	L1b 20Hz power waveform
pwr_waveform_20_hr_ku(time_20_hr_ku, ns_20_hr_ku)	ushort	count	L1b 20Hz power waveform
rec_count_20_hr_ku(time_20_hr_ku)	int	count	Record counter - progressive counter incremented by 1 for each data block.
flag_mcd_20_ku(time_20_ku)	int	/	

For the above variables, the _FillValue is missing but it is possible to figure out whether the variables are meaningful or not by checking the status of some flags.

In particular, as to the counters (i.e. `rec_count_20_hr_ku` and `seq_count_20_hr_ku`) there is no way to know whether they are meaningful so the only case when their contents shouldn't be used (as any other variables) is when the whole block containing the counters are flagged as invalid (i.e. the following bitfields are set in `flag_mcd_20_ku: block_degraded blank_block datation_`)

Likewise specific bitfields in the same flag are devoted to flag the validity or the errors in the waveforms.

For all the remaining variables (with a few exceptions, see later) the default _FillValue for each type is as follows:



_FillValue Specific Settings	
variable type	_FillValue
byte	-128b
int	-2147483648
short	-32768s

The above convention is not used in the following cases:

_FillValue Default Settings			
Variable Name	Variable Type	_FillValue	Notes
flag_cor_error_01(time_cor_01)	int	-1	
flag_cor_status_01(time_cor_01)	int	-1	
flag_instr_conf_rx_flags_20_hr_ku(time_20_hr_ku)	int	-1	
flag_mcd_20_hr_ku(time_20_hr_ku)	int	-1	

Appendix C: Timestamps Data Type

All the timestamps used in the CONFORM products represent the number of seconds since 1/1/2000 in double precision.

In this appendix it is shown that the current choice allows the represent timestamps with a precision of 1 microsecond till January 2034.

As the timestamps are typically added to or subtracted from each other, in order to preserve the precision of these operations down to the microsecond, we need to keep the exact representation of the number till the 10^{-7} , whose binary representation is around 2^{-23} , i.e. 23 bits are needed to represent the decimal part of the timestamps with a precision till 0,1 microseconds

The IEEE 754 standard representation for double precision type reserves 54 bits for the representation of the mantissa (53 bits plus 1 implicitly set), which means that the number of bits left to be used to represent the integer part of the number of seconds is : $53-23 = 30$ bits, which means that we have at disposal $2^{30} - 1 = 1,073,741,823$ sec, i.e. 34 years.

Accordingly, the current representation allows to represent and manage timestamps in the CONFORM without issues in arithmetic operations till January 2034, a date compatible with the mission lifetime.

Appendix D: EE to NetCDF migration

The purpose of this section is to give the CryoSat users some insight into the criteria adopted to implement the migration from EE to CONFORM hoping that this can ease the analysis of the products in the new format.

The logic driving the migration is that this operation has to be implemented in two steps:

1. A version of the IPF1 software has to be released that generates baseline C CONFORM products. This IPF1 version as well as the baseline C CONFORM products are hidden versions, i.e. the software is not installed in the operational platform and the products are not distributed but to a selected groups of users to receive their feedback and suggestions for improvements.
2. The first official version of the IPF1 CONFORM software has to be the baseline D that has to generate CONFORM products containing some evolution from baseline C.

Accordingly the contents of this section are applicable to the step one only, i.e. they explain how the baseline C CONFORM products have been designed.

As of baseline D, the format will evolve without any relation to the EE format.

The Earth Explorer CryoSat Product consists of two files (figure 6-1):

- The XML Header File
- The Product File.

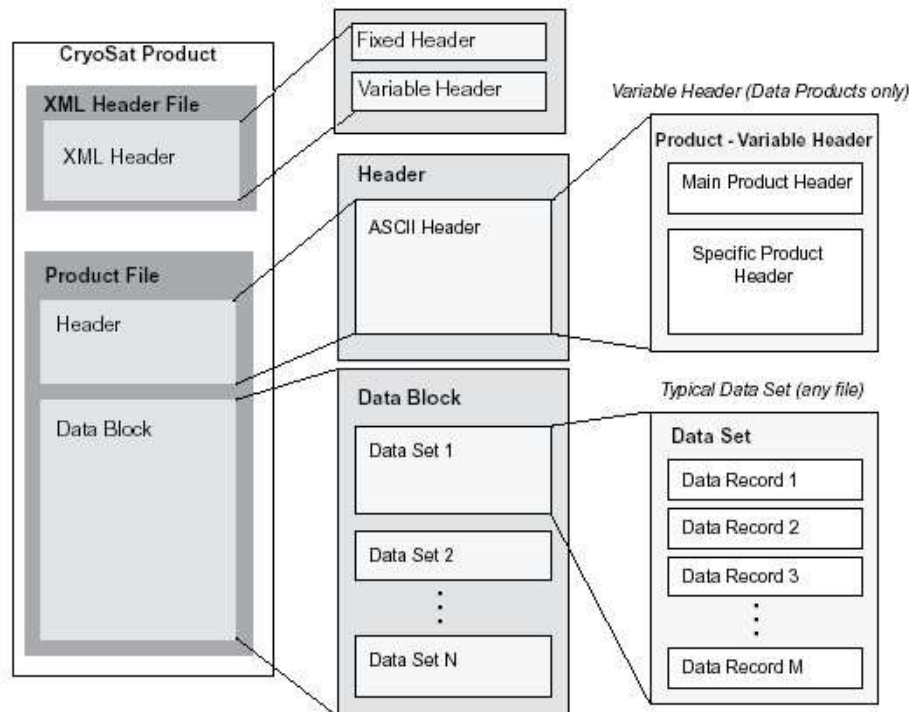


Figure 6-1: EE Product Structure

The CONFORM products consists of one file that contains the same information as the EE Product File whilst the XML Header File doesn't exist anymore in CONFORM and will no longer referred to in this section.

Main relevant content of XML Header File is reported in the Global Attribute section of the netcdf product, in any case the XML Header File Product will be generated for Legacy.

The EE Product File is defined taking the ENVISAT level-0 products as template and consists of:

- Main Product Header (MPH)
- Specific Product Header (SPH)
- Data Sets

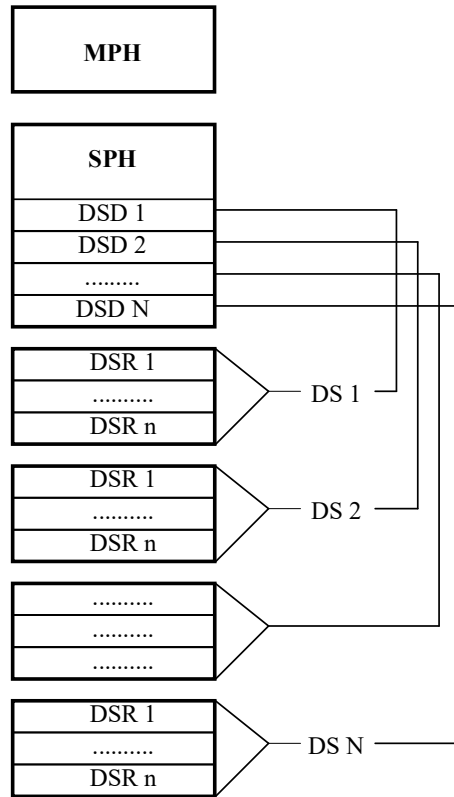


Figure 6-2: EE Product File Structure

The MPH and SPH blocks are ASCII whereas the Data Sets are completely binary and each of them contains one or more Data Set Records.

All the EE CryoSat Products that have migrated to the NetCDF format contain one DS.

		<p style="text-align: right;"><i>CryoSat-2 Ocean Processor</i> <i>CryoSat Ocean NetCDF PFS (L1b&L2)</i></p> <p>Doc. No.: <i>C2-RS-ACS-ESL-5266</i> Issue: <i>3.2</i> Date: <i>31/07/2018</i> Page: <i>184</i></p>
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The general rules driving the migration are:

- The contents of the MPH and SPH have to be converted into NetCDF global attributes
- each DS fields has been converted into a NetCDF variable
- Grouping within the product is only logical (i.e. the group feature of the NetCDF 4.0 is not used but the rationale is kept in the variable naming)
- Three time dimensions are used:
 - One time stamp for each 1Hz measurement.
 - One time stamp for each 20Hz measurement.
 - One time stamp to tag the time when the correction is applied.
- 20 Hz measurements are linked to the corresponding 1 Hz measurement by means of one index.
- `_FillValue` attribute is always filled with limited exceptions.
- Coding of binary flags:
 - For flags coded in a single bit the same convention as S6 GPP is used
 - For flags coded on more than one bit, a variable is created

END OF DOCUMENT