SALP

SALP Products Specification – Volume 10 : Jason-2 User Products

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SUMMARY

Confidentiality :	no Type :
Key words :	Jason-2 User Products
Summary :	This document is aimed at defining the Jason-2 User Products

DOCUMENT CHANGE RECORD

Issue	Update	Date	Modifications	Visa
1	**0**	**28-06-07**	**Creation**	
1	**1**	**18-09-07**	• Accounting for SMM-DM-BA3-GO-22928-CM (Evolution of global attrinutes - adding of MDT model (“mdt_model ») - and evolution of GDR data set - adding of an MDT interpolation flag (“interp_flag_mdt”)) • Corrections (Modification of “number_of_iterations _Ku” and “number_of_iterations_C”)	
1	**2**	**09-11-07**	• Comments relative to brightness temperatures • Accounting for a new DAD and for four new SAD for AMR data processing • Adding of state flags (altimeter acquisition mode and radiometer operating)	

2	**0**	**31-03-08**	• Modification of the "altimeter acquisition mode" flag (20-Hz instead of 1-Hz) • Update of global attributes: – Removal of some attributes – Adding of references to AD 3 • Update of variables definition: – Adding of comments (mainly issued from Jason-1 Handbook), adding reference to the name of variables – Adding of variables attributes: "quality_flag", "time_calendar", "source", "institution", "tai_utc_difference", "leap_second" – Adding of standard names – Reformulation of some names of variables (consistency between the various names) and use of lowercase only in the names of variables – Update of some long-names – Adding of references to AD 3	

2	**1**	**13-05-08**	• Global attributes: – Adding of first_meas_time and last_meas_time – Renaming of the attributes corresponding to the referencement of dynamic input files (xref_...) – Removal of the attributes corresponding to the referencement of static input files – Adding of two attibutes to reference the ellipsoïd (semi-major axis and flattening coefficient) • Data sets: – Removal of quality_flag attibutes for SSHA parameters – Modification of comment attributes for SSHA alt_quality_flag, rad_quality_flag and ecmwf_meteo_map_avail – Update of standard names (range, dry and tropo. corrections, iono. correction, sea state bias, significant waveheight, backscatter coefficient, inverted barometer, HF fluctuations of the SSH, geocentric ocean tide, equilibrium ocean tide, non equilibrium ocean tide, solid earth tide, pole tide, altitude) – Removal of standard names (bathymetry, ssha, mss, mean_topography, load_tide) – Update of long names (mss, mean_topography) • Minor corrections (typo)	
2	**2**	**19-Jun-08**	• Minor corrections provided by EUMETSAT and NOAA, only on header part. (**SALP-DM- M-522-CN)**	**N. Picot**
2	**3**	**27-Nov-08**	• Evolutions to account for project, PIs and Eumetsat feedbacks. **(SALP-DM- M-549-CN)**	**N. Picot**

3	**0**	**9-Sep-11**	• Information about the orbit quality in OGDR products (SALP-DM-7206) • Correction of the volume number in the title of the document. • Evolution to account for new variables in expert products (SGDR) (SALP-FT-7233) • Evolution to include new AMR parameters improving the coastal data quality (O/I/GDR) (SALP-FT-7233) • Evolution to remove the off nadir angle from the platform (not significant) (O/I/GDR) (SALP-FT-7233) • Evolution to include the ice_flag in the SSHA data set products (SALP-FT-7233) • Evolution to include MLE3 retracking parameters (sigma0 is used to derive the altimeter rain flag (O/I/GDR) – all parameters are included in SGDR) (SALP-FT-7233) • Update of global attributes • Minor corrections • Update of the definition of orb_state_flag_diode parameter • Adding of global attributes (Name of the GPSR sensor, name of the GIM files used to create the pass file, name of the MOG2D files used to create the pass file) • Adding of the altimeter surface type in the SSHA data set • Typo corrections • Evolution to account for the inclusion of MLE3 variables in GDR_C products (SALP-FT-8141)	**E. Bronner** **N. Picot** **JP. Dumont**
3	**1**	**13-02-2011**	• Modification of the format of the atmospheric attenuation parameter ("short integer" instead of "byte" for parameter : atmos_corr_sig0_ku and atmos_corr_sig0_c) (SALP-FT-8346) • Quality flag = “orb_state_flag_rest” replaced by Quality flag = “orb_state_flag_rest or orb_state_flag_diode” + comments (SALP-FT-8346) • Microseconds (".mmmmmm") removed from the global attribute « history » (SALP-FT-8346) • Modification of the “tracker_diode_20hz:long_name” (‘counter’ removed from the field) (SALP-FT-8346) • Typos corrections	**E. BRONNER**
3	**2**	**15-03-2012**	• Modification of calibration bias values in the comment of the parameters ‘wind_speed_alt’ and ‘wind_speed_alt_mle3’	**E. BRONNER**

3	**3**	**09/12/2013**	• Modification of the ecmwf_meteo_map_avail flag meaning and comment (SALP-FT-8904).	**E. BRONNER**
3	**4**	**05/07/2016**	• Modification of the comments of parameters 'ssha' and 'ssha_mle3' (SALP-FT-10453rev2).	**E. BRONNER**
3	**5**	**13/01/2017**	Modification of GDR latency after OSTST 2016 recommendation. Latency extended from 60 to 90 days in order to allow cold sky calibration processing and use in radiometer calibrations.	**T. GUINLE**

ABBREVIATIONS

Sigle	Definition
AD	Applicable Documents
AGC	Automatic Gain Control
AMR	Advanced Microwave Radiometer
CAL	Calibration
CDL	Common Data Language
CF-1.0	Climate and Forecast convention
CLS	Collecte Localisation Satellites
CNES	Centre National d'Etudes Spatiales
COG	Center Of Gravity
DAD	Dynamic Auxiliary Data
DORIS	Doppler Orbitography and Radiopositioning Integrated by Satellite
ECMWF	European Centre for Medium-Range Weather Forecasts
FFT	Fast Fourier Transform
GDR	Geophysical Data Record
GPS	Global Positioning System
IGDR	Interim Geophysical Data Record
LPF	Low Pass Filter
LTM	Long Term Monitoring
MDS	Measurement Data Set
N/A	Not Applicable
NRT	Near Real Time
OFL	Off Line
OGDR	Operational Geophysical Data Record
POD	Precise Orbit Determination
POE	Precise Orbit Ephemeris
POSEIDON-3	Jason-2 altimeter
PTR	Point Target Response
RD	Reference Documents
RMS	Root Mean Square
SAD	Static Auxiliary Data
SALP	Service d'Altimétrie et Localisation Précise
SDR	Sensor Data Record
SGDR	Sensor Geophysical Data Record
SNR	Signal to Noise Ratio
SSALTO	Segment Sol ALTimétrie et Orbitographie
SSHA	Sea-Surface Height Anomaly
SWH	Significant WaveHeight
TBC	To Be Confirmed
TBD	To Be Defined
TEC	Total Electron Content
USO	Ultra Stable Oscillator
UTC	Universal Time Coordinate

APPLICABLE AND REFERENCE DOCUMENTS

Reference	Document title
TP3-J0-STB-116-CNES	AD 1 Jason-2 Operational Service Specification
SMM-DD-BA-EA-32179-CLS	AD 2 Bibli_Alti : Jason-2 Interfaces
SMM-ST-BA-EA-32178-CLS	AD 3 Bibli_Alti : Jason-2 Processing Steps
SALP-MU-M-OP-15815-CN	RD 1 OSTM/Jason-2 Products Handbook

TBC AND TBD LIST

TBC/TBD	Paragraph	Brief description

CONTENTS

1. INTRODUCTION

The aim of this document is to define the Jason-2 level2 altimeter products specifications. It is applicable to the development of the processing module (SPA, TM_NRT) and of the other tools developed by 4 partners (BUFR convertor, NRTAVS, …). The document RD 1 (OSTM/Jason-2 Products Handbook) gives the required information to users.

This document has been named according to the Jason-1 mission (SSALTO Products Specifications – Volume 1 : JASON-1 User Products : SALP -ST-M-EA-10879-CN DA162). Other products specification documents are available to describe experts products and orbitography products. Those additional documents are maintain by CNES SALP project and are names :

- SALP-ST-M-EA-10882-CN : SSALTO Products Specifications – Volume 4 : Positioning and orbitography external products
- SALP-ST-M-EA-10883-CN : Spécifications des produits SSALTO – Volume 5 : Altimeter expertise products
- SALP-ST-M-EA-10884-CN : SSALTO Products Specifications – Volume 6 : Mission orbitography and positioning expertise products
- SALP-ST-M-EA-10885-CN : Spécifications des produits SSALTO – Volume 7 : Produits d'expertise – Réseau de balises

According to requirements from AD 1, three different data products shall be produced and distributed to the users:

1. Operational Geophysical Data Record (**OGDR**) produced in near real time
2. Interim Geophysical Data Record (**IGDR**) produced in 1 to 1.5 days
3. Geophysical Data Record (**GDR**) produced in 90 days

The first one is a NRT product. The other two are OFL products.

In addition to the native NetCdf format which are described in this document, a 1Hz BUFR-formatted dataset from the OGDR family (OGDR-BUFR) for distribution via the World Meteorological Organization (WMO) Global Tele-communication System (GTS) and EUMETCast is also generated. The BUFR format is described in RD 1.

Netcdf .OGDR/IGDR/GDR products have the same information and format. The only difference is related to auxiliary data (orbit, meteo files, calibrations, …).

Taken into account Jason-1 heritage, products are splitted into several data sets :

1. One file close to current Jason-1 NRT-**SSHA,** limited to 1Hz sampling.
2. One file close to current Jason-1 I/**GDR**, containing 1Hz and 20Hz values.
3. One file close to current Jason-1 **SGDR**, containing 1Hz, 20hz and waveforms values. This file is not generated in NRT.

The following table shows the data sets available for each kind of product.

		Data set		
		SSHA	GDR	SGDR
Products	OGDR	X	X	
	IGDR	X	X	X
	GDR	X	X	X

Table 1 – Data set availability per product

An overview of the file format used for the data sets is given in section 2. Then the data sets are described from section 3 to section 6.

The four partner Measurement Systems Engineers and Project Scientists conducted an in-depth assessment of which MLE-3 retracker parameters to include in the GDR-C version of the Jason-2 products. The original reason to perform MLE-3 retracking was to provide a valid rain flag as the nominal MLE-4 retracker doesn't provide a useful rain flag - it is always set to zero by the algorithm used on Jason-1 & Jason-2.

Initially, the full suite of MLE-3 retracker variables (range/swh/sigma-0 etc.) were to be added only to the S-GDR and S-IGDR expertise products, but not to the O/I/GDR nor O/I/GDR-SSHA. The 'native' and 'reduced' products would only have included the MLE-3 based rain flag. After extensive discussions, it was decided that the majority of MLE-3 parameters should be included in ALL of the level-2 GDR-C products. The following design principles helped guide this decision:

1) retain consistency, where the O/I/GDR products have the same format, the O/I/GDR-SSHA have the same format, and the S-I/GDR have the same format;
2) retain the relationship between the product families, where the S-I/GDR contain the most complete information (and waveforms), the O/I/GDR contain all the important 1-Hz & 20-Hz variables, and the O/I/GDR-SSHA contain the essential reduced subset of 1-Hz variables;
3) when adding MLE-3 variables, include all variables in the product families which have an MLE-4 counterpart.

The desire was to make the MLE-3 information available to all users of nominal and reduced datasets, as well as those using the expert products, and to facilitate comparison of MLE-3 versus MLE-4 by providing the same set of variables within the GDR-C products.

The addition of MLE-3 variables results in some size increase to the products, but end user software should not be affected because no existing variables have been removed. A size savings was achieved when it was realized that the C-band MLE-4 retracker was to be constrained with attitude=0 in the GDR-C products, and that this is equivalent to MLE-3 retracking for C-band. Hence in the GDR-C products there will be MLE-4 and MLE-3 retracker outputs for Ku-band, while for C-band the MLE-3 retracker outputs (identical to the restrained C-band results) are provided.

The list of new Ku-band MLE-3 parameters in each product family are detailed in the product specification sections below.

Altimeter parameters (e.g. Range, swh, sigma0, etc) and related geophysical parameters (e.g. Ionosphere correction, sea state bias correction, wind speed, etc) named without the "mle3" extension are derived from MLE-4 retracking, while those with the "mle3" extension are derived from MLE-3 retracking.

Most users are advised to use the MLE-4 altimeter parameters for typical scientific applications. The MLE-3 Ku-band parameters are provided for the convenience of specialized studies on the calibration and validation of the mission and impact of altimeter retracking.

2. JASON-2 PRODUCTS OVERVIEW

NETCDF FORMAT AND CF CONVENTION

The netCDF data format has been chosen to store the different data sets (one file per data set). This format is extremely flexible, self describing and has been adopted as a de-facto standard for many operational oceanography systems. What's more, the files will follow the Climate and Forecast NetCDF conventions CF-1.1 because these conventions provide a practical standard for storing.

THE NETCDF DATA MODEL

A netCDF file contains dimensions, variables, and attributes, which all have both a name by which they are identified. These components can be used together to capture the meaning of data and relations among data fields in an array-oriented data set.

2.2.1. DIMENSIONS

A dimension may be used to represent a real physical dimension, for example, time, latitude, longitude, or height. A dimension might also be used to index other quantities (waveforms index for example). The following dimensions are used in the Jason-2 product files:

		Data set		
Dimension name	**Value**	**SSHA**	**GDR**	**SGDR**
time	Number of measurements in the file	Yes	Yes	Yes
meas_ind	**20** (number of elementary measurements)	No	Yes	Yes
wvf_ind	**104** (number of waveform samples)	No	No	Yes

Table 2 - Dimensions used in the Jason-2 data sets

2.2.2. VARIABLES

Variables are used to store the bulk of the data in a netCDF file. 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.

A variable data type is one of a small set of netCDF types. In this document the variable types will be represented as follows:

Variable type	Description
char	characters
byte	8-bit data signed
short	16-bit signed integer
int	32-bit signed integer
float	IEEE single precision floating point (32 bits)
double	IEEE double precision floating point (64 bits)

Table 3 - netCDF variable type

2.2.3. COORDINATE VARIABLES AND AUXILIARY COORDINATE VARIABLES

A variable with the same name as a dimension is called a coordinate variable. It typically defines a physical coordinate corresponding to that dimension. In accordance with the Climate and Forecast conventions, we must declare a coordinate variable for each dimension. What's more, missing values are not allowed in coordinate variables and they must be strictly monotonic.

An **auxiliary coordinate variable** is a netCDF variable that contains coordinates data but is not a coordinate variable as defined above. Unlike coordinate variables, there is no relationship between the name of an auxiliary coordinate variable and the name(s) of its dimension(s).

2.2.4. ATTRIBUTES

NetCDF attributes are used to store data about the data (ancillary data or metadata), similar in many ways to the information stored in data dictionaries and schema in conventional database systems. Most attributes provide information about a specific variable. These are identified by the name of that variable, together with the name of the attribute.

Some attributes provide information about the data set as a whole. They are called **global attributes** (similar to the header of the Jason-1 products).

The following table shows the variable attributes used in the Jason-2 product. There are no mandatory attributes.

Attribute	Description
_FillValue	A value used to represent missing or undefined data
add_offset	If present, this number is to be added to the date after it is read by an application. If both *scale_factor* and *add_offset* 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.
flag_meanings	Use in conjunction with *flag_values* to provide descriptive words or phrase for each flag value.
flag_values	Provide a list of the flag values. Use in conjunction with *flag_meanings*.
institution	Institution which provides the data
leap_second	UTC time at which a leap second occurs

Attribute	Description
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 are to be multiplied by this factor after the data are read by an application. See also *add_offset* 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.
valid_max	Largest theoretical valid value of a variable (this is not the maximum of actual data).
valid_min	Smallest theoretical valid value of a variable (this is not the minimum of actual data).

Table 4 - Variable's attributes

THE COMMON DATA LANGUAGE

The Common Data Language (CDL) will be used to describe the content of a data set.

The CDL is textual notation that described the netCDF object and it is human readable. The netCDF utility **ncdump** converts netCDF objects binary to CDL text. The netCDF utility **ncgen** creates netCDF binary file from CDL text file.

A CDL description of a netCDF data set takes the form:

```
netCDF name {
      dimension: …
      variables: …
      data: …
}
```

where the name is used only as a default in constructing file names by the ncgen utility. The CDL description consists of three optional parts, introduced by the keywords dimensions variables and data. NetCDF dimension declarations appear after the dimensions keyword, netCDF variables and attributes are defined after the variables keyword and variable data assignments appears after the data keyword. CDL statement are terminated by a semicolon. Spaces, tabs and newlines can be used freely for readability. Comments in CDL follow the characters '//' on any line.

Example :

```
netcdf example {
  dimensions:                                              //  dimensions name are declared first
    time = 2680;

  variables:
    double time(time);                                     // variable <type> <name>(<dimension>)
        time:long_name = "time";                           // variable attributes
        time:units = "seconds since 2000-01-01 00:00:00.0";

    int lon(time);
        lon:long_name = "longitude";
        lon:standard_name = "longitude";
        lon:units = "degrees_east";
        lon:scale_factor = 1.0e-06;

    byte alt_echo_type(time);
        alt_echo_type:long_name = "altimeter echo type";
        alt_echo_type:_FillValue = 127b;
        alt_echo_type:flag_values = 0b, 1b ;
        alt_echo_type:flag_meanings = "ocean_like non_ocean_like";
        alt_echo_type:coordinates = "lon lat";

     int alt(time);
        alt:long_name = "1 Hz altitude of satellite";
        alt:_FillValue = 2147483647;
        alt:units = "m";
        alt:add_offset = 1.30e+06;
        alt:scale_factor = 1.00e-04;
        alt:coordinates = "lon lat";
```

- time is a coordinate variable.
- alt_echo_type is a flag fully described by the flag_meanings and flag_values attributes:

  alt_echo_type = 0 -> ocean like echo
  alt_echo_type = 1 -> non ocean like echo

  If alt_echo_type is not computed, it will take the value 127 (_FillValue attribute).

- alt is *packed*. The data are stored in 32-bit integers (long). The value of the altitude of the satellite can be recovered using:

  $alt = (alt_{long} * scale\_factor) + add\_offset$

3. GLOBAL ATTRIBUTES

Global attributes are defined in the table below.

[xxx] refers to the name of the parameter defined in AD 3 (in "Step G1 command file" or "Global attributes of production user products" sections) and AD 3 ("Global attributes to be computed" section in processing step G1).

			Data set		
Attribute name	**Format**	**Description**	**SSHA**	**GDR**	**SGDR**
Conventions	String	netCDF convention followed. **[conventions]** This attribute should be set to **"CF-1.1"** to indicate that the file is compliant with the Climate and Forecast netCDF convention.	X	X	X
title	String	A descriptive title for the data set, built as follows: **[PO_PROD] – [Title_x]**, leading to OGDR - Reduced dataset OGDR - Standard dataset IGDR - Reduced dataset IGDR - Standard dataset IGDR - Expertise dataset GDR - Reduced dataset GDR - Standard dataset GDR - Expertise dataset	X	X	X
institution	String	The name of the data producer (ex. CNES EUMETSAT or NOAA): **[GA_INSTITUTION]**	X	X	X
source	String	The method of production of original data (model vs observational): **"radar altimeter"**	X	X	X
history	String	Product creation date and time **(**YYYY-MM-DD HH:MM:SS: creation**)**	X	X	X
contact	String	A text giving the primary contact for information about the data set (ex. CNES aviso@oceanobs.com, EUMETSAT ops@eumetsat.int, NOAA ESPCOperations@noaa.gov): **[contact]**	X	X	X
references	String	The version of the altimetric library used to produce the data set (ex: L1 library=V3.1p1, L2 library=V3.0p1, Processing Pilot=V3-0p1p2p3): **[GA_REF]**	X	X	X

			Data set		
Attribute name	**Format**	**Description**	**SSHA**	**GDR**	**SGDR**
processing_center	String	Name of the processing center (SALP, EUMPC or ESPC): **[GA_PROC_CENTRE]**	X	X	X
reference_document	String	Name of the reference document describing the products (ex. OSTM/Jason-2 Products Handbook, SALP-MU-M-OP-15815-CN) **[reference_document]**	X	X	X
mission_name	String	Name of the mission (ex. “OSTM/Jason-2”): **[mission_name]**	X	X	X
altimeter_sensor_name	String	Name of the altimeter sensor (ex. “Poseidon-3”): **[altimeter_sensor_name]**	X	X	X
radiometer_sensor_name	String	Name of the radiometer sensor (ex. “AMR”): **[radiometer_sensor_name]**	X	X	X
doris_sensor_name	String	Name of the DORIS sensor (ex. “DGXX”): **[doris_sensor_name]**	X	X	X
gpsr_sensor_name	String	Name of the GPSR sensor (ex. “GPSP”): **[gpsr_sensor_name]**	X	X	X
acq_station_name	String	Identification of the acquisition station (CNES for CNES, EUMET-USG for EUMETSAT, NOAACDAS for NOAA): **[GA_ACQ_STATION]**	X	X	X
cycle_number	long	Cycle number: **[GA_CYCLE_NB]**	X	X	X
absolute_rev_number	long	Absolute number of revolution: **[GA_ABS_REV_NB]**	X	X	X
pass_number	long	Pass number in the cycle (relative pass number): **[GA_PASS_NB]**	X	X	X
absolute_pass_number	long	Absolute pass number (since the beginning of the mission): **[GA_ABS_PASS_NB]**	X	X	X
equator_time	String	UTC time of equator crossing (YYYY-MM-DD HH:MM:SS.mmmmmm): **[GA_EQ_TIME]**	X	X	X
equator_longitude	double	Longitude of equator crossing: **[GA_EQ_LON]**	X	X	X
first_meas_time	String	UTC Date of the first measurement of the data set (YYYY-MM-DD HH:MM:SS.mmmmmm)	X	X	X
last_meas_time	String	UTC Date of the last measurement of the data set (YYYY-MM-DD HH:MM:SS.mmmmmm)	X	X	X

			Data set		
Attribute name	**Format**	**Description**	**SSHA**	**GDR**	**SGDR**
xref_input_frame	String	Name of the input frame (only for OGDRs products): **[GA_FRAME]**	X	X	
xref_altimeter_characterisation	String	Name of the altimeter characterisation data file: **[IF_CHAR_ALT]**	X	X	X
xref_altimeter_ltm	String	Name of the altimeter Long Term Monitoring data file: **[GA_LTM]**	X	X	X
xref_radiometer_temp	String	Name of the file containing the antenna temperature coefficients: **[GA_TEMP]**	X	X	X
xref_doris_uso	String	Name of the file containing the DORIS-derived USO frequency: **[GA_USO]**	X	X	X
xref_orbit_data	String	Name of the file containing the orbit ephemeris (not applicable to OGDRs products): **[GA_ORB]**	X	X	X
xref_pf_data	String	Name of the file containing the platform data (mispointing, distance antenna-COG): **[GA_PLA]**	X	X	X
xref_pole_location	String	Name of the file containing the pole location data: **[GA_POL]**	X	X	X
xref_orf_data	String	Name of the Orbit Revolution File used to create the pass file: **[GA_ORF]**	X	X	X
xref_meteorological_files	String	Name of the meteorological files used to create the pass file: **[GA_METEO]**	X	X	X
xref_utc_tai_data	String	Name of the TAI/UTC leap second offset file used to manage the leap second: **[GA_UTC_TAI]**	X	X	X
xref_radiometer_calibration	String	Name of the file containing the radiometer level-1 calibration: **[GA_RAD_L1B]**	X	X	X
xref_gim_data	String	Name of the GIM files used to create the pass file: **[GA_GIM]**	X	X	X
xref_mog2d_data	String	Name of the MOG2D files used to create the pass file: **[GA_MOG2D]**	X	X	X

			Data set		
Attribute name	**Format**	**Description**	**SSHA**	**GDR**	**SGDR**
ellipsoid_axis	String	Semi-major axis of the reference ellipsoid **[ellipsoid_sm_axis]**	X	X	X
ellipsoid_flattening	String	Flattening coeffcient of the reference ellipsoid **[ellipsoid _flattening]**	X	X	X

4. SSHA DATA SET

```
netcdf ssha {
  dimensions:
    time = < number of measurements >;

  variables:
```

// Time Tag

```
double time(time);
       time:long_name = "time (sec. since 2000-01-01)";
       time:standard_name = "time";
       time:units = "seconds since 2000-01-01 00:00:00.0";
       time:calendar = "gregorian";
       time:tai_utc_difference = [GA_TAI_UTC_DIF];
       time:leap_second = [GA_LEAP_TIME];
       time:comment = "[tai_utc_difference] is the difference between TAI and UTC
reference time (seconds) for the first measurement of the data set. [leap_second] is the
UTC time at which a leap second occurs in the data set, if any. After this UTC time, the
[tai_utc_difference] is increased by 1 second";
```

// Location and surface type

```
int lat(time);
       lat:long_name = "latitude";
       lat:standard_name = "latitude";
       lat:units = "degrees_north";
       lat:scale_factor = 1.00e-06;
       lat:comment = "Positive latitude is North latitude, negative latitude is South
latitude. See Jason-2 User Handbook. Associated quality flag is orb_state_flag_diode for
the OGDR products, orb_state_flag_rest for the IGDR and GDR products";

int lon(time);
       lon:long_name = "longitude";
       lon:standard_name = "longitude";
       lon:units = "degrees_east";
       lon:scale_factor = 1.00e-06;
       lon:comment = "East longitude relative to Greenwich meridian. See Jason-2 User
Handbook. Associated quality flag is orb_state_flag_diode for the OGDR products,
orb_state_flag_rest for the IGDR and GDR products";

byte surface_type(time);
       surface_type:long_name = "surface type";
       surface_type:_FillValue = 127b;
       surface_type:flag_values = 0b, 1b, 2b, 3b ;
       surface_type:flag_meanings = "ocean lake_enclosed_sea ice land";
       surface_type:coordinates = "lon lat";
       surface_type:comment = "Computed using a DTM2000 file: 0 = open oceans or semi-
enclosed seas; 1 = enclosed seas or lakes; 2 = continental ice; 3 = land. See Jason-2
User Handbook";

byte alt_echo_type(time);
       alt_echo_type:long_name = "altimeter echo type";
       alt_echo_type:_FillValue = 127b;
       alt_echo_type:flag_values = 0b, 1b;
       alt_echo_type:flag_meanings = "ocean_like non_ocean_like";
```

```
      alt_echo_type:coordinates = "lon lat";
      alt_echo_type:comment = "The altimeter echo type is determined by testing the rms
of the high rate range measurements against a threshold as well as the number of valid
high rate range measurements against a minimum value";

byte rad_surf_type(time);
      rad_surf_type:long_name = "radiometer surface type";
      rad_surf_type:_FillValue = 127b;
      rad_surf_type:flag_values = 0b, 1b, 2b;
      rad_surf_type:flag_meanings = "open_ocean near_coast land";
      rad_surf_type:coordinates = "lon lat";
      rad_surf_type:comment = "The radiometer surface type flag is applicable to the
radiometer wet troposphere path delays provided by rad_wet_tropo_corr. A value of 0
indicates that open ocean processing is used to compute the path delay, 1 indicates
coastal processing is used, and 2 indicates the path delay is invalid due to land";
```

// Quality information

```
byte alt_quality_flag(time);
      alt_quality_flag:long_name = "altimeter quality flag";
      alt_quality_flag:_FillValue = 127b;
      alt_quality_flag:flag_values = 0b, 1b;
      alt_quality_flag:flag_meanings = "good bad";
      alt_quality_flag:coordinates = "lon lat";
      alt_quality_flag:comment = "Compilation of all altimeter flags except altimeter
echo type : Set to default in the current issue";

byte rad_quality_flag(time);
      rad_quality_flag:long_name = "radiometer quality flag";
      rad_quality_flag:_FillValue = 127b;
      rad_quality_flag:flag_values = 0b, 1b;
      rad_quality_flag:flag_meanings = "good bad";
      rad_quality_flag:coordinates = "lon lat";
      rad_quality_flag:comment = "Compilation of all radiometer flags except radiometer
surface type : Set to default in the current issue";

byte geophysical_quality_flag(time);
      geophysical_quality_flag:long_name = "geophysical quality flag";
      geophysical_quality_flag:_FillValue = 127b;
      geophysical_quality_flag:flag_values = 0b, 1b;
      geophysical_quality_flag:flag_meanings = "good bad";
      geophysical_quality_flag:coordinates = "lon lat";
      geophysical_quality_flag:comment = "Check on validity of all geophysical fields :
Set to default in the current issue";

byte ecmwf_meteo_map_avail(time);
      ecmwf_meteo_map_avail:long_name = "ECMWF meteorological map availability";
      ecmwf_meteo_map_avail:_FillValue = 127b;
      ecmwf_meteo_map_avail:flag_values = 0b, 1b, 2b, 3b ;
      ecmwf_meteo_map_avail:flag_meanings = "2_maps_nominal 2_maps_degraded
1_map_closest_used no_valid_map";
      ecmwf_meteo_map_avail:coordinates = "lon lat";
      ecmwf_meteo_map_avail:comment = "Possible values are: 0 meaning '2 maps, nominal'
(six hours apart), 1 meaning '2 maps, degraded' (more than six hours apart), 2 meaning '1
map, closest map used', 3 meaning 'no valid map';

byte rain_flag(time);
      rain_flag:long_name = "rain flag";
      rain_flag:_FillValue = 127b;
```

```
       rain_flag:flag_values = 0b, 1b;
       rain_flag:flag_meanings = "no_rain rain";
       rain_flag:coordinates = "lon lat";
       rain_flag:comment = "See Jason-2 User Handbook";

byte rad_rain_flag(time);
       rad_rain_flag:long_name = "radiometer rain flag";
       rad_rain_flag:_FillValue = 127b;
       rad_rain_flag:flag_values = 0b, 1b;
       rad_rain_flag:flag_meanings = "no_rain rain";
       rad_rain_flag:coordinates = "lon lat";
       rad_rain_flag:comment = "See Jason-2 User Handbook. The radiometer rain flag
indicates where the radiometer wet troposphere path delay (rad_wet_tropo_corr) is invalid
due to rain contamination";


byte ice_flag(time);
       ice_flag:long_name = "ice flag";
       ice_flag:_FillValue = 127b;
       ice_flag:flag_values = 0b, 1b;
       ice_flag:flag_meanings = "no_ice ice";
       ice_flag:coordinates = "lon lat";
       ice_flag:comment = "See Jason-2 User Handbook";


byte rad_sea_ice_flag(time);
       rad_sea_ice_flag:long_name = "radiometer sea-ice flag";
       rad_sea_ice_flag:_FillValue = 127b;
       rad_sea_ice_flag:flag_values = 0b, 1b;
       rad_sea_ice_flag:flag_meanings = "no_sea_ice sea_ice";
       rad_sea_ice_flag:coordinates = "lon lat";
       rad_sea_ice_flag:comment = "See Jason-2 User Handbook. The radiometer sea ice flag
indicates where the radiometer wet troposphere path delay (rad_wet_tropo_corr) is invalid
due to sea ice contamination";
```

// Orbit

```
int alt(time);
       alt:long_name = "1 Hz altitude of satellite";
       alt: standard _name = "height_above_reference_ellipsoid";
       alt:_FillValue = 2147483647;
       alt:units = "m";
       alt:add_offset = 1.300000e+06;
       alt:scale_factor = 1.00e-04;
       alt:coordinates = "lon lat";
       alt:comment = "Altitude of satellite above the reference ellipsoid. Associated
quality flag is orb_state_flag_diode for the OGDR products, orb_state_flag_rest for the
IGDR and GDR products";
```

// Altimeter range

```
int range_ku(time);
       range_ku:long_name = "1 Hz Ku band corrected altimeter range";
       range_ku:standard_name = "altimeter_range”;
       range_ku:_FillValue = 2147483647;
       range_ku:units = "m";
       range_ku:add_offset = 1.300000e+06;
       range_ku:scale_factor = 1.00e-04;
       range_ku:coordinates = "lon lat";
```

range_ku:comment = "All instrumental corrections included, i.e. distance antenna-COG (cog_corr), USO drift correction (uso_corr), internal path correction (internal_path_delay_corr_ku), Doppler correction (doppler_corr_ku), modeled instrumental errors correction (modeled_instr_corr_range_ku) and system bias";

int range_ku_mle3(time);
range_ku_mle3:long_name = "1 Hz Ku band corrected altimeter range (MLE3 retracking)";
range_ku_mle3:standard_name = "altimeter_range”;
range_ku_mle3:_FillValue = 2147483647;
range_ku_mle3:units = "m";
range_ku_mle3:add_offset = 1.300000e+06;
range_ku_mle3:scale_factor = 1.00e-04;
range_ku_mle3:coordinates = "lon lat";
range_ku_mle3:comment = "All instrumental corrections included, i.e. distance antenna-COG (cog_corr), USO drift correction (uso_corr), internal path correction (internal_path_delay_corr_ku), Doppler correction (doppler_corr_ku), modeled instrumental errors correction (modeled_instr_corr_range_ku_mle3) and system bias";

// Altimeter range corrections

short model_dry_tropo_corr(time);
model_dry_tropo_corr:long_name = "model dry tropospheric correction";
model_dry_tropo_corr:standard_name = "altimeter_range_correction_due_to_dry_troposphere";
model_dry_tropo_corr:source = [mto_fields_source];
model_dry_tropo_corr:institution = [mto_fields_institution];
model_dry_tropo_corr:_FillValue = 32767s;
model_dry_tropo_corr:units = "m";
model_dry_tropo_corr:scale_factor = 1.00e-04;
model_dry_tropo_corr:coordinates = "lon lat";
model_dry_tropo_corr:comment = "Computed at the altimeter time-tag from the interpolation of 2 meteorological fields that surround the altimeter time-tag. A dry tropospheric correction must be added (negative value) to the instrument range to correct this range measurement for dry tropospheric range delays of the radar pulse. See Jason-2 User Handbook”;

short rad_wet_tropo_corr(time);
rad_wet_tropo_corr:long_name = "radiometer wet tropospheric correction";
rad_wet_tropo_corr:standard_name = "altimeter_range_correction_due_to_wet_troposphere";
rad_wet_tropo_corr:source = [radiometer_sensor_name];
rad_wet_tropo_corr:institution = [radiometer_sensor_institution];
rad_wet_tropo_corr:_FillValue = 32767s;
rad_wet_tropo_corr:units = "m";
rad_wet_tropo_corr:scale_factor = 1.00e-04;
rad_wet_tropo_corr:coordinates = "lon lat";
rad_wet_tropo_corr:comment = "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”;

short iono_corr_alt_ku(time);
iono_corr_alt_ku:long_name = "altimeter ionospheric correction on Ku band";
iono_corr_alt_ku:standard_name = "altimeter_range_correction_due_to_ionosphere";
iono_corr_alt_ku:source = [altimeter_sensor_name];
iono_corr_alt_ku:institution = [altimeter_sensor_institution];
iono_corr_alt_ku:_FillValue = 32767s;
iono_corr_alt_ku:units = "m";
iono_corr_alt_ku:scale_factor = 1.00e-04;
iono_corr_alt_ku:coordinates = "lon lat";

iono_corr_alt_ku:comment = "An ionospheric correction must be added (negative value) to the instrument range to correct this range measurement for ionospheric range delays of the radar pulse. See Jason-2 User Handbook";

short iono_corr_alt_ku_mle3(time);
iono_corr_alt_ku_mle3:long_name = "altimeter ionospheric correction on Ku band (MLE3 retracking)";
iono_corr_alt_ku_mle3:standard_name = "altimeter_range_correction_due_to_ionosphere";
iono_corr_alt_ku_mle3:source = [altimeter_sensor_name];
iono_corr_alt_ku_mle3:institution = [altimeter_sensor_institution];
iono_corr_alt_ku_mle3:_FillValue = 32767s;
iono_corr_alt_ku_mle3:units = "m";
iono_corr_alt_ku_mle3:scale_factor = 1.00e-04;
iono_corr_alt_ku_mle3:coordinates = "lon lat";
iono_corr_alt_ku_mle3:comment = "An ionospheric correction must be added (negative value) to the instrument range to correct this range measurement for ionospheric range delays of the radar pulse. See Jason-2 User Handbook";

short sea_state_bias_ku(time);
sea_state_bias_ku:long_name = "sea state bias correction in Ku band";
sea_state_bias_ku:standard_name = "sea_surface_height_bias_due_to_sea_surface_roughness";
sea_state_bias_ku:source = [altimeter_ssb_source];
sea_state_bias_ku:institution = [altimeter_ssb_institution];
sea_state_bias_ku:_FillValue = 32767s;
sea_state_bias_ku:units = "m";
sea_state_bias_ku:scale_factor = 1.00e-04;
sea_state_bias_ku:coordinates = "lon lat";
sea_state_bias_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. This element should not be used over land. See Jason-2 User Handbook";

short sea_state_bias_ku_mle3(time);
sea_state_bias_ku_mle3:long_name = "sea state bias correction in Ku band (MLE3 retracking)";
sea_state_bias_ku_mle3:standard_name = "sea_surface_height_bias_due_to_sea_surface_roughness";
sea_state_bias_ku_mle3:source = [altimeter_ssb_source];
sea_state_bias_ku_mle3:institution = [altimeter_ssb_institution];
sea_state_bias_ku_mle3:_FillValue = 32767s;
sea_state_bias_ku_mle3:units = "m";
sea_state_bias_ku_mle3:scale_factor = 1.00e-04;
sea_state_bias_ku_mle3:coordinates = "lon lat";
sea_state_bias_ku_mle3: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. This element should not be used over land. See Jason-2 User Handbook";

// Significant waveheight

short swh_ku(time);
swh_ku:long_name = "Ku band corrected significant waveheight";
swh_ku:standard_name = "sea_surface_wave_significant_height";
swh_ku:_FillValue = 32767s;
swh_ku:units = "m";
swh_ku:scale_factor = 1.00e-03;
swh_ku:coordinates = "lon lat";
swh_ku:comment = "All instrumental corrections included, i.e. modeled instrumental errors correction (modeled_instr_corr_swh_ku) and system bias";

```
short swh_ku_mle3(time);
       swh_ku_mle3:long_name = "Ku band corrected significant waveheight (MLE3
retracking)";
       swh_ku_mle3:standard_name = "sea_surface_wave_significant_height";
       swh_ku_mle3:_FillValue = 32767s;
       swh_ku_mle3:units = "m";
       swh_ku_mle3:scale_factor = 1.00e-03;
       swh_ku_mle3:coordinates = "lon lat";
       swh_ku_mle3:comment = "All instrumental corrections included, i.e. modeled
instrumental errors correction (modeled_instr_corr_swh_ku_mle3) and system bias";
```

// Backscatter coefficient

```
short sig0_ku(time);
       sig0_ku:long_name = "Ku band corrected backscatter coefficient";
       sig0_ku:standard_name = "surface_backwards_scattering_coefficient_of_radar_wave";
       sig0_ku:_FillValue = 32767s;
       sig0_ku:units = "dB";
       sig0_ku:scale_factor = 1.00e-02;
       sig0_ku:coordinates = "lon lat";
       sig0_ku:comment = "All instrumental corrections included, excepted the system
bias, i.e. AGC instrumental errors correction, internal calibration correction
(internal_corr_sig0_ku), modeled instrumental errors correction
(modeled_instr_corr_sig0_ku) and atmospheric attenuation (atmos_corr_sig0_ku)”

short sig0_ku_mle3(time);
       sig0_ku_mle3:long_name = "Ku band corrected backscatter coefficient (MLE3
retracking)";
       sig0_ku_mle3:standard_name =
"surface_backwards_scattering_coefficient_of_radar_wave";
       sig0_ku_mle3:_FillValue = 32767s;
       sig0_ku_mle3:units = "dB";
       sig0_ku_mle3:scale_factor = 1.00e-02;
       sig0_ku_mle3:coordinates = "lon lat";
       sig0_ku_mle3:comment = "All instrumental corrections included, excepted the system
bias, i.e. AGC instrumental errors correction, internal calibration correction
(internal_corr_sig0_ku), modeled instrumental errors correction
(modeled_instr_corr_sig0_ku_mle3) and atmospheric attenuation (atmos_corr_sig0_ku)";
```

// Geophysical parameters

```
int mean_sea_surface(time);
       mean_sea_surface:long_name = "mean sea surface height above reference ellipsoid";
       mean_sea_surface:source = [mean_sea_surface_source];
       mean_sea_surface:institution = [mean_sea_surface_institution];
       mean_sea_surface:_FillValue = 2147483647;
       mean_sea_surface:units = "m";
       mean_sea_surface:scale_factor = 1.00e-04;
       mean_sea_surface:coordinates = "lon lat";
       mean_sea_surface:comment = "See Jason-2 User Handbook";

int mean_topography(time);
       mean_topography:long_name = "mean dynamic topography above geoid";
       mean_topography:source = [mdt_source];
       mean_topography:institution = [mdt_institution];
       mean_topography:_FillValue = 2147483647;
       mean_topography:units = "m";
       mean_topography:scale_factor = 1.00e-04;
       mean_topography:coordinates = "lon lat";
       mean_topography:comment = "See Jason-2 User Handbook";
```

```
int bathymetry(time);
       bathymetry:long_name = "ocean depth/land elevation";
       bathymetry:source = [bathy_topo_source];
       bathymetry:institution = [bathy_topo_institution];
       bathymetry:_FillValue = 2147483647;
       bathymetry:units = "m";
       bathymetry:coordinates = "lon lat";

short inv_bar_corr(time);
       inv_bar_corr:long_name = "inverted barometer height correction";
       inv_bar_corr:standard_name =
"sea_surface_height_correction_due_to_air_pressure_at_low_frequency";
       inv_bar_corr:source = [mto_fields_source];
       inv_bar_corr:institution = [mto_fields_institution];
       inv_bar_corr:_FillValue = 32767s;
       inv_bar_corr:units = "m";
       inv_bar_corr:scale_factor = 1.00e-04;
       inv_bar_corr:coordinates = "lon lat";
       inv_bar_corr:comment = "Computed at the altimeter time-tag from the interpolation
of 2 meteorological fields that surround the altimeter time-tag. See Jason-2 User
Handbook";

short hf_fluctuations_corr(time);
       hf_fluctuations_corr:long_name = "high frequency fluctuations of the sea surface
topography";
       hf_fluctuations_corr:standard_name =
"sea_surface_height_correction_due_to_air_pressure_and_wind_at_high_frequency";
       hf_fluctuations_corr:institution = [mog2d_institution];
       hf_fluctuations_corr:_FillValue = 32767s;
       hf_fluctuations_corr:units = "m";
       hf_fluctuations_corr:scale_factor = 1.00e-04;
       hf_fluctuations_corr:coordinates = "lon lat";
       hf_fluctuations_corr:comment = "Provided as a correction to the inverted barometer
correction (inv_bar_corr)";

int ocean_tide_sol1(time);
       ocean_tide_sol1:long_name = "geocentric ocean tide height (solution 1)";
       ocean_tide_sol1:standard_name =
"sea_surface_height_amplitude_due_to_geocentric_ocean_tide";
       ocean_tide_sol1:source = [ocean_tide_sol1_source];
       ocean_tide_sol1:institution = [ocean_tide_sol1_institution];
       ocean_tide_sol1:_FillValue = 2147483647;
       ocean_tide_sol1:units = "m";
       ocean_tide_sol1:scale_factor = 1.00e-04;
       ocean_tide_sol1:coordinates = "lon lat";
       ocean_tide_sol1:comment = "Solution 1 corresponds to GOT4.8 model. Includes the
corresponding loading tide (load_tide_sol1) and equilibrium long-period ocean tide height
(ocean_tide_equil). The permanent tide (zero frequency) is not included in this parameter
because it is included in the geoid and mean sea surface (geoid, mean_sea_surface). See
Jason-2 User Handbook";

short solid_earth_tide(time);
       solid_earth_tide:long_name = "solid earth tide height";
       solid_earth_tide:standard_name = "sea_surface_height_amplitude_due_to_earth_tide";
       solid_earth_tide:source = [solid_earth_tide_source];
       solid_earth_tide:_FillValue = 32767s;
       solid_earth_tide:units = "m";
       solid_earth_tide:scale_factor = 1.00e-04;
       solid_earth_tide:coordinates = "lon lat";
```

```
      solid_earth_tide:comment = "Calculated using Cartwright and Tayler tables and
consisting of the second and third degree constituents. The permanent tide (zero
frequency) is not included. See Jason-2 User Handbook";

short pole_tide(time);
      pole_tide:long_name = "geocentric pole tide height";
      pole_tide:standard_name = "sea_surface_height_amplitude_due_to_pole_tide";
      pole_tide:source = [pole_tide_source];
      pole_tide:_FillValue = 32767s;
      pole_tide:units = "m";
      pole_tide:scale_factor = 1.00e-04;
      pole_tide:coordinates = "lon lat";
      pole_tide:comment = "See Jason-2 User Handbook”;
```

// Environmental parameters

```
short wind_speed_alt(time);
      wind_speed_alt:long_name = "altimeter wind speed";
      wind_speed_alt:standard_name = "wind_speed";
      wind_speed_alt:_FillValue = 32767s;
      wind_speed_alt:units = "m/s";
      wind_speed_alt:scale_factor = 1.00e-02;
      wind_speed_alt:coordinates = "lon lat";
      wind_speed_alt:comment = "Should not be used over land. See Jason-2 User Handbook.
A calibration bias of 0.32 dB has been added to the Ku-band backscatter coefficient
(sig0_ku) before computing the wind speed";

short wind_speed_alt_mle3(time);
      wind_speed_alt_mle3:long_name = "altimeter wind speed (MLE3 retracking)";
      wind_speed_alt_mle3:standard_name = "wind_speed";
      wind_speed_alt_mle3:_FillValue = 32767s;
      wind_speed_alt_mle3:units = "m/s";
      wind_speed_alt_mle3:scale_factor = 1.00e-02;
      wind_speed_alt_mle3:coordinates = "lon lat";
      wind_speed_alt_mle3:comment = "Should not be used over land. See Jason-2 User
Handbook. A calibration bias of 0.34 dB has been added to the Ku-band backscatter
coefficient (sig0_ku_mle3) before computing the wind speed";

short rad_water_vapor(time);
      rad_water_vapor:long_name = "radiometer water vapor content";
      rad_water_vapor:standard_name = "atmosphere_water_vapor_content";
      rad_water_vapor:source = [radiometer_sensor_name];
      rad_water_vapor:institution = [radiometer_sensor_institution];
      rad_water_vapor:_FillValue = 32767s;
      rad_water_vapor:units = "kg/m^2";
      rad_water_vapor:scale_factor = 1.00e-01;
      rad_water_vapor:coordinates = "lon lat";
      rad_water_vapor:comment = "Should not be used over land";

short rad_liquid_water(time);
      rad_liquid_water:long_name = "radiometer liquid water content";
      rad_liquid_water:standard_name = "atmosphere_cloud_liquid_water_content";
      rad_liquid_water:source = [radiometer_sensor_name];
      rad_liquid_water:institution = [radiometer_sensor_institution];
      rad_liquid_water:_FillValue = 32767s;
      rad_liquid_water:units = "kg/m^2";
      rad_liquid_water:scale_factor = 1.00e-02;
      rad_liquid_water:coordinates = "lon lat";
      rad_liquid_water:comment = "Should not be used over land";
```

// Sea Surface height

```
short ssha(time);
       ssha:long_name = "sea surface height anomaly";
       ssha:standard_name = "sea_surface_height_above_sea_level";
       ssha:source = [altimeter_sensor_name];
       ssha:institution = [altimeter_sensor_institution];
       ssha:_FillValue = 32767s;
       ssha:units = "m";
       ssha:scale_factor = 1.00e-03;
       ssha:coordinates = "lon lat";
       ssha:comment = "= altitude of satellite (alt) - Ku band corrected altimeter range
(range_ku) - altimeter ionospheric correction on Ku band (iono_corr_alt_ku) - model dry
tropospheric correction (model_dry_tropo_corr) - radiometer wet tropospheric correction
(rad_wet_tropo_corr) - sea state bias correction in Ku band (sea_state_bias_ku) - solid
earth tide height (solid_earth_tide) - geocentric ocean tide height solution 1
(ocean_tide_sol1) - geocentric pole tide height (pole_tide) - inverted barometer height
correction (inv_bar_corr) - high frequency fluctuations of the sea surface topography
(hf_fluctuations_corr for I/GDR off line products only) - mean sea surface
(mean_sea_surface). Set to default if the altimeter echo type (alt_echo_type) is set to 1
= non ocean like, the radiometer surface type (rad_surf_type) set to 2 = land ";

short ssha_mle3(time);
       ssha_mle3:long_name = "sea surface height anomaly (MLE3 retracking)";
       ssha_mle3:standard_name = "sea_surface_height_above_sea_level";
       ssha_mle3:source = [altimeter_sensor_name];
       ssha_mle3:institution = [altimeter_sensor_institution];
       ssha_mle3:_FillValue = 32767s;
       ssha_mle3:units = "m";
       ssha_mle3:scale_factor = 1.00e-03;
       ssha_mle3:coordinates = "lon lat";
       ssha_mle3:comment = "= altitude of satellite (alt) - Ku band corrected altimeter
range (range_ku_mle3) - altimeter ionospheric correction on Ku band
(iono_corr_alt_ku_mle3) - model dry tropospheric correction (model_dry_tropo_corr) -
radiometer wet tropospheric correction (rad_wet_tropo_corr) - sea state bias correction
in Ku band (sea_state_bias_ku_mle3) - solid earth tide height (solid_earth_tide) -
geocentric ocean tide height solution 1 (ocean_tide_sol1) - geocentric pole tide height
(pole_tide) - inverted barometer height correction (inv_bar_corr) - high frequency
fluctuations of the sea surface topography (hf_fluctuations_corr for I/GDR off line
products only) - mean sea surface (mean_sea_surface). Set to default if the altimeter
echo type (alt_echo_type) is set to 1 = non ocean like, the radiometer surface type
(rad_surf_type) set to 2 = land”;

}
```

5. GDR DATA SET

```
netcdf gdr {
  dimensions:
    time = < number of measurements >;
    meas_ind = 20;

  variables:
```

// Time Tag

```
double time(time);
       time:long_name = "time (sec. since 2000-01-01)";
       time:standard_name = "time";
       time:units = "seconds since 2000-01-01 00:00:00.0";
       time:calendar = "gregorian";
       time:tai_utc_difference = [GA_TAI_UTC_DIF];
       time:leap_second = [GA_LEAP_TIME];
       time:comment = "[tai_utc_difference] is the difference between TAI and UTC
reference time (seconds) for the first measurement of the data set. [leap_second] is the
UTC time at which a leap second occurs in the data set, if any. After this UTC time, the
[tai_utc_difference] is increased by 1 second";

byte meas_ind(meas_ind);
       meas_ind:long_name = "elementary measurement index";
       meas_ind:units = "count";
      meas_ind:comment = "Set to be compliant with the CF-1.1 convention";

double time_20hz(time,meas_ind);
       time_20hz:long_name = "time 20 Hz (sec. since 2000-01-01)";
       time_20hz:standard_name = "time";
       time_20hz:_FillValue = 18446744073709551616.000000;
       time_20hz:units = "seconds since 2000-01-01 00:00:00.0";
       time_20hz:calendar = "gregorian";
       time_20hz:tai_utc_difference = [GA_TAI_UTC_DIF];
       time_20hz:leap_second = [GA_LEAP_TIME];
       time_20hz:comment = "[tai_utc_difference] is the difference between TAI and UTC
reference time (seconds) for the first measurement of the data set. [leap_second] is the
UTC time at which a leap second occurs in the data set, if any. After this UTC time, the
[tai_utc_difference] is increased by 1 second";
```

// Location and surface type

```
int lat(time);
       lat:long_name = "latitude";
       lat:standard_name = "latitude";
       lat:units = "degrees_north";
       lat:scale_factor = 1.00e-06;
       lat:quality_flag = "orb_state_flag_rest or orb_state_flag_diode";
       lat:comment = "Positive latitude is North latitude, negative latitude is South
latitude. See Jason-2 User Handbook. Associated quality flag is orb_state_flag_diode for
the OGDR products, orb_state_flag_rest for the IGDR and GDR products";

int lon(time);
       lon:long_name = "longitude";
```

lon:standard_name = "longitude";
lon:units = "degrees_east";
lon:scale_factor = 1.00e-06;
lon:quality_flag = "orb_state_flag_rest or orb_state_flag_diode";
lon:comment = "East longitude relative to Greenwich meridian. See Jason-2 User Handbook. Associated quality flag is orb_state_flag_diode for the OGDR products, orb_state_flag_rest for the IGDR and GDR products";

int lon_20hz(time,meas_ind);
lon_20hz:long_name = "20 Hz longitude";
lon_20hz:standard_name = "longitude";
lon_20hz:_FillValue = 2147483647;
lon_20hz:units = "degrees_east";
lon_20hz:scale_factor = 1.00e-06;
lon_20hz:comment = "East longitude relative to Greenwich meridian. See Jason-2 User Handbook";

int lat_20hz(time,meas_ind);
lat_20hz:long_name = "20 Hz latitude";
lat_20hz:standard_name = "latitude";
lat_20hz:_FillValue = 2147483647;
lat_20hz:units = "degrees_north";
lat_20hz:scale_factor = 1.00e-06;
lat_20hz:comment = "Positive latitude is North latitude, negative latitude is South latitude. See Jason-2 User Handbook";

byte surface_type(time);
surface_type:long_name = "surface type";
surface_type:_FillValue = 127b;
surface_type:flag_values = 0b, 1b, 2b, 3b ;
surface_type:flag_meanings = "ocean lake_enclosed_sea ice land";
surface_type:coordinates = "lon lat";
surface_type:comment = "Computed using a DTM2000 file: 0 = open oceans or semi-enclosed seas; 1 = enclosed seas or lakes; 2 = continental ice; 3 = land. See Jason-2 User Handbook";

byte alt_echo_type(time);
alt_echo_type:long_name = "altimeter echo type";
alt_echo_type:_FillValue = 127b;
alt_echo_type:flag_values = 0b, 1b;
alt_echo_type:flag_meanings = "ocean_like non_ocean_like";
alt_echo_type:coordinates = "lon lat";
alt_echo_type:comment = "The altimeter echo type is determined by testing the rms of the high rate range measurements against a threshold as well as the number of valid high rate range measurements against a minimum value”;

byte rad_surf_type(time);
rad_surf_type:long_name = "radiometer surface type";
rad_surf_type:_FillValue = 127b;
rad_surf_type:flag_values = 0b, 1b, 2b;
rad_surf_type:flag_meanings = "open_ocean near_coast land";
rad_surf_type:coordinates = "lon lat";
rad_surf_type:comment = "The radiometer surface type flag is applicable to the radiometer wet troposphere path delays provided by rad_wet_tropo_corr. A value of 0 indicates that open ocean processing is used to compute the path delay, 1 indicates coastal processing is used, and 2 indicates the path delay is invalid due to land";

int rad_distance_to_land(time);
rad_distance_to_land:long_name = "radiometer radial distance to land";
rad_distance_to_land:_FillValue = 2147483647;
rad_distance_to_land:units = "m";

```
      rad_distance_to_land:coordinates = "lon lat";
      rad_distance_to_land: comment = "Shortest distance between nadir sub-satellite
point and land";
```

// Quality information and sensor status

// Quality flags for 1Hz altimeter data

```
byte qual_alt_1hz_range_ku(time);
      qual_alt_1hz_range_ku:long_name = "quality flag for 1 Hz altimeter data: Ku band
range";
      qual_alt_1hz_range_ku:_FillValue = 127b;
      qual_alt_1hz_range_ku:flag_values = 0b, 1b;
      qual_alt_1hz_range_ku:flag_meanings = "good bad";
      qual_alt_1hz_range_ku:coordinates = "lon lat";

byte qual_alt_1hz_range_ku_mle3(time);
      qual_alt_1hz_range_ku_mle3:long_name = "quality flag for 1 Hz altimeter data: Ku
band range (MLE3 retracking)";
      qual_alt_1hz_range_ku_mle3:_FillValue = 127b;
      qual_alt_1hz_range_ku_mle3:flag_values = 0b, 1b;
      qual_alt_1hz_range_ku_mle3:flag_meanings = "good bad";
      qual_alt_1hz_range_ku_mle3:coordinates = "lon lat";

byte qual_alt_1hz_range_c(time);
      qual_alt_1hz_range_c:long_name = "quality flag for 1 Hz altimeter data: C band
range";
      qual_alt_1hz_range_c:_FillValue = 127b;
      qual_alt_1hz_range_c:flag_values = 0b, 1b;
      qual_alt_1hz_range_c:flag_meanings = "good bad";
      qual_alt_1hz_range_c:coordinates = "lon lat";

byte qual_alt_1hz_swh_ku(time);
      qual_alt_1hz_swh_ku:long_name = "quality flag for 1 Hz altimeter data: Ku band
SWH";
      qual_alt_1hz_swh_ku:_FillValue = 127b;
      qual_alt_1hz_swh_ku:flag_values = 0b, 1b;
      qual_alt_1hz_swh_ku:flag_meanings = "good bad";
      qual_alt_1hz_swh_ku:coordinates = "lon lat";

byte qual_alt_1hz_swh_ku_mle3(time);
      qual_alt_1hz_swh_ku_mle3:long_name = "quality flag for 1 Hz altimeter data: Ku
band SWH (MLE3 retracking)";
      qual_alt_1hz_swh_ku_mle3:_FillValue = 127b;
      qual_alt_1hz_swh_ku_mle3:flag_values = 0b, 1b;
      qual_alt_1hz_swh_ku_mle3:flag_meanings = "good bad";
      qual_alt_1hz_swh_ku_mle3:coordinates = "lon lat";

byte qual_alt_1hz_swh_c(time);
      qual_alt_1hz_swh_c:long_name = "quality flag for 1 Hz altimeter data: C band SWH";
      qual_alt_1hz_swh_c:_FillValue = 127b;
      qual_alt_1hz_swh_c:flag_values = 0b, 1b;
      qual_alt_1hz_swh_c:flag_meanings = "good bad";
      qual_alt_1hz_swh_c:coordinates = "lon lat";

byte qual_alt_1hz_sig0_ku(time);
      qual_alt_1hz_sig0_ku:long_name = "quality flag for 1 Hz altimeter data: Ku band
backscatter coefficient";
      qual_alt_1hz_sig0_ku:_FillValue = 127b;
      qual_alt_1hz_sig0_ku:flag_values = 0b, 1b;
      qual_alt_1hz_sig0_ku:flag_meanings = "good bad";
```

```
      qual_alt_1hz_sig0_ku:coordinates = "lon lat";

byte qual_alt_1hz_sig0_ku_mle3(time);
      qual_alt_1hz_sig0_ku_mle3:long_name = "quality flag for 1 Hz altimeter data: Ku
band backscatter coefficient (MLE3 retracking)";
      qual_alt_1hz_sig0_ku_mle3:_FillValue = 127b;
      qual_alt_1hz_sig0_ku_mle3:flag_values = 0b, 1b;
      qual_alt_1hz_sig0_ku_mle3:flag_meanings = "good bad";
      qual_alt_1hz_sig0_ku_mle3:coordinates = "lon lat";

byte qual_alt_1hz_sig0_c(time);
      qual_alt_1hz_sig0_c:long_name = "quality flag for 1 Hz altimeter data: C band
backscatter coefficient";
      qual_alt_1hz_sig0_c:_FillValue = 127b;
      qual_alt_1hz_sig0_c:flag_values = 0b, 1b;
      qual_alt_1hz_sig0_c:flag_meanings = "good bad";
      qual_alt_1hz_sig0_c:coordinates = "lon lat";

byte qual_alt_1hz_off_nadir_angle_wf_ku(time);
      qual_alt_1hz_off_nadir_angle_wf_ku:long_name = "quality flag for 1 Hz altimeter
      data: off nadir angle from Ku band";
      qual_alt_1hz_off_nadir_angle_wf_ku:_FillValue = 127b;
      qual_alt_1hz_off_nadir_angle_wf_ku:flag_values = 0b, 1b;
      qual_alt_1hz_off_nadir_angle_wf_ku:flag_meanings = "good bad";
      qual_alt_1hz_off_nadir_angle_wf_ku:coordinates = "lon lat";

// Quality flags for 1 Hz altimeter instrumental corrections

byte qual_inst_corr_1hz_range_ku(time);
      qual_inst_corr_1hz_range_ku:long_name = "quality flag for 1 Hz instrumental
correction: Ku band range";
      qual_inst_corr_1hz_range_ku:_FillValue = 127b;
      qual_inst_corr_1hz_range_ku:flag_values = 0b, 1b;
      qual_inst_corr_1hz_range_ku:flag_meanings = "good bad";
      qual_inst_corr_1hz_range_ku:coordinates = "lon lat";

byte qual_inst_corr_1hz_range_ku_mle3(time);
      qual_inst_corr_1hz_range_ku_mle3:long_name = "quality flag for 1 Hz instrumental
correction: Ku band range (MLE3 retracking)";
      qual_inst_corr_1hz_range_ku_mle3:_FillValue = 127b;
      qual_inst_corr_1hz_range_ku_mle3:flag_values = 0b, 1b;
      qual_inst_corr_1hz_range_ku_mle3:flag_meanings = "good bad";
      qual_inst_corr_1hz_range_ku_mle3:coordinates = "lon lat";

byte qual_inst_corr_1hz_range_c(time);
      qual_inst_corr_1hz_range_c:long_name = "quality flag for 1 Hz instrumental
correction: C band range";
      qual_inst_corr_1hz_range_c:_FillValue = 127b;
      qual_inst_corr_1hz_range_c:flag_values = 0b, 1b;
      qual_inst_corr_1hz_range_c:flag_meanings = "good bad";
      qual_inst_corr_1hz_range_c:coordinates = "lon lat";

byte qual_inst_corr_1hz_swh_ku(time);
      qual_inst_corr_1hz_swh_ku:long_name = "quality flag for 1 Hz instrumental
correction: Ku band SWH";
      qual_inst_corr_1hz_swh_ku:_FillValue = 127b;
      qual_inst_corr_1hz_swh_ku:flag_values = 0b, 1b;
      qual_inst_corr_1hz_swh_ku:flag_meanings = "good bad";
      qual_inst_corr_1hz_swh_ku:coordinates = "lon lat";
```

```
byte qual_inst_corr_1hz_swh_ku_mle3(time);
       qual_inst_corr_1hz_swh_ku_mle3:long_name = "quality flag for 1 Hz instrumental
correction: Ku band SWH (MLE3 retracking)";
       qual_inst_corr_1hz_swh_ku_mle3:_FillValue = 127b;
       qual_inst_corr_1hz_swh_ku_mle3:flag_values = 0b, 1b;
       qual_inst_corr_1hz_swh_ku_mle3:flag_meanings = "good bad";
       qual_inst_corr_1hz_swh_ku_mle3:coordinates = "lon lat";

byte qual_inst_corr_1hz_swh_c(time);
       qual_inst_corr_1hz_swh_c:long_name = "quality flag for 1 Hz instrumental
correction: C band SWH";
       qual_inst_corr_1hz_swh_c:_FillValue = 127b;
       qual_inst_corr_1hz_swh_c:flag_values = 0b, 1b;
       qual_inst_corr_1hz_swh_c:flag_meanings = "good bad";
       qual_inst_corr_1hz_swh_c:coordinates = "lon lat";

byte qual_inst_corr_1hz_sig0_ku(time);
       qual_inst_corr_1hz_sig0_ku:long_name = "quality flag for 1 Hz instrumental
correction: Ku band backscatter coefficient";
       qual_inst_corr_1hz_sig0_ku:_FillValue = 127b;
       qual_inst_corr_1hz_sig0_ku:flag_values = 0b, 1b;
       qual_inst_corr_1hz_sig0_ku:flag_meanings = "good bad";
       qual_inst_corr_1hz_sig0_ku:coordinates = "lon lat";

byte qual_inst_corr_1hz_sig0_ku_mle3(time);
       qual_inst_corr_1hz_sig0_ku_mle3:long_name = "quality flag for 1 Hz instrumental
correction: Ku band backscatter coefficient (MLE3 retracking)";
       qual_inst_corr_1hz_sig0_ku_mle3:_FillValue = 127b;
       qual_inst_corr_1hz_sig0_ku_mle3:flag_values = 0b, 1b;
       qual_inst_corr_1hz_sig0_ku_mle3:flag_meanings = "good bad";
       qual_inst_corr_1hz_sig0_ku_mle3:coordinates = "lon lat";

byte qual_inst_corr_1hz_sig0_c(time);
       qual_inst_corr_1hz_sig0_c:long_name = "quality flag for 1 Hz instrumental
correction: C band backscatter coefficient";
       qual_inst_corr_1hz_sig0_c:_FillValue = 127b;
       qual_inst_corr_1hz_sig0_c:flag_values = 0b, 1b;
       qual_inst_corr_1hz_sig0_c:flag_meanings = "good bad";
       qual_inst_corr_1hz_sig0_c:coordinates = "lon lat";


       // Quality flags for 1 Hz radiometer data

byte qual_rad_1hz_tb187(time);
       qual_rad_1hz_tb187:long_name = "quality flag for 1 Hz radiometer data: 18.7 GHz
brightness temperature";
       qual_rad_1hz_tb187:_FillValue = 127b;
       qual_rad_1hz_tb187:flag_values = 0b, 1b;
       qual_rad_1hz_tb187:flag_meanings = "good bad";
       qual_rad_1hz_tb187:coordinates = "lon lat";

byte qual_rad_1hz_tb238(time);
       qual_rad_1hz_tb238:long_name = "quality flag for 1 Hz radiometer data: 23.8 GHz
brightness temperature";
       qual_rad_1hz_tb238:_FillValue = 127b;
       qual_rad_1hz_tb238:flag_values = 0b, 1b;
       qual_rad_1hz_tb238:flag_meanings = "good bad";
       qual_rad_1hz_tb238:coordinates = "lon lat";

byte qual_rad_1hz_tb340(time);
```

```
      qual_rad_1hz_tb340:long_name = "quality flag for 1 Hz radiometer data: 34 GHz
brightness temperature";
      qual_rad_1hz_tb340:_FillValue = 127b;
      qual_rad_1hz_tb340:flag_values = 0b, 1b;
      qual_rad_1hz_tb340:flag_meanings = "good bad";
      qual_rad_1hz_tb340:coordinates = "lon lat";

byte rad_averaging_flag(time);
      rad_averaging_flag:long_name = "radiometer along-track averaging flag";
      rad_averaging_flag:_FillValue = 127b;
      rad_averaging_flag:flag_values = 0b, 1b;
      rad_averaging_flag:flag_meanings = "good bad";
      rad_averaging_flag:coordinates = "lon lat";

short rad_land_frac_187(time);
      rad_land_frac_187:long_name = "radiometer 18.7 GHz antenna gain weighted land
fraction in main beam";
      rad_land_frac_187:_FillValue = 32767s;
      rad_land_frac_187:units = "%";
      rad_land_frac_187:scale_factor = 1.00e-02;
      rad_land_frac_187:coordinates = "lon lat";

short rad_land_frac_238(time);
      rad_land_frac_238:long_name = "radiometer 23.8 GHz antenna gain weighted land
fraction in main beam";
      rad_land_frac_238:_FillValue = 32767s;
      rad_land_frac_238:units = "%";
      rad_land_frac_238:scale_factor = 1.00e-02;
      rad_land_frac_238:coordinates = "lon lat";

short rad_land_frac_340(time);
      rad_land_frac_340:long_name = "radiometer 34 GHz antenna gain weighted land
fraction in main beam";
      rad_land_frac_340:_FillValue = 32767s;
      rad_land_frac_340:units = "%";
      rad_land_frac_340:scale_factor = 1.00e-02;
      rad_land_frac_340:coordinates = "lon lat";


      // Altimeter state flags


byte alt_state_flag_oper(time);
      alt_state_flag_oper:long_name = "altimeter state flag: altimeter operating";
      alt_state_flag_oper:_FillValue = 127b;
      alt_state_flag_oper:flag_values = 0b, 1b;
      alt_state_flag_oper:flag_meanings = "SideA SideB";
      alt_state_flag_oper:coordinates = "lon lat";
      alt_state_flag_oper:comment = "Side A = nominal; Side B = redondancy";

byte alt_state_flag_c_band(time);
      alt_state_flag_c_band:long_name = "altimeter state flag: C bandwidth used";
      alt_state_flag_c_band:_FillValue = 127b;
      alt_state_flag_c_band:flag_values = 0b, 1b;
      alt_state_flag_c_band:flag_meanings = "320MHz 100MHz";
      alt_state_flag_c_band:coordinates = "lon lat";

byte alt_state_flag_band_seq(time);
      alt_state_flag_band_seq:long_name = "altimeter state flag: Ku/C band sequencing";
      alt_state_flag_band_seq:_FillValue = 127b;
      alt_state_flag_band_seq:flag_values = 0b, 1b;
      alt_state_flag_band_seq:flag_meanings = "3Ku_1C_3Ku 2Ku_1C_2Ku";
```

```
        alt_state_flag_band_seq:coordinates = "lon lat";

byte alt_state_flag_ku_band_status(time);
        alt_state_flag_ku_band_status:long_name = "altimeter state flag: Ku band status";
        alt_state_flag_ku_band_status:_FillValue = 127b;
        alt_state_flag_ku_band_status:flag_values = 0b, 1b;
        alt_state_flag_ku_band_status:flag_meanings = "On Off";
        alt_state_flag_ku_band_status:coordinates = "lon lat";

byte alt_state_flag_c_band_status(time);
        alt_state_flag_c_band_status:long_name = "altimeter state flag: C band status";
        alt_state_flag_c_band_status:_FillValue = 127b;
        alt_state_flag_c_band_status:flag_values = 0b, 1b;
        alt_state_flag_c_band_status:flag_meanings = "On Off";
        alt_state_flag_c_band_status:coordinates = "lon lat";

byte alt_state_flag_acq_mode_20hz (time,meas_ind);
        alt_state_flag_acq_mode_20hz:long_name = "20 Hz altimeter state flag: acquisition
mode";
        alt_state_flag_acq_mode_20hz:_FillValue = 127b;
        alt_state_flag_acq_mode_20hz:flag_values = 0b, 1b, 2b;
        alt_state_flag_acq_mode_20hz:flag_meanings = "autonomous_acq/track
autonomous_DIODEacq/track DIODE+DEM/track";
        alt_state_flag_acq_mode_20hz:coordinates = "lon_20Hz lat_20Hz";
        alt_state_flag_acq_mode_20hz:comment = "0 = autonomous acquisition / tracking, 1 =
autonomous DIODE acquisition / tracking, 2 = DIODE + Digital Elevation Model tracking";

byte alt_state_flag_tracking_mode_20hz(time,meas_ind);
        alt_state_flag_tracking_mode_20hz:long_name = "20 Hz altimeter state flag:
tracking mode";
        alt_state_flag_tracking_mode_20hz:_FillValue = 127b;
        alt_state_flag_tracking_mode_20hz:flag_values = 0b, 1b;
        alt_state_flag_tracking_mode_20hz:flag_meanings = "split-gate_tracking
median_tracking";
        alt_state_flag_tracking_mode_20hz:coordinates = "lon_20Hz lat_20Hz";
        alt_state_flag_tracking_mode_20hz:comment = "0 = split-gate tracking, 1 = median
tracking";


        // Radiometer state flag


byte rad_state_flag_oper(time);
        rad_state_flag_oper:long_name = "radiometer state flag: radiometer operating";
        rad_state_flag_oper:_FillValue = 127b;
        rad_state_flag_oper:flag_values = 0b, 1b;
        rad_state_flag_oper:flag_meanings = "SideA SideB";
        rad_state_flag_oper:coordinates = "lon lat";
        rad_state_flag_oper:comment = "Side A = nominal; Side B = redondancy";


        // Orbit state flags


byte orb_state_flag_diode(time);
        orb_state_flag_diode:long_name = "orbit state flag: OGDR products";
        orb_state_flag_diode:_FillValue = 127b;
        orb_state_flag_diode:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
        orb_state_flag_diode:flag_meanings = "From good quality (0) to bad quality (9)";
        orb_state_flag_diode:coordinates = "lon lat";
        orb_state_flag_diode:comment = "0 = Accurate orbit (0 - 5 cm radial), 1 = Good
orbit (5 - 10 cm radial), 2 = Moderate orbit (10 - 15 cm radial), 4-8 = Potentially
degraded orbit (> 15 cm radial), 9 = Degraded orbit (e.g., as during maneuver)";
```

```
byte orb_state_flag_rest(time);
       orb_state_flag_rest:long_name = "orbit state flag: restituted orbit";
       orb_state_flag_rest:_FillValue = 127b;
       orb_state_flag_rest:flag_values = 0b, 1b, 2b, 3b, 4b, 5b, 6b, 7b, 8b, 9b ;
       orb_state_flag_rest:flag_meanings = "op_maneuver op_adjusted op_extrapolated
pre_adjusted pre_maneuver pre_interpolated_gap pre_extrapolated_L1 pre_extrapolated_L1S2
pre_extrapolated_S2 DIODE";
       orb_state_flag_rest:coordinates = "lon lat";
       orb_state_flag_rest:comment = "0 characterizes a mission operations orbit that is
computed during a maneuver period, 1 stands for an adjusted mission operations orbit, 2
stands for an extrapolated mission operations orbit, 3 stands for an adjusted
(preliminary/precise) orbit, 4 indicates that the (preliminary/precise) orbit is
estimated during a maneuver period, 5 indicates that the (preliminary/precise) orbit is
interpolated over a tracking data gap, 6 means that the (preliminary/precise) orbit is
extrapolated for a duration less than 1 day, 7 means that the (preliminary/precise) orbit
is extrapolated for a duration that ranges from 1 day to 2 days, 8 means that the
(preliminary/precise) orbit is extrapolated for a duration larger than 2 days, or that
the orbit is extrapolated just after a maneuver, 9 stands for the DORIS DIODE navigator
orbit. The nominal value is 3";
```

// Geophysical flags

```
byte ecmwf_meteo_map_avail(time);
       ecmwf_meteo_map_avail:long_name = "ECMWF meteorological map availability";
       ecmwf_meteo_map_avail:_FillValue = 127b;
       ecmwf_meteo_map_avail:flag_values = 0b, 1b, 2b, 3b ;
       ecmwf_meteo_map_avail:flag_meanings = "2_maps_nominal 2_maps_degraded
1_map_closest_used no_valid_map";
       ecmwf_meteo_map_avail:coordinates = "lon lat";
       ecmwf_meteo_map_avail:comment = "Possible values are: 0 meaning '2 maps, nominal'
(six hours apart), 1 meaning '2 maps, degraded' (more than six hours apart), 2 meaning '1
map, closest map used', 3 meaning 'no valid map';

byte rain_flag(time);
       rain_flag:long_name = "rain flag";
       rain_flag:_FillValue = 127b;
       rain_flag:flag_values = 0b, 1b;
       rain_flag:flag_meanings = "no_rain rain";
       rain_flag:coordinates = "lon lat";
       rain_flag:comment = "See Jason-2 User Handbook";

byte rad_rain_flag(time);
       rad_rain_flag:long_name = "radiometer rain flag";
       rad_rain_flag:_FillValue = 127b;
       rad_rain_flag:flag_values = 0b, 1b;
       rad_rain_flag:flag_meanings = "no_rain rain";
       rad_rain_flag:coordinates = "lon lat";
       rad_rain_flag:comment = "See Jason-2 User Handbook. The radiometer rain flag
indicates where the radiometer wet troposphere path delay (rad_wet_tropo_corr) is invalid
due to rain contamination";

byte ice_flag(time);
       ice_flag:long_name = "ice flag";
       ice_flag:_FillValue = 127b;
       ice_flag:flag_values = 0b, 1b;
       ice_flag:flag_meanings = "no_ice ice";
       ice_flag:coordinates = "lon lat";
       ice_flag:comment = "See Jason-2 User Handbook";
```

```
byte rad_sea_ice_flag(time);
       rad_sea_ice_flag:long_name = "radiometer sea-ice flag";
       rad_sea_ice_flag:_FillValue = 127b;
       rad_sea_ice_flag:flag_values = 0b, 1b;
       rad_sea_ice_flag:flag_meanings = "no_sea_ice sea_ice";
       rad_sea_ice_flag:coordinates = "lon lat";
       rad_sea_ice_flag:comment = "See Jason-2 User Handbook. The radiometer sea ice flag
indicates where the radiometer wet troposphere path delay (rad_wet_tropo_corr) is invalid
due to sea ice contamination";
```

// Quality flags for interpolation

```
byte interp_flag_tb(time);
       interp_flag_tb:long_name = "radiometer brightness temperatures interpolation
flag";
       interp_flag_tb:_FillValue = 127b;
       interp_flag_tb:flag_values = 0b, 1b, 2b, 3b;
       interp_flag_tb:flag_meanings = "good interpolation_with_gap extrapolation fail";
       interp_flag_tb:coordinates = "lon lat";
       interp_flag_tb:comment = "Possible values are: 0 = interpolation without gap
between AMR data, 1 = interpolation with gap between AMR data, 2 = extrapolation of AMR
data, 3 = failure of extrapolation and interpolation”;

byte interp_flag_mean_sea_surface(time);
       interp_flag_mean_sea_surface:long_name = "mean_sea_surface interpolation flag";
       interp_flag_mean_sea_surface:_FillValue = 127b;
       interp_flag_mean_sea_surface:flag_values = 0b, 1b;
       interp_flag_mean_sea_surface:flag_meanings = "good bad";
       interp_flag_mean_sea_surface:coordinates = "lon lat";

byte interp_flag_mdt(time);
       interp_flag_mdt:long_name = "MDT interpolation flag";
       interp_flag_mdt:_FillValue = 127b;
       interp_flag_mdt:flag_values = 0b, 1b;
       interp_flag_mdt:flag_meanings = "good bad";
       interp_flag_mdt:coordinates = "lon lat";

byte interp_flag_ocean_tide_sol1(time);
       interp_flag_ocean_tide_sol1:long_name = "ocean tide solution 1 interpolation
flag";
       interp_flag_ocean_tide_sol1:_FillValue = 127b;
       interp_flag_ocean_tide_sol1:flag_values = 0b, 1b;
       interp_flag_ocean_tide_sol1:flag_meanings = "good bad";
       interp_flag_ocean_tide_sol1:coordinates = "lon lat";
       interp_flag_ocean_tide_sol1:comment = "0 = 4 points over ocean; 1 = less than 4
points";

byte interp_flag_ocean_tide_sol2(time);
       interp_flag_ocean_tide_sol2:long_name = "ocean tide solution 2 interpolation
flag";
       interp_flag_ocean_tide_sol2:_FillValue = 127b;
       interp_flag_ocean_tide_sol2:flag_values = 0b, 1b;
       interp_flag_ocean_tide_sol2:flag_meanings = "good bad";
       interp_flag_ocean_tide_sol2:coordinates = "lon lat";
       interp_flag_ocean_tide_sol2:comment = "0 = 4 points over ocean; 1 = less than 4
points";

byte interp_flag_meteo(time);
       interp_flag_meteo:long_name = "meteorological data interpolation flag";
       interp_flag_meteo:_FillValue = 127b;
```

```
      interp_flag_meteo:flag_values = 0b, 1b;
      interp_flag_meteo:flag_meanings = "good bad";
      interp_flag_meteo:coordinates = "lon lat";
      interp_flag_meteo:comment = "0 = interpolation from 4 points; 1 = interpolation
from less than 4 points";
```

// Orbit

```
int alt(time);
      alt:long_name = "1 Hz altitude of satellite";
      alt:standard_name = "height_above_reference_ellipsoid";
      alt:_FillValue = 2147483647;
      alt:units = "m";
      alt:add_offset = 1.300000e+06;
      alt:scale_factor = 1.00e-04;
      alt:coordinates = "lon lat";
      alt:quality_flag = "orb_state_flag_rest or orb_state_flag_diode";
      alt:comment = "Altitude of satellite above the reference ellipsoid. Associated
quality flag is orb_state_flag_diode for the OGDR products, orb_state_flag_rest for the
IGDR and GDR products";

int alt_20hz(time,meas_ind);
      alt_20hz:long_name = "20 Hz altitude of satellite";
      alt_20hz:standard_name = "height_above_reference_ellipsoid";
      alt_20hz:_FillValue = 2147483647;
      alt_20hz:units = "m";
      alt_20hz:add_offset = 1.300000e+06;
      alt_20hz:scale_factor = 1.00e-04;
      alt_20hz:coordinates = "lon_20Hz lat_20Hz";
      alt_20hz:comment = "Altitude of satellite above the reference ellipsoid";

short orb_alt_rate(time);
      orb_alt_rate:long_name = "1 Hz orbital altitude rate";
      orb_alt_rate:_FillValue = 32767s;
      orb_alt_rate:units = "m/s";
      orb_alt_rate:scale_factor = 1.00e-02;
      orb_alt_rate:coordinates = "lon lat";
      orb_alt_rate:comment = "The reference surface for the orbital altitude rate is the
combined mean_sea_surface/geoid surface. It is used to compute the Doppler correction on
the altimeter range (doppler_corr_ku, doppler_corr_c)";
```

// Altimeter range

```
int range_ku(time);
      range_ku:long_name = "1 Hz Ku band corrected altimeter range";
      range_ku:standard_name = "altimeter_range”;
range_ku:_FillValue = 2147483647;
      range_ku:units = "m";
      range_ku:add_offset = 1.300000e+06;
      range_ku:scale_factor = 1.00e-04;
      range_ku:coordinates = "lon lat";
      range_ku:quality_flag = "qual_alt_1hz_range_ku";
      range_ku:comment = "All instrumental corrections included, i.e. distance antenna-
COG (cog_corr), USO drift correction (uso_corr), internal path correction
(internal_path_delay_corr_ku), Doppler correction (doppler_corr_ku), modeled instrumental
errors correction (modeled_instr_corr_range_ku) and system bias";

int range_20hz_ku(time,meas_ind);
```

range_20hz_ku:long_name = "20 Hz Ku band corrected altimeter range";
range_20hz_ku:standard_name = "altimeter_range”;
range_20hz_ku:_FillValue = 2147483647;
range_20hz_ku:units = "m";
range_20hz_ku:add_offset = 1.300000e+06;
range_20hz_ku:scale_factor = 1.00e-04;
range_20hz_ku:coordinates = "lon_20Hz lat_20Hz";
range_20hz_ku:comment = "All instrumental corrections included, i.e. distance antenna-COG (cog_corr), USO drift correction (uso_corr), internal path correction (internal_path_delay_corr_ku), Doppler correction (doppler_corr_ku), modeled instrumental errors correction (modeled_instr_corr_range_ku) and system bias";

int range_c(time);
range_c:long_name = "1 Hz C band corrected altimeter range";
range_c:standard_name = "altimeter_range”;
range_c:_FillValue = 2147483647;
range_c:units = "m";
range_c:add_offset = 1.300000e+06;
range_c:scale_factor = 1.00e-04;
range_c:coordinates = "lon lat";
range_c:quality_flag = "qual_alt_1hz_range_c";
range_c:comment = "All instrumental corrections included, i.e. distance antenna-COG (cog_corr), USO drift correction (uso_corr), internal path correction (internal_path_delay_corr_c), Doppler correction (doppler_corr_c), modeled instrumental errors correction (modeled_instr_corr_range_c) and system bias";

int range_20hz_c(time,meas_ind);
range_20hz_c:long_name = "20 Hz C band corrected altimeter range";
range_20hz_c:standard_name = "altimeter_range”;
range_20hz_c:_FillValue = 2147483647;
range_20hz_c:units = "m";
range_20hz_c:add_offset = 1.300000e+06;
range_20hz_c:scale_factor = 1.00e-04;
range_20hz_c:coordinates = "lon_20Hz lat_20Hz";
range_20hz_c:comment = "All instrumental corrections included, i.e. distance antenna-COG (cog_corr), USO drift correction (uso_corr), internal path correction (internal_path_delay_corr_c), Doppler correction (doppler_corr_c), modeled instrumental errors correction (modeled_instr_corr_range_c) and system bias";

byte range_used_20hz_ku(time,meas_ind);
range_used_20hz_ku:long_name = "20 Hz flag for utilization in the computation of 1Hz Ku band range";
range_used_20hz_ku:_FillValue = 127b;
range_used_20hz_ku:flag_values = 0b, 1b;
range_used_20hz_ku:flag_meanings = "yes no";
range_used_20hz_ku:coordinates = "lon_20Hz lat_20Hz";
range_used_20hz_ku:comment = "Map of valid points used to compute the 1-Hz Ku-band altimeter range";

byte range_used_20hz_c(time,meas_ind);
range_used_20hz_c:long_name = "20 Hz flag for utilization in the computation of 1Hz C band range";
range_used_20hz_c:_FillValue = 127b;
range_used_20hz_c:flag_values = 0b, 1b;
range_used_20hz_c:flag_meanings = "yes no";
range_used_20hz_c:coordinates = "lon_20Hz lat_20Hz";
range_used_20hz_c:comment = "Map of valid points used to compute the 1-Hz C-band altimeter range";

short range_rms_ku(time);
range_rms_ku:long_name = "RMS of the Ku band range";

```
      range_rms_ku:_FillValue = 32767s;
      range_rms_ku:units = "m";
      range_rms_ku:scale_factor = 1.00e-04;
      range_rms_ku:coordinates = "lon lat";
      range_rms_ku:comment = "Compression of Ku-band high rate elements is preceded by a
detection of outliers. Only valid high-rate values are used to compute this element";

short range_rms_c(time);
      range_rms_c:long_name = "RMS of the C band range";
      range_rms_c:_FillValue = 32767s;
      range_rms_c:units = "m";
      range_rms_c:scale_factor = 1.00e-04;
      range_rms_c:coordinates = "lon lat";
      range_rms_c:comment = "Compression of C-band high rate elements is preceded by a
detection of outliers. Only valid high-rate values are used to compute this element";

byte range_numval_ku(time);
      range_numval_ku:long_name = "number of valid points for Ku band range";
      range_numval_ku:_FillValue = 127b;
      range_numval_ku:units = "count";
      range_numval_ku:coordinates = "lon lat";
      range_numval_ku:valid_min = 0b;
      range_numval_ku:valid_max = 20b;

byte range_numval_c(time);
      range_numval_c:long_name = "number of valid points for C band range";
      range_numval_c:_FillValue = 127b;
      range_numval_c:units = "count";
      range_numval_c:coordinates = "lon lat";
      range_numval_c:valid_min = 0b;
      range_numval_c:valid_max = 20b;
```

// Altimeter range – ocean-2 (MLE3)

```
int range_ku_mle3(time);
      range_ku_mle3:long_name = "1 Hz Ku band corrected altimeter range (MLE3
retracking)";
      range_ku_mle3:standard_name = "altimeter_range”;
      range_ku_mle3:_FillValue = 2147483647;
      range_ku_mle3:units = "m";
      range_ku_mle3:add_offset = 1.300000e+06;
      range_ku_mle3:scale_factor = 1.00e-04;
      range_ku_mle3:coordinates = "lon lat";
      range_ku_mle3:quality_flag = "qual_alt_1hz_range_ku_mle3";
      range_ku_mle3:comment = "All instrumental corrections included, i.e. distance
antenna-COG (cog_corr), USO drift correction (uso_corr), internal path correction
(internal_path_delay_corr_ku), Doppler correction (doppler_corr_ku), modeled instrumental
errors correction (modeled_instr_corr_range_ku_mle3) and system bias";

int range_20hz_ku_mle3(time,meas_ind);
      range_20hz_ku_mle3:long_name = "20 Hz Ku band corrected altimeter range (MLE3
retracking)";
      range_20hz_ku_mle3:standard_name = "altimeter_range”;
      range_20hz_ku_mle3:_FillValue = 2147483647;
      range_20hz_ku_mle3:units = "m";
      range_20hz_ku_mle3:add_offset = 1.300000e+06;
      range_20hz_ku_mle3:scale_factor = 1.00e-04;
      range_20hz_ku_mle3:coordinates = "lon_20Hz lat_20Hz";
      range_20hz_ku_mle3:comment = "All instrumental corrections included, i.e. distance
antenna-COG (cog_corr), USO drift correction (uso_corr), internal path correction
```

(internal_path_delay_corr_ku), Doppler correction (doppler_corr_ku), modeled instrumental errors correction (modeled_instr_corr_range_ku_mle3) and system bias";

byte range_used_20hz_ku_mle3(time,meas_ind);
range_used_20hz_ku_mle3:long_name = "20 Hz flag for utilization in the computation of 1Hz Ku band range (MLE3 retracking)";
range_used_20hz_ku_mle3:_FillValue = 127b;
range_used_20hz_ku_mle3:flag_values = 0b, 1b;
range_used_20hz_ku_mle3:flag_meanings = "yes no";
range_used_20hz_ku_mle3:coordinates = "lon_20Hz lat_20Hz";
range_used_20hz_ku_mle3:comment = "Map of valid points used to compute the 1-Hz Ku-band altimeter range";

short range_rms_ku_mle3(time);
range_rms_ku_mle3:long_name = "RMS of the Ku band range (MLE3 retracking)";
range_rms_ku_mle3:_FillValue = 32767s;
range_rms_ku_mle3:units = "m";
range_rms_ku_mle3:scale_factor = 1.00e-04;
range_rms_ku_mle3:coordinates = "lon lat";
range_rms_ku_mle3:comment = "Compression of Ku-band high rate elements is preceded by a detection of outliers. Only valid high-rate values are used to compute this element";

byte range_numval_ku_mle3(time);
range_numval_ku_mle3:long_name = "number of valid points for Ku band range (MLE3 retracking)";
range_numval_ku_mle3:_FillValue = 127b;
range_numval_ku_mle3:units = "count";
range_numval_ku_mle3:coordinates = "lon lat";
range_numval_ku_mle3:valid_min = 0b;
range_numval_ku_mle3:valid_max = 20b;

// Ocean retracking outputs

byte number_of_iterations_ku(time,meas_ind);
number_of_iterations_ku:long_name = "2O Hz number of iterations of the ocean retracking in Ku band";
number_of_iterations_ku:_FillValue = 127b;
number_of_iterations_ku:units = "count";
number_of_iterations_ku:coordinates = "lon_20Hz lat_20Hz";

byte number_of_iterations_ku_mle3(time,meas_ind);
number_of_iterations_ku_mle3:long_name = "2O Hz number of iterations of the ocean retracking in Ku band (MLE3 retracking)";
number_of_iterations_ku_mle3:_FillValue = 127b;
number_of_iterations_ku_mle3:units = "count";
number_of_iterations_ku_mle3:coordinates = "lon_20Hz lat_20Hz";

byte number_of_iterations_c(time,meas_ind);
number_of_iterations_c:long_name = "2O Hz number of iterations of the ocean retracking in C band";
number_of_iterations_c:_FillValue = 127b;
number_of_iterations_c:units = "count";
number_of_iterations_c:coordinates = "lon_20Hz lat_20Hz";

// Altimeter range corrections

int net_instr_corr_range_ku(time);

net_instr_corr_range_ku:long_name = "net instrumental correction on the Ku band range";
net_instr_corr_range_ku:_FillValue = 2147483647;
net_instr_corr_range_ku:units = "m";
net_instr_corr_range_ku:scale_factor = 1.00e-04;
net_instr_corr_range_ku:coordinates = "lon lat";
net_instr_corr_range_ku:quality_flag = "qual_inst_corr_1hz_range_ku";
net_instr_corr_range_ku:comment = "Sum of distance antenna-COG (cog_corr), USO drift correction (uso_corr), internal path correction (internal_path_delay_corr_ku), Doppler correction (doppler_corr_ku), modeled instrumental errors correction (modeled_instr_corr_range_ku) and system bias";

int net_instr_corr_range_ku_mle3(time);
net_instr_corr_range_ku_mle3:long_name = "net instrumental correction on the Ku band range (MLE3 retracking)";
net_instr_corr_range_ku_mle3:_FillValue = 2147483647;
net_instr_corr_range_ku_mle3:units = "m";
net_instr_corr_range_ku_mle3:scale_factor = 1.00e-04;
net_instr_corr_range_ku_mle3:coordinates = "lon lat";
net_instr_corr_range_ku_mle3:quality_flag = "qual_inst_corr_1hz_range_ku_mle3";
net_instr_corr_range_ku_mle3:comment = "Sum of distance antenna-COG (cog_corr), USO drift correction (uso_corr), internal path correction (internal_path_delay_corr_ku), Doppler correction (doppler_corr_ku), modeled instrumental errors correction (modeled_instr_corr_range_ku_mle3) and system bias";

int net_instr_corr_range_c(time);
net_instr_corr_range_c:long_name = "net instrumental correction on the C band range";
net_instr_corr_range_c:_FillValue = 2147483647;
net_instr_corr_range_c:units = "m";
net_instr_corr_range_c:scale_factor = 1.00e-04;
net_instr_corr_range_c:coordinates = "lon lat";
net_instr_corr_range_c:quality_flag = "qual_inst_corr_1hz_range_c";
net_instr_corr_range_c:comment = "Sum of distance antenna-COG (cog_corr), USO drift correction (uso_corr), internal path correction (internal_path_delay_corr_c), Doppler correction (doppler_corr_c), modeled instrumental errors correction (modeled_instr_corr_range_c) and system bias";

short model_dry_tropo_corr(time);
model_dry_tropo_corr:long_name = "model dry tropospheric correction";
model_dry_tropo_corr:standard_name = "altimeter_range_correction_due_to_dry_troposphere";
model_dry_tropo_corr:source = [mto_fields_source];
model_dry_tropo_corr:institution = [mto_fields_institution];
model_dry_tropo_corr:_FillValue = 32767s;
model_dry_tropo_corr:units = "m";
model_dry_tropo_corr:scale_factor = 1.00e-04;
model_dry_tropo_corr:coordinates = "lon lat";
model_dry_tropo_corr:quality_flag = "interp_flag_meteo";
model_dry_tropo_corr:comment = "Computed at the altimeter time-tag from the interpolation of 2 meteorological fields that surround the altimeter time-tag. A dry tropospheric correction must be added (negative value) to the instrument range to correct this range measurement for dry tropospheric range delays of the radar pulse. See Jason-2 User Handbook”;

short model_wet_tropo_corr(time);
model_wet_tropo_corr:long_name = "model wet tropospheric correction";
model_wet_tropo_corr:standard_name = "altimeter_range_correction_due_to_wet_troposphere";
model_wet_tropo_corr:source = [mto_fields_source];
model_wet_tropo_corr:institution = [mto_fields_institution];

model_wet_tropo_corr:_FillValue = 32767s;
model_wet_tropo_corr:units = "m";
model_wet_tropo_corr:scale_factor = 1.00e-04;
model_wet_tropo_corr:coordinates = "lon lat";
model_wet_tropo_corr:quality_flag = "interp_flag_meteo";
model_wet_tropo_corr:comment = "Computed at the altimeter time-tag from the interpolation of 2 meteorological fields that surround the altimeter time-tag. 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. See Jason-2 User Handbook";

short rad_wet_tropo_corr(time);
rad_wet_tropo_corr:long_name = "radiometer wet tropospheric correction";
rad_wet_tropo_corr:standard_name = "altimeter_range_correction_due_to_wet_troposphere";
rad_wet_tropo_corr:source = [radiometer_sensor_name];
rad_wet_tropo_corr:institution = [radiometer_sensor_institution];
rad_wet_tropo_corr:_FillValue = 32767s;
rad_wet_tropo_corr:units = "m";
rad_wet_tropo_corr:scale_factor = 1.00e-04;
rad_wet_tropo_corr:coordinates = "lon lat";
rad_wet_tropo_corr:quality_flag = "qual_rad_1hz_tb187 and qual_rad_1hz_tb238 and qual_rad_1hz_tb340 and interp_flag_tb";
rad_wet_tropo_corr:comment = "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”;

short iono_corr_alt_ku(time);
iono_corr_alt_ku:long_name = "altimeter ionospheric correction on Ku band";
iono_corr_alt_ku:standard_name = "altimeter_range_correction_due_to_ionosphere";
iono_corr_alt_ku:source = [altimeter_sensor_name];
iono_corr_alt_ku:institution = [altimeter_sensor_institution];
iono_corr_alt_ku:_FillValue = 32767s;
iono_corr_alt_ku:units = "m";
iono_corr_alt_ku:scale_factor = 1.00e-04;
iono_corr_alt_ku:coordinates = "lon lat";
iono_corr_alt_ku:comment = "An ionospheric correction must be added (negative value) to the instrument range to correct this range measurement for ionospheric range delays of the radar pulse. See Jason-2 User Handbook”;

short iono_corr_alt_ku_mle3(time);
iono_corr_alt_ku_mle3:long_name = "altimeter ionospheric correction on Ku band (MLE3 retracking)";
iono_corr_alt_ku_mle3:standard_name = "altimeter_range_correction_due_to_ionosphere";
iono_corr_alt_ku_mle3:source = [altimeter_sensor_name];
iono_corr_alt_ku_mle3:institution = [altimeter_sensor_institution];
iono_corr_alt_ku_mle3:_FillValue = 32767s;
iono_corr_alt_ku_mle3:units = "m";
iono_corr_alt_ku_mle3:scale_factor = 1.00e-04;
iono_corr_alt_ku_mle3:coordinates = "lon lat";
iono_corr_alt_ku_mle3:comment = "An ionospheric correction must be added (negative value) to the instrument range to correct this range measurement for ionospheric range delays of the radar pulse. See Jason-2 User Handbook”;

short iono_corr_gim_ku(time);
iono_corr_gim_ku:long_name = "GIM ionospheric correction on Ku band";
iono_corr_gim_ku:standard_name = "altimeter_range_correction_due_to_ionosphere";
iono_corr_gim_ku:institution = [GIM_institution];
iono_corr_gim_ku:_FillValue = 32767s;
iono_corr_gim_ku:units = "m";

iono_corr_gim_ku:scale_factor = 1.00e-04;
iono_corr_gim_ku:coordinates = "lon lat";
iono_corr_gim_ku:comment = "An ionospheric correction must be added (negative value) to the instrument range to correct this range measurement for ionospheric range delays of the radar pulse. See Jason-2 User Handbook";

short sea_state_bias_ku(time);
sea_state_bias_ku:long_name = "sea state bias correction in Ku band";
sea_state_bias_ku:standard_name = "sea_surface_height_bias_due_to_sea_surface_roughness";
sea_state_bias_ku:source = [altimeter_ssb_source];
sea_state_bias_ku:institution = [altimeter_ssb_institution];
sea_state_bias_ku:_FillValue = 32767s;
sea_state_bias_ku:units = "m";
sea_state_bias_ku:scale_factor = 1.00e-04;
sea_state_bias_ku:coordinates = "lon lat";
sea_state_bias_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. This element should not be used over land. See Jason-2 User Handbook";

short sea_state_bias_ku_mle3(time);
sea_state_bias_ku_mle3:long_name = "sea state bias correction in Ku band (MLE3 retracking)";
sea_state_bias_ku_mle3:standard_name = "sea_surface_height_bias_due_to_sea_surface_roughness";
sea_state_bias_ku_mle3:source = [altimeter_ssb_source];
sea_state_bias_ku_mle3:institution = [altimeter_ssb_institution];
sea_state_bias_ku_mle3:_FillValue = 32767s;
sea_state_bias_ku_mle3:units = "m";
sea_state_bias_ku_mle3:scale_factor = 1.00e-04;
sea_state_bias_ku_mle3:coordinates = "lon lat";
sea_state_bias_ku_mle3: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. This element should not be used over land. See Jason-2 User Handbook";

short sea_state_bias_c(time);
sea_state_bias_c:long_name = "sea state bias correction in C band";
sea_state_bias_c:standard_name = "sea_surface_height_bias_due_to_sea_surface_roughness";
sea_state_bias_c:source = [altimeter_ssb_source];
sea_state_bias_c:institution = [altimeter_ssb_institution];
sea_state_bias_c:_FillValue = 32767s;
sea_state_bias_c:units = "m";
sea_state_bias_c:scale_factor = 1.00e-04;
sea_state_bias_c:coordinates = "lon lat";
sea_state_bias_c: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. This element should not be used over land. See Jason-2 User Handbook";

short sea_state_bias_c_mle3(time);
sea_state_bias_c_mle3:long_name = "sea state bias correction in C band (MLE3 retracking)";
sea_state_bias_c_mle3:standard_name = "sea_surface_height_bias_due_to_sea_surface_roughness";
sea_state_bias_c_mle3:source = [altimeter_ssb_source];
sea_state_bias_c_mle3:institution = [altimeter_ssb_institution];
sea_state_bias_c_mle3:_FillValue = 32767s;
sea_state_bias_c_mle3:units = "m";
sea_state_bias_c_mle3:scale_factor = 1.00e-04;
sea_state_bias_c_mle3:coordinates = "lon lat";

sea_state_bias_c_mle3: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. This element should not be used over land. See Jason-2 User Handbook";

// Significant waveheight

short swh_ku(time);
swh_ku:long_name = "Ku band corrected significant waveheight";
swh_ku:standard_name = "sea_surface_wave_significant_height";
swh_ku:_FillValue = 32767s;
swh_ku:units = "m";
swh_ku:scale_factor = 1.00e-03;
swh_ku:coordinates = "lon lat";
swh_ku:quality_flag = "qual_alt_1hz_swh_ku";
swh_ku:comment = "All instrumental corrections included, i.e. modeled instrumental errors correction (modeled_instr_corr_swh_ku) and system bias";

short swh_20hz_ku(time,meas_ind);
swh_20hz_ku:long_name = "20 Hz Ku band corrected significant waveheight";
swh_20hz_ku:standard_name = "sea_surface_wave_significant_height";
swh_20hz_ku:_FillValue = 32767s;
swh_20hz_ku:units = "m";
swh_20hz_ku:scale_factor = 1.00e-03;
swh_20hz_ku:coordinates = "lon_20Hz lat_20Hz";
swh_20hz_ku:comment = "All instrumental corrections included, i.e. modeled instrumental errors correction (modeled_instr_corr_swh_ku) and system bias";

short swh_c(time);
swh_c:long_name = "C band corrected significant waveheight";
swh_c:standard_name = "sea_surface_wave_significant_height";
swh_c:_FillValue = 32767s;
swh_c:units = "m";
swh_c:scale_factor = 1.00e-03;
swh_c:coordinates = "lon lat";
swh_c:quality_flag = "qual_alt_1hz_swh_c";
swh_c:comment = "All instrumental corrections included, i.e. modeled instrumental errors correction (modeled_instr_corr_swh_c) and system bias";

short swh_20hz_c(time,meas_ind);
swh_20hz_c:long_name = "20 Hz C band corrected significant waveheight";
swh_20hz_c:standard_name = "sea_surface_wave_significant_height";
swh_20hz_c:_FillValue = 32767s;
swh_20hz_c:units = "m";
swh_20hz_c:scale_factor = 1.00e-03;
swh_20hz_c:coordinates = "lon_20Hz lat_20Hz";
swh_20hz_c:comment = "All instrumental corrections included, i.e. modeled instrumental errors correction (modeled_instr_corr_swh_c) and system bias";

byte swh_used_20hz_ku(time,meas_ind);
swh_used_20hz_ku:long_name = "20 Hz flag for utilization in the computation of 1Hz Ku band significant waveheight";
swh_used_20hz_ku:_FillValue = 127b;
swh_used_20hz_ku:flag_values = 0b, 1b;
swh_used_20hz_ku:flag_meanings = "yes no";
swh_used_20hz_ku:coordinates = "lon_20Hz lat_20Hz";
swh_used_20hz_ku:comment = "Map of valid points used to compute the 1-Hz Ku-band significant waveheight";

byte swh_used_20hz_c(time,meas_ind);

```
      swh_used_20hz_c:long_name = "20 Hz flag for utilization in the computation of 1Hz
C band significant waveheight";
      swh_used_20hz_c:_FillValue = 127b;
      swh_used_20hz_c:flag_values = 0b, 1b;
      swh_used_20hz_c:flag_meanings = "yes no";
      swh_used_20hz_c:coordinates = "lon_20Hz lat_20Hz";
      swh_used_20hz_c:comment = "Map of valid points used to compute the 1-Hz C-band
significant waveheight";

short swh_rms_ku(time);
      swh_rms_ku:long_name = "RMS of the Ku band significant waveheight";
      swh_rms_ku:_FillValue = 32767s;
      swh_rms_ku:units = "m";
      swh_rms_ku:scale_factor = 1.00e-03;
      swh_rms_ku:coordinates = "lon lat";
      swh_rms_ku:comment = "Compression of Ku-band high rate elements is preceded by a
detection of outliers. Only valid high-rate values are used to compute this element";

short swh_rms_c(time);
      swh_rms_c:long_name = "RMS of the C band significant waveheight";
      swh_rms_c:_FillValue = 32767s;
      swh_rms_c:units = "m";
      swh_rms_c:scale_factor = 1.00e-03;
      swh_rms_c:coordinates = "lon lat";
      swh_rms_c:comment = "Compression of C-band high rate elements is preceded by a
detection of outliers. Only valid high-rate values are used to compute this element";

byte swh_numval_ku(time);
      swh_numval_ku:long_name = "number of valid points used to compute Ku significant
waveheight";
      swh_numval_ku:_FillValue = 127b;
      swh_numval_ku:units = "count";
      swh_numval_ku:coordinates = "lon lat";
      swh_numval_ku:valid_min = 0b;
      swh_numval_ku:valid_max = 20b;

byte swh_numval_c(time);
      swh_numval_c:long_name = "number of valid points used to compute C significant
waveheight";
      swh_numval_c:_FillValue = 127b;
      swh_numval_c:units = "count";
      swh_numval_c:coordinates = "lon lat";
      swh_numval_c:valid_min = 0b;
      swh_numval_c:valid_max = 20b;
```

// Significant waveheight – ocean-2 (MLE3)

```
short swh_ku_mle3(time);
      swh_ku_mle3:long_name = "Ku band corrected significant waveheight (MLE3
retracking)";
      swh_ku_mle3:standard_name = "sea_surface_wave_significant_height";
      swh_ku_mle3:_FillValue = 32767s;
      swh_ku_mle3:units = "m";
      swh_ku_mle3:scale_factor = 1.00e-03;
      swh_ku_mle3:coordinates = "lon lat";
      swh_ku_mle3:quality_flag = "qual_alt_1hz_swh_ku_mle3";
      swh_ku_mle3:comment = "All instrumental corrections included, i.e. modeled
instrumental errors correction (modeled_instr_corr_swh_ku_mle3) and system bias";

short swh_20hz_ku_mle3(time,meas_ind);
```

```
	swh_20hz_ku_mle3:long_name = "20 Hz Ku band corrected significant waveheight (MLE3
retracking)";
	swh_20hz_ku_mle3:standard_name = "sea_surface_wave_significant_height";
	swh_20hz_ku_mle3:_FillValue = 32767s;
	swh_20hz_ku_mle3:units = "m";
	swh_20hz_ku_mle3:scale_factor = 1.00e-03;
	swh_20hz_ku_mle3:coordinates = "lon_20Hz lat_20Hz";
	swh_20hz_ku_mle3:comment = "All instrumental corrections included, i.e. modeled
instrumental errors correction (modeled_instr_corr_swh_ku_mle3) and system bias";

byte swh_used_20hz_ku_mle3(time,meas_ind);
	swh_used_20hz_ku_mle3:long_name = "20 Hz flag for utilization in the computation
of 1Hz Ku band significant waveheight (MLE3 retracking)";
	swh_used_20hz_ku_mle3:_FillValue = 127b;
	swh_used_20hz_ku_mle3:flag_values = 0b, 1b;
	swh_used_20hz_ku_mle3:flag_meanings = "yes no";
	swh_used_20hz_ku_mle3:coordinates = "lon_20Hz lat_20Hz";
	swh_used_20hz_ku_mle3:comment = "Map of valid points used to compute the 1-Hz Ku-
band significant waveheight";

short swh_rms_ku_mle3(time);
	swh_rms_ku_mle3:long_name = "RMS of the Ku band significant waveheight (MLE3
retracking)";
	swh_rms_ku_mle3:_FillValue = 32767s;
	swh_rms_ku_mle3:units = "m";
	swh_rms_ku_mle3:scale_factor = 1.00e-03;
	swh_rms_ku_mle3:coordinates = "lon lat";
	swh_rms_ku_mle3:comment = "Compression of Ku-band high rate elements is preceded
by a detection of outliers. Only valid high-rate values are used to compute this
element";

byte swh_numval_ku_mle3(time);
	swh_numval_ku_mle3:long_name = "number of valid points used to compute Ku
significant waveheight (MLE3 retracking)";
	swh_numval_ku_mle3:_FillValue = 127b;
	swh_numval_ku_mle3:units = "count";
	swh_numval_ku_mle3:coordinates = "lon lat";
	swh_numval_ku_mle3:valid_min = 0b;
	swh_numval_ku_mle3:valid_max = 20b;
```

// Significant waveheight corrections

```
short net_instr_corr_swh_ku(time);
	net_instr_corr_swh_ku:long_name = "net instrumental correction on Ku band
significant waveheight";
	net_instr_corr_swh_ku:_FillValue = 32767s;
	net_instr_corr_swh_ku:units = "m";
	net_instr_corr_swh_ku:scale_factor = 1.00e-03;
	net_instr_corr_swh_ku:coordinates = "lon lat";
	net_instr_corr_swh_ku:quality_flag = "qual_inst_corr_1hz_swh_ku";
	net_instr_corr_swh_ku:comment = "Sum of modeled instrumental errors correction
(modeled_instr_corr_swh_ku) and system bias";

short net_instr_corr_swh_ku_mle3(time);
	net_instr_corr_swh_ku_mle3:long_name = "net instrumental correction on Ku band
significant waveheight (MLE3 retracking)";
	net_instr_corr_swh_ku_mle3:_FillValue = 32767s;
	net_instr_corr_swh_ku_mle3:units = "m";
	net_instr_corr_swh_ku_mle3:scale_factor = 1.00e-03;
	net_instr_corr_swh_ku_mle3:coordinates = "lon lat";
```

```
      net_instr_corr_swh_ku_mle3:quality_flag = "qual_inst_corr_1hz_swh_ku_mle3";
      net_instr_corr_swh_ku_mle3:comment = "Sum of modeled instrumental errors
correction (modeled_instr_corr_swh_ku_mle3) and system bias";

short net_instr_corr_swh_c(time);
      net_instr_corr_swh_c:long_name = "net instrumental correction on C band
significant waveheight";
      net_instr_corr_swh_c:_FillValue = 32767s;
      net_instr_corr_swh_c:units = "m";
      net_instr_corr_swh_c:scale_factor = 1.00e-03;
      net_instr_corr_swh_c:coordinates = "lon lat";
      net_instr_corr_swh_c:quality_flag = "qual_inst_corr_1hz_swh_c";
      net_instr_corr_swh_c:comment = "Sum of modeled instrumental errors correction
(modeled_instr_corr_swh_c) and system bias";
```

// Backscatter coefficient

```
short sig0_ku(time);
      sig0_ku:long_name = "Ku band corrected backscatter coefficient";
      sig0_ku:standard_name = "surface_backwards_scattering_coefficient_of_radar_wave";
      sig0_ku:_FillValue = 32767s;
      sig0_ku:units = "dB";
      sig0_ku:scale_factor = 1.00e-02;
      sig0_ku:coordinates = "lon lat";
      sig0_ku:quality_flag = "qual_alt_1hz_sig0_ku";
      sig0_ku:comment = "All instrumental corrections included, excepted the system
bias, i.e. AGC instrumental errors correction, internal calibration correction
(internal_corr_sig0_ku), modeled instrumental errors correction
(modeled_instr_corr_sig0_ku) and atmospheric attenuation (atmos_corr_sig0_ku)";

short sig0_20hz_ku(time,meas_ind);
      sig0_20hz_ku:long_name = "20 Hz Ku band corrected backscatter coefficient";
      sig0_20hz_ku:standard_name =
"surface_backwards_scattering_coefficient_of_radar_wave";
      sig0_20hz_ku:_FillValue = 32767s;
      sig0_20hz_ku:units = "dB";
      sig0_20hz_ku:scale_factor = 1.00e-02;
      sig0_20hz_ku:coordinates = "lon_20Hz lat_20Hz";
      sig0_20hz_ku:comment = "All instrumental corrections included, excepted the system
bias, i.e. AGC instrumental errors correction, internal calibration correction
(internal_corr_sig0_ku), modeled instrumental errors correction
(modeled_instr_corr_sig0_ku) and atmospheric attenuation (atmos_corr_sig0_ku)";

short sig0_c(time);
      sig0_c:long_name = "C band corrected backscatter coefficient";
      sig0_c:standard_name = "surface_backwards_scattering_coefficient_of_radar_wave";
      sig0_c:_FillValue = 32767s;
      sig0_c:units = "dB";
      sig0_c:scale_factor = 1.00e-02;
      sig0_c:coordinates = "lon lat";
      sig0_c:quality_flag = "qual_alt_1hz_sig0_c";
      sig0_c:comment = "All instrumental corrections included, excepted the system bias,
i.e. AGC instrumental errors correction, internal calibration correction
(internal_corr_sig0_c), modeled instrumental errors correction
(modeled_instr_corr_sig0_c) and atmospheric attenuation (atmos_corr_sig0_c)";

short sig0_20hz_c(time,meas_ind);
      sig0_20hz_c:long_name = "20 Hz C band corrected backscatter coefficient";
      sig0_20hz_c:standard_name =
"surface_backwards_scattering_coefficient_of_radar_wave";
```

```
       sig0_20hz_c:_FillValue = 32767s;
       sig0_20hz_c:units = "dB";
       sig0_20hz_c:scale_factor = 1.00e-02;
       sig0_20hz_c:coordinates = "lon_20Hz lat_20Hz";
       sig0_20hz_c:comment = "All instrumental corrections included, excepted the system
bias, i.e. AGC instrumental errors correction, internal calibration correction
(internal_corr_sig0_c), modeled instrumental errors correction
(modeled_instr_corr_sig0_c) and atmospheric attenuation (atmos_corr_sig0_c)";

byte sig0_used_20hz_ku(time,meas_ind);
       sig0_used_20hz_ku:long_name = "20 Hz flag for utilization in the computation of
1Hz Ku band backscatter coefficient";
       sig0_used_20hz_ku:_FillValue = 127b;
       sig0_used_20hz_ku:flag_values = 0b, 1b;
       sig0_used_20hz_ku:flag_meanings = "yes no";
       sig0_used_20hz_ku:coordinates = "lon_20Hz lat_20Hz";
       sig0_used_20hz_ku:comment = "Map of valid points used to compute the 1-Hz Ku-band
backscatter coefficient";

byte sig0_used_20hz_c(time,meas_ind);
       sig0_used_20hz_c:long_name = "20 Hz flag for utilization in the computation of 1Hz
C band backscatter coefficient";
       sig0_used_20hz_c:_FillValue = 127b;
       sig0_used_20hz_c:flag_values = 0b, 1b;
       sig0_used_20hz_c:flag_meanings = "yes no";
       sig0_used_20hz_c:coordinates = "lon_20Hz lat_20Hz";
       sig0_used_20hz_c:comment = "Map of valid points used to compute the 1-Hz C-band
backscatter coefficient";

short sig0_rms_ku(time);
       sig0_rms_ku:long_name = "RMS of the Ku band backscatter coefficient";
       sig0_rms_ku:_FillValue = 32767s;
       sig0_rms_ku:units = "dB";
       sig0_rms_ku:scale_factor = 1.00e-02;
       sig0_rms_ku:coordinates = "lon lat";
       sig0_rms_ku:comment = "Compression of Ku-band high rate elements is preceded by a
detection of outliers. Only valid high-rate values are used to compute this element";

short sig0_rms_c(time);
       sig0_rms_c:long_name = "RMS of the C band backscatter coefficient";
       sig0_rms_c:_FillValue = 32767s;
       sig0_rms_c:units = "dB";
       sig0_rms_c:scale_factor = 1.00e-02;
       sig0_rms_c:coordinates = "lon lat";
       sig0_rms_c:comment = "Compression of C-band high rate elements is preceded by a
detection of outliers. Only valid high-rate values are used to compute this element";

byte sig0_numval_ku(time);
       sig0_numval_ku:long_name = "number of valid points used to compute Ku backscatter
coefficient";
       sig0_numval_ku:_FillValue = 127b;
       sig0_numval_ku:units = "count";
       sig0_numval_ku:coordinates = "lon lat";
       sig0_numval_ku:valid_min = 0b;
       sig0_numval_ku:valid_max = 20b;

byte sig0_numval_c(time);
       sig0_numval_c:long_name = "number of valid points used to compute C backscatter
coefficient";
       sig0_numval_c:_FillValue = 127b;
       sig0_numval_c:units = "count";
```

```
      sig0_numval_c:coordinates = "lon lat";
      sig0_numval_c:valid_min = 0b;
      sig0_numval_c:valid_max = 20b;
```

// Backscatter coefficient – ocean-2 (MLE3)

```
short sig0_ku_mle3(time);
      sig0_ku_mle3:long_name = "Ku band corrected backscatter coefficient (MLE3
retracking)";
      sig0_ku_mle3:standard_name =
"surface_backwards_scattering_coefficient_of_radar_wave";
      sig0_ku_mle3:_FillValue = 32767s;
      sig0_ku_mle3:units = "dB";
      sig0_ku_mle3:scale_factor = 1.00e-02;
      sig0_ku_mle3:coordinates = "lon lat";
      sig0_ku_mle3:quality_flag = "qual_alt_1hz_sig0_ku_mle3";
      sig0_ku_mle3:comment = "All instrumental corrections included, excepted the system
bias, i.e. AGC instrumental errors correction, internal calibration correction
(internal_corr_sig0_ku), modeled instrumental errors correction
(modeled_instr_corr_sig0_ku_mle3) and atmospheric attenuation (atmos_corr_sig0_ku)";

short sig0_20hz_ku_mle3(time,meas_ind);
      sig0_20hz_ku_mle3:long_name = "20 Hz Ku band corrected backscatter coefficient
(MLE3 retracking)";
      sig0_20hz_ku_mle3:standard_name =
"surface_backwards_scattering_coefficient_of_radar_wave";
      sig0_20hz_ku_mle3:_FillValue = 32767s;
      sig0_20hz_ku_mle3:units = "dB";
      sig0_20hz_ku_mle3:scale_factor = 1.00e-02;
      sig0_20hz_ku_mle3:coordinates = "lon_20Hz lat_20Hz";
      sig0_20hz_ku_mle3:comment = "All instrumental corrections included, excepted the
system bias, i.e. AGC instrumental errors correction, internal calibration correction
(internal_corr_sig0_ku), modeled instrumental errors correction
(modeled_instr_corr_sig0_ku_mle3) and atmospheric attenuation (atmos_corr_sig0_ku)";

byte sig0_used_20hz_ku_mle3(time,meas_ind);
      sig0_used_20hz_ku_mle3:long_name = "20 Hz flag for utilization in the computation
of 1Hz Ku band backscatter coefficient (MLE3 retracking)";
      sig0_used_20hz_ku_mle3:_FillValue = 127b;
      sig0_used_20hz_ku_mle3:flag_values = 0b, 1b;
      sig0_used_20hz_ku_mle3:flag_meanings = "yes no";
      sig0_used_20hz_ku_mle3:coordinates = "lon_20Hz lat_20Hz";
      sig0_used_20hz_ku_mle3:comment = "Map of valid points used to compute the 1-Hz Ku-
band backscatter coefficient";

short sig0_rms_ku_mle3(time);
      sig0_rms_ku_mle3:long_name = "RMS of the Ku band backscatter coefficient (MLE3
retracking)";
      sig0_rms_ku_mle3:_FillValue = 32767s;
      sig0_rms_ku_mle3:units = "dB";
      sig0_rms_ku_mle3:scale_factor = 1.00e-02;
      sig0_rms_ku_mle3:coordinates = "lon lat";
      sig0_rms_ku_mle3:comment = "Compression of Ku-band high rate elements is preceded
by a detection of outliers. Only valid high-rate values are used to compute this
element";

byte sig0_numval_ku_mle3(time);
      sig0_numval_ku_mle3:long_name = "number of valid points used to compute Ku
backscatter coefficient (MLE3 retracking)";
      sig0_numval_ku_mle3:_FillValue = 127b;
```

```
       sig0_numval_ku_mle3:units = "count";
       sig0_numval_ku_mle3:coordinates = "lon lat";
       sig0_numval_ku_mle3:valid_min = 0b;
       sig0_numval_ku_mle3:valid_max = 20b;
```

// Tracker AGC

```
short agc_ku(time);
       agc_ku:long_name = "Ku band corrected AGC";
       agc_ku:_FillValue = 32767s;
       agc_ku:units = "dB";
       agc_ku:scale_factor = 1.00e-02;
       agc_ku:coordinates = "lon lat";
       agc_ku:comment = "AGC is corrected for instrumental errors due to the
imperfections of the on-board attenuators";

short agc_c(time);
       agc_c:long_name = "C band corrected AGC";
       agc_c:_FillValue = 32767s;
       agc_c:units = "dB";
       agc_c:scale_factor = 1.00e-02;
       agc_c:coordinates = "lon lat";
       agc_c:comment = "AGC is corrected for instrumental errors due to the imperfections
of the on-board attenuators";

short agc_rms_ku(time);
       agc_rms_ku:long_name = "RMS of the Ku band AGC";
       agc_rms_ku:_FillValue = 32767s;
       agc_rms_ku:units = "dB";
       agc_rms_ku:scale_factor = 1.00e-02;
       agc_rms_ku:coordinates = "lon lat";
       agc_rms_ku:comment = "Compression of Ku-band high rate elements is preceded by a
detection of outliers. Only valid high-rate values are used to compute this element";

short agc_rms_c(time);
       agc_rms_c:long_name = "RMS of the C band AGC";
       agc_rms_c:_FillValue = 32767s;
       agc_rms_c:units = "dB";
       agc_rms_c:scale_factor = 1.00e-02;
       agc_rms_c:coordinates = "lon lat";
       agc_rms_c:comment = "Compression of C-band high rate elements is preceded by a
detection of outliers. Only valid high-rate values are used to compute this element";

byte agc_numval_ku(time);
       agc_numval_ku:long_name = "number of valid points used to compute Ku band AGC";
       agc_numval_ku:_FillValue = 127b;
       agc_numval_ku:units = "count";
       agc_numval_ku:coordinates = "lon lat";
       agc_numval_ku:valid_min = 0b;
       agc_numval_ku:valid_max = 20b;

byte agc_numval_c(time);
       agc_numval_c:long_name = "number of valid points used to compute C band AGC";
       agc_numval_c:_FillValue = 127b;
       agc_numval_c:units = "count";
       agc_numval_c:coordinates = "lon lat";
       agc_numval_c:valid_min = 0b;
       agc_numval_c:valid_max = 20b;
```

// Backscatter coefficient corrections

```
short net_instr_corr_sig0_ku(time);
       net_instr_corr_sig0_ku:long_name = "net instrumental correction on Ku backscatter
coefficient";
       net_instr_corr_sig0_ku:_FillValue = 32767s;
       net_instr_corr_sig0_ku:units = "dB";
       net_instr_corr_sig0_ku:scale_factor = 1.00e-02;
       net_instr_corr_sig0_ku:coordinates = "lon lat";
       net_instr_corr_sig0_ku:quality_flag = "qual_inst_corr_1hz_sig0_ku";
       net_instr_corr_sig0_ku:comment = "Sum of AGC instrumental errors correction,
internal calibration correction (internal_corr_sig0_ku) and modeled instrumental errors
correction (modeled_instr_corr_sig0_ku) - system bias not included";

short net_instr_corr_sig0_ku_mle3(time);
       net_instr_corr_sig0_ku_mle3:long_name = "net instrumental correction on Ku
backscatter coefficient (MLE3 retracking)";
       net_instr_corr_sig0_ku_mle3:_FillValue = 32767s;
       net_instr_corr_sig0_ku_mle3:units = "dB";
       net_instr_corr_sig0_ku_mle3:scale_factor = 1.00e-02;
       net_instr_corr_sig0_ku_mle3:coordinates = "lon lat";
       net_instr_corr_sig0_ku_mle3:quality_flag = "qual_inst_corr_1hz_sig0_ku_mle3";
       net_instr_corr_sig0_ku_mle3:comment = "Sum of AGC instrumental errors correction,
internal calibration correction (internal_corr_sig0_ku) and modeled instrumental errors
correction (modeled_instr_corr_sig0_ku_mle3) - system bias not included";

short net_instr_corr_sig0_c(time);
       net_instr_corr_sig0_c:long_name = "net instrumental correction on C backscatter
coefficient";
       net_instr_corr_sig0_c:_FillValue = 32767s;
       net_instr_corr_sig0_c:units = "dB";
       net_instr_corr_sig0_c:scale_factor = 1.00e-02;
       net_instr_corr_sig0_c:coordinates = "lon lat";
       net_instr_corr_sig0_c:quality_flag = "qual_inst_corr_1hz_sig0_c";
       net_instr_corr_sig0_c:comment = "Sum of AGC instrumental errors correction,
internal calibration correction (internal_corr_sig0_c) and modeled instrumental errors
correction (modeled_instr_corr_sig0_c) - system bias not included";

short atmos_corr_sig0_ku(time);
       atmos_corr_sig0_ku:long_name = "atmospheric attenuation correction on Ku band
backscatter coefficient";
       atmos_corr_sig0_ku:_FillValue = 32767s;
       atmos_corr_sig0_ku:units = "dB";
       atmos_corr_sig0_ku:scale_factor = 1.00e-02;
       atmos_corr_sig0_ku:coordinates = "lon lat";

short atmos_corr_sig0_c(time);
       atmos_corr_sig0_c:long_name = "atmospheric attenuation correction on C band
backscatter coefficient";
       atmos_corr_sig0_c:_FillValue = 32767s;
       atmos_corr_sig0_c:units = "dB";
       atmos_corr_sig0_c:scale_factor = 1.00e-02;
       atmos_corr_sig0_c:coordinates = "lon lat";
```

// Off nadir angle

```
short off_nadir_angle_wf_ku(time);
       off_nadir_angle_wf_ku:long_name = "square of the off nadir angle computed from Ku
waveforms";
```

```
      off_nadir_angle_wf_ku:_FillValue = 32767s;
      off_nadir_angle_wf_ku:units = "degrees^2";
      off_nadir_angle_wf_ku:scale_factor = 1.00e-04;
      off_nadir_angle_wf_ku:coordinates = "lon lat";
      off_nadir_angle_wf_ku:quality_flag = "qual_alt_1hz_off_nadir_angle_wf_ku";

short off_nadir_angle_wf_20hz_ku(time,meas_ind);
      off_nadir_angle_wf_20hz_ku:long_name = "20 Hz square of the off nadir angle
computed from Ku waveforms";
      off_nadir_angle_wf_20hz_ku:_FillValue = 32767s;
      off_nadir_angle_wf_20hz_ku:units = "degrees^2";
      off_nadir_angle_wf_20hz_ku:scale_factor = 1.00e-04;
      off_nadir_angle_wf_20hz_ku:coordinates = "lon_20Hz lat_20Hz";
```

// Brightness temperatures

```
short tb_187(time);
      tb_187:long_name = "18.7 GHz main beam brightness temperature";
      tb_187:standard_name = "surface_brightness_temperature";
      tb_187:_FillValue = 32767s;
      tb_187:units = "K";
      tb_187:scale_factor = 1.00e-02;
      tb_187:coordinates = "lon lat";
      tb_187:quality_flag = "qual_rad_1hz_tb187";
      tb_187:comment = "Brightness temperatures are unsmoothed (along-track averaging
has not been performed on the brightness temperatures)";

short tb_238(time);
      tb_238:long_name = "23.8 GHz main beam brightness temperature";
      tb_238:standard_name = "surface_brightness_temperature";
      tb_238:_FillValue = 32767s;
      tb_238:units = "K";
      tb_238:scale_factor = 1.00e-02;
      tb_238:coordinates = "lon lat";
      tb_238:quality_flag = "qual_rad_1hz_tb238";
      tb_238:comment = "Brightness temperatures are unsmoothed (along-track averaging
has not been performed on the brightness temperatures)";

short tb_340(time);
      tb_340:long_name = "34 GHz main beam brightness temperature";
      tb_340:standard_name = "surface_brightness_temperature";
      tb_340:_FillValue = 32767s;
      tb_340:units = "K";
      tb_340:scale_factor = 1.00e-02;
      tb_340:coordinates = "lon lat";
      tb_340:quality_flag = "qual_rad_1hz_tb340";
      tb_340:comment = "Brightness temperatures are unsmoothed (along-track averaging
has not been performed on the brightness temperatures)";

short tb_187_smoothed(time);
      tb_187_smoothed:long_name = "18.7 GHz main beam smoothed brightness temperature";
      tb_187_smoothed:standard_name = "surface_brightness_temperature";
      tb_187_smoothed:_FillValue = 32767s;
      tb_187_smoothed:units = "K";
      tb_187_smoothed:scale_factor = 1.00e-02;
      tb_187_smoothed:coordinates = "lon lat";
      tb_187_smoothed:quality_flag = "qual_rad_1hz_tb187";
      tb_187_smoothed:comment = "Brightness temperatures are along-track averaged";
```

```
short tb_238_smoothed (time);
       tb_238_smoothed:long_name = "23.8 GHz main beam smoothed brightness temperature";
       tb_238_smoothed:standard_name = "surface_brightness_temperature";
       tb_238_smoothed:_FillValue = 32767s;
       tb_238_smoothed:units = "K";
       tb_238_smoothed:scale_factor = 1.00e-02;
       tb_238_smoothed:coordinates = "lon lat";
       tb_238_smoothed:quality_flag = "qual_rad_1hz_tb238";
       tb_238_smoothed:comment = "Brightness temperatures are along-track averaged";

short tb_340_smoothed (time);
       tb_340_smoothed:long_name = "34 GHz main beam smoothed brightness temperature";
       tb_340_smoothed:standard_name = "surface_brightness_temperature";
       tb_340_smoothed:_FillValue = 32767s;
       tb_340_smoothed:units = "K";
       tb_340_smoothed:scale_factor = 1.00e-02;
       tb_340_smoothed:coordinates = "lon lat";
       tb_340_smoothed:quality_flag = "qual_rad_1hz_tb340";
       tb_340_smoothed:comment = "Brightness temperatures are along-track averaged";
```

// Geophysical parameters

```
int mean_sea_surface(time);
       mean_sea_surface:long_name = "mean sea surface height above reference ellipsoid";
       mean_sea_surface:source = [mean_sea_surface_source];
       mean_sea_surface:institution = [mean_sea_surface_institution];
       mean_sea_surface:_FillValue = 2147483647;
       mean_sea_surface:units = "m";
       mean_sea_surface:scale_factor = 1.00e-04;
       mean_sea_surface:coordinates = "lon lat";
       mean_sea_surface:quality_flag = "interp_flag_mean_sea_surface";
       mean_sea_surface:comment = "See Jason-2 User Handbook";

int mean_topography(time);
       mean_topography:long_name = "mean dynamic topography above geoid";
       mean_topography:source = [mdt_source];
       mean_topography:institution = [mdt_institution];
       mean_topography:_FillValue = 2147483647;
       mean_topography:units = "m";
       mean_topography:scale_factor = 1.00e-04;
       mean_topography:coordinates = "lon lat";
       mean_topography:quality_flag = "interp_flag_mdt";
       mean_topography:comment = "See Jason-2 User Handbook";

int geoid(time);
       geoid:long_name = "geoid height";
       geoid:standard_name = "geoid_height_above_reference_ellipsoid";
       geoid:source = [geoid_source];
       geoid:institution = [geoid_institution];
       geoid:_FillValue = 2147483647;
       geoid:units = "m";
       geoid:scale_factor = 1.00e-04;
       geoid:coordinates = "lon lat";
       geoid: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). See
Jason-2 User Handbook";

int bathymetry(time);
       bathymetry:long_name = "ocean depth/land elevation";
       bathymetry:source = [bathy_topo_source];
```

```
      bathymetry:institution = [bathy_topo_institution];
      bathymetry:_FillValue = 2147483647;
      bathymetry:units = "m";
      bathymetry:coordinates = "lon lat";

short inv_bar_corr(time);
      inv_bar_corr:long_name = "inverted barometer height correction";
      inv_bar_corr:standard_name =
"sea_surface_height_correction_due_to_air_pressure_at_low_frequency";
      inv_bar_corr:source = [mto_fields_source];
      inv_bar_corr:institution = [mto_fields_institution];
      inv_bar_corr:_FillValue = 32767s;
      inv_bar_corr:units = "m";
      inv_bar_corr:scale_factor = 1.00e-04;
      inv_bar_corr:coordinates = "lon lat";
      inv_bar_corr:quality_flag = "interp_flag_meteo";
      inv_bar_corr:comment = "Computed at the altimeter time-tag from the interpolation
of 2 meteorological fields that surround the altimeter time-tag. See Jason-2 User
Handbook";

short hf_fluctuations_corr(time);
      hf_fluctuations_corr:long_name = "high frequency fluctuations of the sea surface
topography";
      hf_fluctuations_corr:standard_name =
"sea_surface_height_correction_due_to_air_pressure_and_wind_at_high_frequency";
      hf_fluctuations_corr:institution = [mog2d_institution];
      hf_fluctuations_corr:_FillValue = 32767s;
      hf_fluctuations_corr:units = "m";
      hf_fluctuations_corr:scale_factor = 1.00e-04;
      hf_fluctuations_corr:coordinates = "lon lat";
      hf_fluctuations_corr:comment = "Provided as a correction to the inverted barometer
correction (inv_bar_corr)";

int ocean_tide_sol1(time);
      ocean_tide_sol1:long_name = "geocentric ocean tide height (solution 1)";
      ocean_tide_sol1:standard_name =
"sea_surface_height_amplitude_due_to_geocentric_ocean_tide";
      ocean_tide_sol1:source = [ocean_tide_sol1_source];
      ocean_tide_sol1:institution = [ocean_tide_sol1_institution];
      ocean_tide_sol1:_FillValue = 2147483647;
      ocean_tide_sol1:units = "m";
      ocean_tide_sol1:scale_factor = 1.00e-04;
      ocean_tide_sol1:coordinates = "lon lat";
      ocean_tide_sol1:quality_flag = "interp_flag_ocean_tide_sol1";
      ocean_tide_sol1:comment = "Solution 1 corresponds to GOT4.8 model. Includes the
corresponding loading tide (load_tide_sol1) and equilibrium long-period ocean tide height
(ocean_tide_equil). The permanent tide (zero frequency) is not included in this parameter
because it is included in the geoid and mean sea surface (geoid, mean_sea_surface). See
Jason-2 User Handbook";

int ocean_tide_sol2(time);
      ocean_tide_sol2:long_name = "geocentric ocean tide height (solution 2)";
      ocean_tide_sol2:standard_name =
"sea_surface_height_amplitude_due_to_geocentric_ocean_tide";
      ocean_tide_sol2:source = [ocean_tide_sol2_source];
      ocean_tide_sol2:institution = [ocean_tide_sol2_institution];
      ocean_tide_sol2:_FillValue = 2147483647;
      ocean_tide_sol2:units = "m";
      ocean_tide_sol2:scale_factor = 1.00e-04;
      ocean_tide_sol2:coordinates = "lon lat";
      ocean_tide_sol2:quality_flag = "interp_flag_ocean_tide_sol2";
```

ocean_tide_sol2:comment = "Solution 2 corresponds to FES2004 model. Includes the corresponding loading tide (load_tide_sol2) and equilibrium long-period ocean tide height (ocean_tide_equil). The permanent tide (zero frequency) is not included in this parameter because it is included in the geoid and mean sea surface (geoid, mean_sea_surface). See Jason-2 User Handbook";

short ocean_tide_equil(time);
ocean_tide_equil:long_name = "equilibrium long-period ocean tide height";
ocean_tide_equil:standard_name = "sea_surface_height_amplitude_due_to_equilibrium_ocean_tide";
ocean_tide_equil:source = [ocean_tide_eq_source];
ocean_tide_equil:_FillValue = 32767s;
ocean_tide_equil:units = "m";
ocean_tide_equil:scale_factor = 1.00e-04;
ocean_tide_equil:coordinates = "lon lat";
ocean_tide_equil:comment = "This value has already been added to the two geocentric ocean tide height values recorded in the product (ocean_tide_sol1 and ocean_tide_sol2). The permanent tide (zero frequency) is not included in this parameter because it is included in the geoid and mean sea surface (geoid, mean_sea_surface). See Jason-2 User Handbook";

short ocean_tide_non_equil(time);
ocean_tide_non_equil:long_name = "non-equilibrium long-period ocean tide height";
ocean_tide_non_equil:standard_name = "sea_surface_height_amplitude_due_to_non_equilibrium_ocean_tide";
ocean_tide_non_equil:source = [ocean_tide_neq_source];
ocean_tide_non_equil:institution = [ocean_tide_neq_institution];
ocean_tide_non_equil:_FillValue = 32767s;
ocean_tide_non_equil:units = "m";
ocean_tide_non_equil:scale_factor = 1.00e-04;
ocean_tide_non_equil:coordinates = "lon lat";
ocean_tide_non_equil:comment = "This parameter is computed as a correction to the parameter ocean_tide_equil. This value can be added to ocean_tide_equil (or ocean_tide_sol1, ocean_tide_sol2) so that the resulting value models the total non equilibrium ocean tide height. See Jason-2 User Handbook”;

short load_tide_sol1(time);
load_tide_sol1:long_name = "load tide height for geocentric ocean tide (solution 1)";
load_tide_sol1:source = [tidal_loading_sol1_source];
load_tide_sol1:institution = [tidal_loading_sol1_institution];
load_tide_sol1:_FillValue = 32767s;
load_tide_sol1:units = "m";
load_tide_sol1:scale_factor = 1.00e-04;
load_tide_sol1:coordinates = "lon lat";
load_tide_sol1:comment = "This value has already been added to the corresponding ocean tide height value recorded in the product (ocean_tide_sol1). See Jason-2 User Handbook”;

short load_tide_sol2(time);
load_tide_sol2:long_name = "load tide height for geocentric ocean tide (solution 2)";
load_tide_sol2:source = [tidal_loading_sol2_source];
load_tide_sol2:institution = [tidal_loading_sol2_institution];
load_tide_sol2:_FillValue = 32767s;
load_tide_sol2:units = "m";
load_tide_sol2:scale_factor = 1.00e-04;
load_tide_sol2:coordinates = "lon lat";
load_tide_sol2:comment = "This value has already been added to the corresponding ocean tide height value recorded in the product (ocean_tide_sol2). See Jason-2 User Handbook”;

```
short solid_earth_tide(time);
       solid_earth_tide:long_name = "solid earth tide height";
       solid_earth_tide::standard_name =
"sea_surface_height_amplitude_due_to_earth_tide";
       solid_earth_tide::source = [solid_earth_tide_source];
       solid_earth_tide:_FillValue = 32767s;
       solid_earth_tide:units = "m";
       solid_earth_tide:scale_factor = 1.00e-04;
       solid_earth_tide:coordinates = "lon lat";
       solid_earth_tide:comment = "Calculated using Cartwright and Tayler tables and
consisting of the second and third degree constituents. The permanent tide (zero
frequency) is not included. See Jason-2 User Handbook";

short pole_tide(time);
       pole_tide:long_name = "geocentric pole tide height";
       pole_tide:standard_name = "sea_surface_height_amplitude_due_to_pole_tide";
       pole_tide:source = [pole_tide_source];
       pole_tide:_FillValue = 32767s;
       pole_tide:units = "m";
       pole_tide:scale_factor = 1.00e-04;
       pole_tide:coordinates = "lon lat";
       pole_tide:comment = "See Jason-2 User Handbook”;
```

// Environmental parameters

```
short wind_speed_model_u(time);
       wind_speed_model_u:long_name = "U component of the model wind vector";
       wind_speed_model_u:standard_name = "wind_speed";
       wind_speed_model_u:source = [mto_fields_source];
       wind_speed_model_u:institution = [mto_fields_institution];
       wind_speed_model_u:_FillValue = 32767s;
       wind_speed_model_u:units = "m/s";
       wind_speed_model_u:scale_factor = 1.00e-02;
       wind_speed_model_u:coordinates = "lon lat";
       wind_speed_model_u:quality_flag = "interp_flag_meteo and ecmwf_meteo_map_avail";
       wind_speed_model_u:comment = "Computed at the altimeter time-tag from the
interpolation of 2 meteorological fields that surround the altimeter time-tag. See Jason-
2 User Handbook”;

short wind_speed_model_v(time);
       wind_speed_model_v:long_name = "V component of the model wind vector";
       wind_speed_model_v:standard_name = "wind_speed";
       wind_speed_model_v:source = [mto_fields_source];
       wind_speed_model_v:institution = [mto_fields_institution];
       wind_speed_model_v:_FillValue = 32767s;
       wind_speed_model_v:units = "m/s";
       wind_speed_model_v:scale_factor = 1.00e-02;
       wind_speed_model_v:coordinates = "lon lat";
       wind_speed_model_v:quality_flag = "interp_flag_meteo and ecmwf_meteo_map_avail";
       wind_speed_model_v:comment = "Computed at the altimeter time-tag from the
interpolation of 2 meteorological fields that surround the altimeter time-tag. See Jason-
2 User Handbook”;

short wind_speed_alt(time);
       wind_speed_alt:long_name = "altimeter wind speed";
       wind_speed_alt:standard_name = "wind_speed";
       wind_speed_alt:_FillValue = 32767s;
       wind_speed_alt:units = "m/s";
       wind_speed_alt:scale_factor = 1.00e-02;
```

```
      wind_speed_alt:coordinates = "lon lat";
      wind_speed_alt:comment = "Should not be used over land. See Jason-2 User Handbook.
A calibration bias of 0.32 dB has been added to the Ku-band backscatter
coefficient (sig0_ku) before computing the wind speed";

short wind_speed_alt_mle3(time);
      wind_speed_alt_mle3:long_name = "altimeter wind speed (MLE3 retracking)";
      wind_speed_alt_mle3:standard_name = "wind_speed";
      wind_speed_alt_mle3:_FillValue = 32767s;
      wind_speed_alt_mle3:units = "m/s";
      wind_speed_alt_mle3:scale_factor = 1.00e-02;
      wind_speed_alt_mle3:coordinates = "lon lat";
      wind_speed_alt_mle3:comment = "Should not be used over land. See Jason-2 User
Handbook. A calibration bias of 0.34 dB has been added to the Ku-band backscatter
coefficient (sig0_ku_mle3) before computing the wind speed";

short wind_speed_rad(time);
      wind_speed_rad:long_name = "radiometer wind speed";
      wind_speed_rad:standard_name = "wind_speed";
      wind_speed_rad:source = [radiometer_sensor_name];
      wind_speed_rad:institution = [radiometer_sensor_institution];
      wind_speed_rad:_FillValue = 32767s;
      wind_speed_rad:units = "m/s";
      wind_speed_rad:scale_factor = 1.00e-02;
      wind_speed_rad:coordinates = "lon lat";
      wind_speed_rad:comment = "Should not be used over land. See Jason-2 User
Handbook”;

short rad_water_vapor(time);
      rad_water_vapor:long_name = "radiometer water vapor content";
      rad_water_vapor:standard_name = "atmosphere_water_vapor_content";
      rad_water_vapor:source = [radiometer_sensor_name];
      rad_water_vapor:institution = [radiometer_sensor_institution];
      rad_water_vapor:_FillValue = 32767s;
      rad_water_vapor:units = "kg/m^2";
      rad_water_vapor:scale_factor = 1.00e-01;
      rad_water_vapor:coordinates = "lon lat";
      rad_water_vapor:quality_flag = "qual_rad_1hz_tb187 and qual_rad_1hz_tb238 and
qual_rad_1hz_tb340 and interp_flag_tb";
      rad_water_vapor:comment = "Should not be used over land";

short rad_liquid_water(time);
      rad_liquid_water:long_name = "radiometer liquid water content";
      rad_liquid_water:standard_name = "atmosphere_cloud_liquid_water_content";
      rad_liquid_water:source = [radiometer_sensor_name];
      rad_liquid_water:institution = [radiometer_sensor_institution];
      rad_liquid_water:_FillValue = 32767s;
      rad_liquid_water:units = "kg/m^2";
      rad_liquid_water:scale_factor = 1.00e-02;
      rad_liquid_water:coordinates = "lon lat";
      rad_liquid water:quality_flag = "qual_rad_1hz_tb187 and qual_rad_1hz_tb238 and
qual_rad_1hz_tb340 and interp_flag_tb";
      rad_liquid water:comment = "Should not be used over land";
```

// Ice retracking

```
int ice_range_20hz_ku(time,meas_ind);
      ice_range_20hz_ku:long_name = "20 Hz Ku band altimeter range (ice retracking)";
      ice_range_20hz_ku:standard_name = "altimeter_range”;
      ice_range_20hz_ku:_FillValue = 2147483647;
```

```
      ice_range_20hz_ku:units = "m";
      ice_range_20hz_ku:add_offset = 1.300000e+06;
      ice_range_20hz_ku:scale_factor = 1.00e-04;
      ice_range_20hz_ku:coordinates = "lon_20Hz lat_20Hz";
      ice_range_20hz_ku:comment = "Distance antenna-COG (cog_corr), USO drift correction
(uso_corr) and internal path correction (internal_path_delay_corr_ku) included";

int ice_range_20hz_c(time,meas_ind);
      ice_range_20hz_c:long_name = "20 Hz C band altimeter range (ice retracking)";
      ice_range_20hz_c:standard_name = "altimeter_range”;
      ice_range_20hz_c:_FillValue = 2147483647;
      ice_range_20hz_c:units = "m";
      ice_range_20hz_c:add_offset = 1.300000e+06;
      ice_range_20hz_c:scale_factor = 1.00e-04;
      ice_range_20hz_c:coordinates = "lon_20Hz lat_20Hz";
      ice_range_20hz_c:comment = "Distance antenna-COG (cog_corr), USO drift correction
(uso_corr) and internal path correction (internal_path_delay_corr_c) included";

short ice_sig0_20hz_ku(time,meas_ind);
      ice_sig0_20hz_ku:long_name = "20 Hz Ku band backscatter coefficient (ice
retracking)";
      ice_sig0_20hz_ku:standard_name =
"surface_backwards_scattering_coefficient_of_radar_wave";
      ice_sig0_20hz_ku:_FillValue = 32767s;
      ice_sig0_20hz_ku:units = "dB";
      ice_sig0_20hz_ku:scale_factor = 1.00e-02;
      ice_sig0_20hz_ku:coordinates = "lon_20Hz lat_20Hz";
      ice_sig0_20hz_ku:comment = "AGC instrumental errors correction and internal
calibration correction (internal_corr_sig0_ku) included";

short ice_sig0_20hz_c(time,meas_ind);
      ice_sig0_20hz_c:long_name = "20 Hz C band backscatter coefficient (ice
retracking)";
      ice_sig0_20hz_c:standard_name =
"surface_backwards_scattering_coefficient_of_radar_wave";
      ice_sig0_20hz_c:_FillValue = 32767s;
      ice_sig0_20hz_c:units = "dB";
      ice_sig0_20hz_c:scale_factor = 1.00e-02;
      ice_sig0_20hz_c:coordinates = "lon_20Hz lat_20Hz";
      ice_sig0_20hz_c:comment = "AGC instrumental errors correction and internal
calibration correction (internal_corr_sig0_c) included";
```

// Ice retracking outputs

```
byte ice_qual_flag_20hz_ku(time,meas_ind);
      ice_qual_flag_20hz_ku:long_name = "20 Hz Ku band ice retracking quality flag";
      ice_qual_flag_20hz_ku:_FillValue = 127b;
      ice_qual_flag_20hz_ku:flag_values = 0b, 1b;
      ice_qual_flag_20hz_ku:flag_meanings = "good bad";
      ice_qual_flag_20hz_ku:coordinates = "lon_20hz lat_20hz";
      ice_qual_flag_20hz_ku:comment = "ice retracking quality flag";
```

// Waveforms characteristics

```
short mqe_20hz_ku(time,meas_ind);
      mqe_20hz_ku:long_name = "20 Hz Ku band MQE (ocean retracking)";
      mqe_20hz_ku:_FillValue = 32767s;
      mqe_20hz_ku:units = "count";
```

```
      mqe_20hz_ku:scale_factor = 1.00e-04;
      mqe_20hz_ku:coordinates = "lon_20Hz lat_20Hz";
      mqe_20hz_ku:comment = "Mean Quadratic Error between the waveforms samples and the
corresponding model samples built from the ocean retracking outputs";

short mqe_20hz_ku_mle3(time,meas_ind);
      mqe_20hz_ku_mle3:long_name = "20 Hz Ku band MQE (MLE3 retracking)";
      mqe_20hz_ku_mle3:_FillValue = 32767s;
      mqe_20hz_ku_mle3:units = "count";
      mqe_20hz_ku_mle3:scale_factor = 1.00e-04;
      mqe_20hz_ku_mle3:coordinates = "lon_20Hz lat_20Hz";
      mqe_20hz_ku_mle3:comment = "Mean Quadratic Error between the waveforms samples and
the corresponding model samples built from the ocean retracking outputs";

short mqe_20hz_c(time,meas_ind);
      mqe_20hz_c:long_name = "20 Hz C band MQE (ocean retracking)";
      mqe_20hz_c:_FillValue = 32767s;
      mqe_20hz_c:units = "count";
      mqe_20hz_c:scale_factor = 1.00e-04;
      mqe_20hz_c:coordinates = "lon_20Hz lat_20Hz";
      mqe_20hz_c:comment = "Mean Quadratic Error between the waveforms samples and the
corresponding model samples built from the ocean retracking outputs";

short peakiness_20hz_ku(time,meas_ind);
      peakiness_20hz_ku:long_name = "20 Hz peakiness on Ku band waveforms";
      peakiness_20hz_ku:_FillValue = 32767s;
      peakiness_20hz_ku:units = "count";
      peakiness_20hz_ku:scale_factor = 1.00e-03;
      peakiness_20hz_ku:coordinates = "lon_20Hz lat_20Hz";

short peakiness_20hz_c(time,meas_ind);
      peakiness_20hz_c:long_name = "20 Hz peakiness on C band waveforms";
      peakiness_20hz_c:_FillValue = 32767s;
      peakiness_20hz_c:units = "count";
      peakiness_20hz_c:scale_factor = 1.00e-03;
      peakiness_20hz_c:coordinates = "lon_20Hz lat_20Hz";
```

// Sea Surface height

```
short ssha(time);
      ssha:long_name = "sea surface height anomaly";
      ssha:standard_name = "sea_surface_height_above_sea_level";
      ssha:source = [altimeter_sensor_name];
      ssha:institution = [altimeter_sensor_institution];
      ssha:_FillValue = 32767s;
      ssha:units = "m";
      ssha:scale_factor = 1.00e-03;
      ssha:coordinates = "lon lat";
      ssha:comment = "= altitude of satellite (alt) - Ku band corrected altimeter range
(range_ku) - altimeter ionospheric correction on Ku band (iono_corr_alt_ku) - model dry
tropospheric correction (model_dry_tropo_corr) - radiometer wet tropospheric correction
(rad_wet_tropo_corr) - sea state bias correction in Ku band (sea_state_bias_ku) - solid
earth tide height (solid_earth_tide) - geocentric ocean tide height solution 1
(ocean_tide_sol1) - geocentric pole tide height (pole_tide) - inverted barometer height
correction (inv_bar_corr) - high frequency fluctuations of the sea surface topography
(hf_fluctuations_corr for I/GDR off line products only) - mean sea surface
(mean_sea_surface). Set to default if the altimeter echo type (alt_echo_type) is set to 1
= non ocean like, the radiometer surface type (rad_surf_type) set to 2 = land";

short ssha_mle3(time);
```

```
        ssha_mle3:long_name = "sea surface height anomaly (MLE3 retracking)";
        ssha_mle3:standard_name = "sea_surface_height_above_sea_level";
        ssha_mle3:source = [altimeter_sensor_name];
        ssha_mle3:institution = [altimeter_sensor_institution];
        ssha_mle3:_FillValue = 32767s;
        ssha_mle3:units = "m";
        ssha_mle3:scale_factor = 1.00e-03;
        ssha_mle3:coordinates = "lon lat";
        ssha_mle3:comment = "= altitude of satellite (alt) - Ku band corrected altimeter
range (range_ku_mle3) - altimeter ionospheric correction on Ku band
(iono_corr_alt_ku_mle3) - model dry tropospheric correction (model_dry_tropo_corr) -
radiometer wet tropospheric correction (rad_wet_tropo_corr) - sea state bias correction
in Ku band (sea_state_bias_ku_mle3) - solid earth tide height (solid_earth_tide) -
geocentric ocean tide height solution 1 (ocean_tide_sol1) - geocentric pole tide height
(pole_tide) - inverted barometer height correction (inv_bar_corr) - high frequency
fluctuations of the sea surface topography (hf_fluctuations_corr for I/GDR off line
products only) - mean sea surface (mean_sea_surface). Set to default if the altimeter
echo type (alt_echo_type) is set to 1 = non ocean like, the radiometer surface type
(rad_surf_type) set to 2 = land”;

}
```

6. SGDR DATA SET

All the variables described for the GDR data set are available in SGDR. Below are given the data available only in the SGDR data set.

```
netcdf sgdr {
  dimensions:
time = < number of measurements >;
meas_ind = 20;
wvf_ind = 104;

  variables:
```

// Time Tag

```
double time(time);
       time:long_name = "time (sec. since 2000-01-01)";
       time:standard_name = "time";
       time:units = "seconds since 2000-01-01 00:00:00.0";
       time:calendar = "gregorian";
       time:tai_utc_difference = [GA_TAI_UTC_DIF];
       time:leap_second = [GA_LEAP_TIME];
       time:comment = "[tai_utc_difference] is the difference between TAI and UTC
reference time (seconds) for the first measurement of the data set. [leap_second] is the
UTC time at which a leap second occurs in the data set, if any. After this UTC time, the
[tai_utc_difference] is increased by 1 second";

byte meas_ind(meas_ind);
       meas_ind:long_name = "elementary measurement index";
       meas_ind:units = "count";
      meas_ind:comment = "Set to be compliant with the CF-1.1 convention";

byte wvf_ind(wvf_ind);
       wvf_ind:long_name = "waveform index";
       wvf_ind:units = "count";
       wvf_ind:comment = "Set to be compliant with the CF-1.1 convention";

double time_20hz(time,meas_ind);
       time_20hz:long_name = "time 20 Hz (sec. since 2000-01-01)";
       time_20hz:standard_name = "time";
       time_20hz:_FillValue = 18446744073709551616.000000;
       time_20hz:units = "seconds since 2000-01-01 00:00:00.0";
       time_20hz:calendar = "gregorian";
       time_20hz:tai_utc_difference = [GA_TAI_UTC_DIF];
       time_20hz:leap_second = [GA_LEAP_TIME];
       time_20hz:comment = "[tai_utc_difference] is the difference between TAI and UTC
reference time (seconds) for the first measurement of the data set. [leap_second] is the
UTC time at which a leap second occurs in the data set, if any. After this UTC time, the
[tai_utc_difference] is increased by 1 second";
```

// Cf. GDR product

…/… [cf. section 5]

// Tracker range

```
int tracker_20hz_ku(time,meas_ind);
       tracker_20hz_ku:long_name = "20 Hz Ku band corrected tracker range";
       tracker_20hz_ku:standard_name = "altimeter_range”;
       tracker_20hz_ku:_FillValue = 2147483647;
       tracker_20hz_ku:units = "m";
       tracker_20hz_ku:add_offset = 1.300000e+06;
       tracker_20hz_ku:scale_factor = 1.00e-04;
       tracker_20hz_ku:coordinates = "lon_20Hz lat_20Hz";
       tracker_20hz_ku:comment = "Ku-band operating tracker (’Diode+DEM’ or ’Median’ or
’Split-Gate’ tracker). This includes the Distance antenna-COG (cog_corr), USO drift
correction (uso_corr) and internal path correction (internal_path_delay_corr_ku). But not
the Doppler correction (doppler_corr_ku), modeled instrumental errors correction
(modeled_instr_corr_range_ku) and system bias”;

int tracker_diode_20hz_ku(time,meas_ind);
       tracker_diode_20hz_ku:long_name = "20 Hz tracker range from Diode+DEM";
       tracker_diode_20hz_ku:standard_name = "altimeter_range”;
       tracker_diode_20hz_ku:_FillValue = 2147483647;
       tracker_diode_20hz_ku:units = "m";
       tracker_diode_20hz_ku:add_offset = 1.300000e+06;
       tracker_diode_20hz_ku:scale_factor = 1.00e-04;
       tracker_diode_20hz_ku:coordinates = "lon_20Hz lat_20Hz";

int tracker_20hz_c(time,meas_ind);
       tracker_20hz_c:long_name = "20 Hz C band corrected tracker range";
       tracker_20hz_c:standard_name = "altimeter_range”;
       tracker_20hz_c:_FillValue = 2147483647;
       tracker_20hz_c:units = "m";
       tracker_20hz_c:add_offset = 1.300000e+06;
       tracker_20hz_c:scale_factor = 1.00e-04;
       tracker_20hz_c:coordinates = "lon_20Hz lat_20Hz";
       tracker_20hz_c:comment = "C-band operating tracker. This includes the Distance
antenna-COG (cog_corr), USO drift correction (uso_corr) and internal path correction
(internal_path_delay_corr_c). But not the Doppler correction (doppler_corr_c), modeled
instrumental errors correction (modeled_instr_corr_range_c) and system bias”;
```

// Altimeter range corrections

```
int uso_corr(time);
       uso_corr:long_name = "USO frequency correction on altimeter range";
       uso_corr:_FillValue = 2147483647;
       uso_corr:units = "m";
       uso_corr:scale_factor = 1.00e-04;
       uso_corr:comment = "Correction of the USO frequency drift on the altimeter range";

int internal_path_delay_corr_ku(time);
       internal_path_delay_corr_ku:long_name = "Ku band internal path delay correction on
altimeter range";
       internal_path_delay_corr_ku:_FillValue = 2147483647;
       internal_path_delay_corr_ku:units = "m";
       internal_path_delay_corr_ku:scale_factor = 1.00e-04;
       internal_path_delay_corr_ku:comment = "Internal calibration correction on the Ku-
band altimeter range";

int internal_path_delay_corr_c(time);
       internal_path_delay_corr_c:long_name = "C band internal path delay correction on
altimeter range";
```

```
      internal_path_delay_corr_c:_FillValue = 2147483647;
      internal_path_delay_corr_c:units = "m";
      internal_path_delay_corr_c:scale_factor = 1.00e-04;
      internal_path_delay_corr_c:comment = "Internal calibration correction on the C-
band altimeter range";

short modeled_instr_corr_range_ku(time);
      modeled_instr_corr_range_ku:long_name = "Ku band modeled instrumental correction
on altimeter range";
      modeled_instr_corr_range_ku:_FillValue = 32767s;
      modeled_instr_corr_range_ku:units = "m";
      modeled_instr_corr_range_ku:scale_factor = 1.00e-04;

short modeled_instr_corr_range_ku_mle3(time);
      modeled_instr_corr_range_ku_mle3:long_name = "Ku band modeled instrumental
correction on altimeter range (MLE3 retracking)";
      modeled_instr_corr_range_ku_mle3:_FillValue = 32767s;
      modeled_instr_corr_range_ku_mle3:units = "m";
      modeled_instr_corr_range_ku_mle3:scale_factor = 1.00e-04;

short modeled_instr_corr_range_c(time);
      modeled_instr_corr_range_c:long_name = "C band modeled instrumental correction on
altimeter range";
      modeled_instr_corr_range_c:_FillValue = 32767s;
      modeled_instr_corr_range_c:units = "m";
      modeled_instr_corr_range_c:scale_factor = 1.00e-04;

short doppler_corr_ku(time);
      doppler_corr_ku:long_name = "Ku band Doppler correction on altimeter range";
      doppler_corr_ku:_FillValue = 32767s;
      doppler_corr_ku:units = "m";
      doppler_corr_ku:scale_factor = 1.00e-04;

short doppler_corr_c(time);
      doppler_corr_c:long_name = "C band Doppler correction on altimeter range";
      doppler_corr_c:_FillValue = 32767s;
      doppler_corr_c:units = "m";
      doppler_corr_c:scale_factor = 1.00e-04;

short cog_corr(time);
      cog_corr:long_name = "Distance antenna-COG correction on altimeter range";
      cog_corr:_FillValue = 32767s;
      cog_corr:units = "m";
      cog_corr:scale_factor = 1.00e-04;
```

// Significant waveheight corrections

```
short modeled_instr_corr_swh_ku(time);
      modeled_instr_corr_swh_ku:long_name = "Ku band modeled instrumental correction on
significant waveheight";
      modeled_instr_corr_swh_ku:_FillValue = 32767s;
      modeled_instr_corr_swh_ku:units = "m";
      modeled_instr_corr_swh_ku:scale_factor = 1.00e-03;

short modeled_instr_corr_swh_ku_mle3(time);
      modeled_instr_corr_swh_ku_mle3:long_name = "Ku band modeled instrumental
correction on significant waveheight (MLE3 retracking)";
      modeled_instr_corr_swh_ku_mle3:_FillValue = 32767s;
      modeled_instr_corr_swh_ku_mle3:units = "m";
      modeled_instr_corr_swh_ku_mle3:scale_factor = 1.00e-03;
```

```
short modeled_instr_corr_swh_c(time);
       modeled_instr_corr_swh_c:long_name = "C band modeled instrumental correction on
significant waveheight";
       modeled_instr_corr_swh_c:_FillValue = 32767s;
       modeled_instr_corr_swh_c:units = "m";
       modeled_instr_corr_swh_c:scale_factor = 1.00e-03;
```

// Backscatter coefficient corrections

```
short internal_corr_sig0_ku(time);
       internal_corr_sig0_ku:long_name = "Ku band internal calibration correction on
backscatter coefficient";
       internal_corr_sig0_ku:_FillValue = 32767s;
       internal_corr_sig0_ku:units = "dB";
       internal_corr_sig0_ku:scale_factor = 1.00e-02;

short internal_corr_sig0_c(time);
       internal_corr_sig0_c:long_name = "C band internal calibration correction on
backscatter coefficient";
       internal_corr_sig0_c:_FillValue = 32767s;
       internal_corr_sig0_c:units = "dB";
       internal_corr_sig0_c:scale_factor = 1.00e-02;

short modeled_instr_corr_sig0_ku(time);
       modeled_instr_corr_sig0_ku:long_name = "Ku band modeled instrumental correction on
backscatter coefficient";
       modeled_instr_corr_sig0_ku:_FillValue = 32767s;
       modeled_instr_corr_sig0_ku:units = "dB";
       modeled_instr_corr_sig0_ku:scale_factor = 1.00e-02;

short modeled_instr_corr_sig0_ku_mle3(time);
       modeled_instr_corr_sig0_ku_mle3:long_name = "Ku band modeled instrumental
correction on backscatter coefficient (MLE3 retracking)";
       modeled_instr_corr_sig0_ku_mle3:_FillValue = 32767s;
       modeled_instr_corr_sig0_ku_mle3:units = "dB";
       modeled_instr_corr_sig0_ku_mle3:scale_factor = 1.00e-02;

short modeled_instr_corr_sig0_c(time);
       modeled_instr_corr_sig0_c:long_name = "C band modeled instrumental on backscatter
coefficient";
       modeled_instr_corr_sig0_c:_FillValue = 32767s;
       modeled_instr_corr_sig0_c:units = "dB";
       modeled_instr_corr_sig0_c:scale_factor = 1.00e-02;
```

// Tracker AGC

```
short agc_20hz_ku(time,meas_ind);
       agc_20hz_ku:long_name = "20 Hz Ku band corrected AGC";
       agc_20hz_ku:_FillValue = 32767s;
       agc_20hz_ku:units = "dB";
       agc_20hz_ku:scale_factor = 1.00e-02;
       agc_20hz_ku:coordinates = "lon_20Hz lat_20Hz";
       agc_20hz_ku:comment = "AGC is corrected for instrumental errors due to the
imperfections of the on-board attenuators";

short agc_20hz_c(time,meas_ind);
       agc_20hz_c:long_name = "20 Hz C band corrected AGC";
```

```
       agc_20hz_c:_FillValue = 32767s;
       agc_20hz_c:units = "dB";
       agc_20hz_c:scale_factor = 1.00e-02;
       agc_20hz_c:coordinates = "lon_20Hz lat_20Hz";
       agc_20hz_c:comment = "AGC is corrected for instrumental errors due to the
imperfections of the on-board attenuators";

short agc_corr_20hz_ku(time,meas_ind);
       agc_corr_20hz_ku:long_name = "20 Hz Ku band AGC correction";
       agc_corr_20hz_ku:_FillValue = 32767s;
       agc_corr_20hz_ku:units = "dB";
       agc_corr_20hz_ku:scale_factor = 1.00e-02;
       agc_corr_20hz_ku:coordinates = "lon_20Hz lat_20Hz";

short agc_corr_20hz_c(time,meas_ind);
       agc_corr_20hz_c:long_name = "20 Hz C band AGC correction";
       agc_corr_20hz_c:_FillValue = 32767s;
       agc_corr_20hz_c:units = "dB";
       agc_corr_20hz_c:scale_factor = 1.00e-02;
       agc_corr_20hz_c:coordinates = "lon_20Hz lat_20Hz";
```

// Scaling factors for Sigma0 evaluation

```
int scaling_factor_20hz_ku(time,meas_ind);
       scaling_factor_20hz_ku:long_name = "Scaling factor for Ku band backscatter
coefficient";
       scaling_factor_20hz_ku:_FillValue = 2147483647;
       scaling_factor_20hz_ku:units = "dB";
       scaling_factor_20hz_ku:scale_factor = 1.00e-02;
       scaling_factor_20hz_ku:coordinates = "lon_20Hz lat_20Hz";
       scaling_factor_20hz_ku:comment = "This scaling factor represents the backscatter
coefficient for a Ku-band waveform amplitude equal to 1. It is a raw value accounting for
AGC 20Hz correction and internal calibration correction. All other correction are not
applied (ie atmospheric attenuation, modeled instrumental errors correction and system
bias)";

int scaling_factor_20hz_c(time,meas_ind);
       scaling_factor_20hz_c:long_name = "Scaling factor for C band backscatter
coefficient";
       scaling_factor_20hz_c:_FillValue = 2147483647;
       scaling_factor_20hz_c:units = "dB";
       scaling_factor_20hz_c:scale_factor = 1.00e-02;
       scaling_factor_20hz_c:coordinates = "lon_20Hz lat_20Hz";
       scaling_factor_20hz_c:comment = "This scaling factor represents the backscatter
coefficient for a C-band waveform amplitude equal to 1. It is a raw value accounting for
AGC 20Hz correction and internal calibration correction. All other correction are not
applied (ie atmospheric attenuation, modeled instrumental errors correction and system
bias)";
```

// Ocean retracking outputs

// Ocean-3 (MLE4) outputs

```
int epoch_20hz_ku(time,meas_ind);
       epoch_20hz_ku:long_name = "Ku band epoch (ocean retracking)";
       epoch_20hz_ku:_FillValue = 2147483647;
       epoch_20hz_ku:units = "s";
       epoch_20hz_ku:scale_factor = 1.00e-15;
       epoch_20hz_ku:coordinates = "lon_20Hz lat_20Hz";
```

```
int width_leading_edge_20hz_ku(time,meas_ind);
       width_leading_edge_20hz_ku:long_name = "Ku band width of the leading edge (ocean
retracking)";
       width_leading_edge_20hz_ku:_FillValue = 2147483647;
       width_leading_edge_20hz_ku:units = "s";
       width_leading_edge_20hz_ku:scale_factor = 1.00e-15;
       width_leading_edge_20hz_ku:coordinates = "lon_20Hz lat_20Hz";
       width_leading_edge_20hz_ku:comment = "The width of the leading edge corresponds to
the so-called composite sigma (SigmaC)";

int amplitude_20hz_ku(time,meas_ind);
       amplitude_20hz_ku:long_name = "Ku band amplitude (ocean retracking) [FFT power
unit]";
       amplitude_20hz_ku:_FillValue = 2147483647;
       amplitude_20hz_ku:units = "count";
       amplitude_20hz_ku:scale_factor = 1.00e-06;
       amplitude_20hz_ku:coordinates = "lon_20Hz lat_20Hz";

int thermal_noise_20hz_ku(time,meas_ind);
       thermal_noise_20hz_ku:long_name = "Ku band thermal noise (ocean retracking) [FFT
power unit]";
       thermal_noise_20hz_ku:_FillValue = 2147483647;
       thermal_noise_20hz_ku:units = "count";
       thermal_noise_20hz_ku:scale_factor = 1.00e-06;
       thermal_noise_20hz_ku:coordinates = "lon_20Hz lat_20Hz";

int epoch_20hz_c(time,meas_ind);
       epoch_20hz_c:long_name = "C band epoch (ocean retracking)";
       epoch_20hz_c:_FillValue = 2147483647;
       epoch_20hz_c:units = "s";
       epoch_20hz_c:scale_factor = 1.00e-15;
       epoch_20hz_c:coordinates = "lon_20Hz lat_20Hz";

int width_leading_edge_20hz_c(time,meas_ind);
       width_leading_edge_20hz_c:long_name = "C band width of the leading edge (ocean
retracking)";
       width_leading_edge_20hz_c:_FillValue = 2147483647;
       width_leading_edge_20hz_c:units = "s";
       width_leading_edge_20hz_c:scale_factor = 1.00e-15;
       width_leading_edge_20hz_c:coordinates = "lon_20Hz lat_20Hz";
       width_leading_edge_20hz_c:comment = "The width of the leading edge corresponds to
the so-called composite sigma (SigmaC)";

int amplitude_20hz_c(time,meas_ind);
       amplitude_20hz_c:long_name = "C band amplitude (ocean retracking) [FFT power
unit]";
       amplitude_20hz_c:_FillValue = 2147483647;
       amplitude_20hz_c:units = "count";
       amplitude_20hz_c:scale_factor = 1.00e-06;
       amplitude_20hz_c:coordinates = "lon_20Hz lat_20Hz";

int thermal_noise_20hz_c(time,meas_ind);
       thermal_noise_20hz_c:long_name = "C band thermal noise (ocean retracking) [FFT
power unit]";
       thermal_noise_20hz_c:_FillValue = 2147483647;
       thermal_noise_20hz_c:units = "count";
       thermal_noise_20hz_c:scale_factor = 1.00e-06;
       thermal_noise_20hz_c:coordinates = "lon_20Hz lat_20Hz";
```

// Ocean-2 (MLE3) outputs

```
int epoch_20hz_ku_mle3(time,meas_ind);
       epoch_20hz_ku_mle3:long_name = "Ku band epoch (MLE3 retracking)";
       epoch_20hz_ku_mle3:_FillValue = 2147483647;
       epoch_20hz_ku_mle3:units = "s";
       epoch_20hz_ku_mle3:scale_factor = 1.00e-15;
       epoch_20hz_ku_mle3:coordinates = "lon_20Hz lat_20Hz";

int width_leading_edge_20hz_ku_mle3(time,meas_ind);
       width_leading_edge_20hz_ku_mle3:long_name = "Ku band width of the leading edge
(MLE3 retracking)";
       width_leading_edge_20hz_ku_mle3:_FillValue = 2147483647;
       width_leading_edge_20hz_ku_mle3:units = "s";
       width_leading_edge_20hz_ku_mle3:scale_factor = 1.00e-15;
       width_leading_edge_20hz_ku_mle3:coordinates = "lon_20Hz lat_20Hz";
       width_leading_edge_20hz_ku_mle3:comment = "The width of the leading edge
corresponds to the so-called composite sigma (SigmaC)";

int amplitude_20hz_ku_mle3(time,meas_ind);
       amplitude_20hz_ku_mle3:long_name = "Ku band amplitude (MLE3 retracking) [FFT power
unit]";
       amplitude_20hz_ku_mle3:_FillValue = 2147483647;
       amplitude_20hz_ku_mle3:units = "count";
       amplitude_20hz_ku_mle3:scale_factor = 1.00e-06;
       amplitude_20hz_ku_mle3:coordinates = "lon_20Hz lat_20Hz";
```

// Waveforms

```
short waveforms_20hz_ku(time,meas_ind,wvf_ind);
       waveforms_20hz_ku:long_name = "Ku band waveform samples";
       waveforms_20hz_ku:_FillValue = 32767s;
       waveforms_20hz_ku:units = "count";
       waveforms_20hz_ku:comment = "Waveforms are not corrected for the Low Pass Filter
effects";

short waveforms_20hz_c(time,meas_ind,wvf_ind);
       waveforms_20hz_c:long_name = "C band waveform samples";
       waveforms_20hz_c:_FillValue = 32767s;
       waveforms_20hz_c:units = "count";
       waveforms_20hz_c:comment = "Waveforms are not corrected for the Low Pass Filter
effects";
```

// Radiometer parameters

```
short ta_187(time);
       ta_187:long_name = "18.7 GHz antenna temperature";
       ta_187:_FillValue = 32767s;
       ta_187:units = "K";
       ta_187:scale_factor = 1.00e-02;
       ta_187:coordinates = "lon lat";

short ta_238(time);
       ta_238:long_name = "23.8 GHz antenna temperature";
       ta_238:_FillValue = 32767s;
       ta_238:units = "K";
       ta_238:scale_factor = 1.00e-02;
       ta_238:coordinates = "lon lat";
```

```
short ta_340(time);
       ta_340:long_name = "34 GHz antenna temperature";
       ta_340:_FillValue = 32767s;
       ta_340:units = "K";
       ta_340:scale_factor = 1.00e-02;
       ta_340:coordinates = "lon lat";

}
```

DIFFUSION

INTERNAL:

MENOT Frédéric	DCT/PS/EA
GARCIA Charlotte	DCT/PS/EA
WERY Florian	DCT/PS/EA
QUEYRUT Olivier	DCT/PS/EA
GUILLOT Amandine	DCT/SI/TR
GUINLE Thierry	DCT/ME/OC
BRONNER Emilie	DCT/ME/OC
PICOT Nicolas	DCT/PO/AL

EXTERNAL:

S. D'ALESSIO	CLS/DT
J.P. DUMONT	CLS/DOS
S. URIEN	CLS/DOS
G. DIBARBOURE	CLS/DOS
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