D3_2 CDR/FCDR File Format Specification

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1 Content

2 Introduction

This codument contains the detailed file format specifications for FIDUCEO generated Fundamental Climate Data Records (FCDR) and the derived Climate Data Records (CDR) data products. The dataformat aims to be as close as possible to common and well established standards used in the community. Basis for the format is the ESA CCI data standard in conjunction with the NetCDF CF conventions version 1.6.

This document also defines a common file naming convention to be applied to all FIDUCEO FCDR/CDR data.

2.1 Version Control

Version	Reason	Reviewer	Date of Issue
1.0	Initial version		
1.1	Update to release 1.1.0	Sabine Embacher	08.09.2017
1.1.1	Cumulative updates		27.10.2017
1.1.2	Cumulative updates, first version of global flag definitions		13.12.2017
1.1.3	Updated flag definitions, merged contributions from sensor teams		21.02.2018
1.1.4	Added coordinate variables, global flag data, channel correlation and spectral response functions		27.04.2018
1.1.5	Added LUTs and correlation length variables, first version of CDRs		04.07.2018
2.0.0	Stable CDR format, added common uncertainties to AVHRR and HIRS FCDR	RPhipps, team	24.08.2018

2.2 Applicable and Reference Documents

The following documents are applicable (AD) or reference (RD) documents used in this handbook.

AD 1	CCI-PRGM-EOPS-TN-13-0009	Data Standards Requirements for CCI Data Producers, v1.2, 2015
AD 2	CF Metadata Conventions	NetCDF Climate and Forecast (CF) Metadata Conventions, v1.6

3 Conventions

3.1 File names

This section specifies the common file naming pattern that applies to all CDR and FCDR files generated in the FIDUCEO project.

The naming convention introduced here shall allow to uniquely identify every product file and provide a summary of the file content. A file name will be composed of a prescribed sequence of data fields separated by an underscore character ('_'). An example:

PROJECT_RECORD_DATA_SENSOR_PLATFORM_START-DATETIME_END-DATETIME_TYPE_PROCESSOR-VERSION_FORMAT-VERSION.nc

All FIDUCEO CDR and FCDR file are stored in NetCDF format, so they share the common extension '.nc'.

Field Name	Description
PROJECT	Value is always "FIDUCEO"
RECORD	Either "CDR" or "FCDR"
DATA	Describes the data content. Values may be "L1C", "SST", "UTH", "ALBEDO" or "AOT"
SENSOR	Names the data sensor. Values may be "AVHRRxx", "HIRSx", "MHS", "MVIRI" or "AMSUB"
PLATFORM	Names the satellite platform. Values may be "NOAAxx", "METOPA", "MET7-0.00". A platform name can be followed by a geostationary nadir longitude, separated by a single dash.
START-DATETIME	Denotes the sensing start date and time as UTC. Format is always "YYYYMMDDHHMMSS"
END-DATETIME	Denotes the sensing end date and time as UTC. Format is always "YYYYMMDDHHMMSS"
TYPE	Describes the content type. Valid values are "EASY", "FULL", "L2", "L3" or "ENSEMBLE"
PROCESSOR-VERSION	Denotes the processing software version used, format "vxx.x"
FORMAT-VERSION	Denotes the file format version used, format "fvx.x.x"

3.2 Dimensions

All dimensions in this document share common names

- "x": cross-track dimension, east-west dimension for geostationary data
- "y": along-track dimension, north-south dimension for geostationary data
- "channel": z-dimension for 3 dimensional datasets containing spectral measurements or dimension of channel correlation matrices
- "n_frequencies": dimension denoting the size of the spectral response function. Since the set of frequencies can differ between instrument channels, the length of this dimension is the number of frequencies given for the channel whose SRF is defined with highest accuracy, i.e. which contains most frequency samples. For channels with a coarser frequency grid the not-needed entries of the corresponding variables are set to _FillValue.

- “lut_size”: dimension defining a look-up table extension
- “bounds”: dimension defining lower and upper bounds – size is always 2
- “delta_x”: dimension defining the correlation length along a scanline
- “delta_y”: dimension defining the correlation length across scanlines

Every dimension has an associated NetCDF coordinate variable. The “x” and “y” coordinates are mere index counters, whereas the “channel” coordinate variable is of type string and denotes the sensor specific channel names in increasing spectral order. The specific names are described in the subsections of chapter 7.1.

3.3 Correlation

Error correlation can occur is different dimensions:

- Pixels in scanline
- Scanline to scanline
- Image to image
- Orbit to orbit or
- Time to time (e.g. year to year, or month to month)

These structural correlation differences are denoted by attributes assigned to the uncertainty variables. If any of the following attributes is present at a variable, correlation in the dimensions is present:

- “pixel_correlation_form”: inter pixel correlation within a scanline
- “scan_correlation_form”: inter-scanline correlation
- “image_correlation_form”: correlation in between image acquisitions
- “orbit_correlation_form”: correlation between orbit acquisitions
- “time_correlation_form”: correlation across time

When one of the correlation form parameters is present, it is accompanied by additional attributes describing the units and the correlation width:

- “pixel_correlation_units”
- “scan_correlation_units”
- “image_correlation_units”
- “orbit_correlation_units”
- “time_correlation_units”

The scales attribute takes a vector of numbers as values that describe the correlation length in the units denoted in the associated units attribute; a value of “infinite” denotes a correlation width that covers the whole dimension. The number of scale parameters is depending on the correlation form and may vary.

- “pixel_correlation_scales”
- “scan_correlation_scales”
- “image_correlation_scales”
- “orbit_correlation_scales”

- "time_correlation_scales"

The values of the attributes denote the correlation form, which can be one of the following

Table 3-1: Correlation form parameters

Correlation form	Parameters	Description
random	none required	For fully random effects there is no correlation with any other pixel
rectangle_absolute	[-a, +b] per pixel. Allow for a way of representing [-∞, +∞] Optional extra notation "rmax" which states correlation coefficient for all pixel/scanline/orbit pixels. If missing, rmax = 1 (assumes fully correlated)	An effect is systematic within a range and different outside that range. For each pixel/scanline/orbit in range say number of pixels/etc either side that it shares a correlation with. For fully systematic effects notation to say "systematic with all"
triangle_relative	[n] – number of pixels/scanlines being averged in simple rolling average	Suitable for rolling averages over a window from (–n-1)/2 to (+n-1)/2 (i.e. for n pixels/scanlines being averaged) Assumes a simple mean, not a weighted mean.
truncated_gaussian_relative	[n] – number of pixels being averaged in a weighted rolling average OR [n, sigma] n: truncation from –n to +n, sigma: Gaussian standard deviation. Provided once (rather than per pixel)	Suitable for rolling averages over a window from (–n-1)/2 to (+n-1)/2 (i.e. for n pixels/scanlines being averaged). Assumes a weighted mean, for any weights (and thus also includes things like spline fitting). Also suitable for anything else where the assumption is that "closer pixels/scanlines are more correlated than further pixels". This can use two terms – n gives the truncation range outside which the assumption is there is no correlation, and sigma gives how fast the correlation drops off (I will later define what sigma is for the rolling average – so this can be same format with a default value)
repeating_rectangles	[-a, +b, rmax, L, h] per pixel/scanline/orbit etc (rmax, L, h will be same for different pixels)	Correlation coefficient assumed to be rmax for pixels/scanlines from –a to +b, and h for pixels/scanlines from L-a to L+b and from 2L-a to 2L+b and so on (iL-a to iL+b) for all integers i

repeating_truncated_gaussian	[n, sigma, L, h]	Correlation coefficient assumed to drop off as a truncated Gaussian for local pixels/scanlines etc in the range defined by n and a similar Gaussian with a peak of h and the same width for pixels/scanlines iL pixels apart on either side, for all integers i.

3.4 Probability Density Functions

There are many different probability distribution functions for uncertainty contributions that can exist. Here we define a few key functions. In all cases the uncertainty should be the standard uncertainty (the standard deviation of the PDF). This can be calculated from other, more intuitive parameters described here. Nothing more is needed to define PDF/uncertainty.

Table 2: Probability density functions

PDF	How to determine standard uncertainty
gaussian	standard deviation
digitised_gaussian	standard deviation
rectangle	- Half width divide by square root of 3
triangular	Half base width divided by square root of 6
u-distribution	Half base width divided by square root of 2

4 Virtual Variables

The concept of a virtual variable is introduced to reduce the storage volume of the FCDR archive. A virtual variable is a NetCDF variable that does not contain data, instead it contains a textual representation of a mathematical expression that is used to calculate the data of the variable "on-the-fly".

A virtual variable is a standard NetCDF variable with the dimension "virtual" (which denotes a scalar) and a number of attributes containing all information required for the decoding process.

Variable Name	Attribute	Value	Comment
	virtual	true	
	dimension	[channel y x]	A string referencing the dimensions of the target raster.
	expression	a*a + b*b	The mathematical expression using the syntax as described below

The virtual variable can have more attributes; the ones above are required for correct detection and evaluation of the data.

4.1 Syntax

The mathematical expression for a virtual variable must follow the syntax conventions described in the following chapters.

The mathematical expression is evaluated at each pixel (x/y(/z)) of the raster in a vectorised operation; it is not possible to index to other locations in the raster or to use ranges of indices (e.g. for averaging).

4.1.1 Mathematical Variables

Variables of the equation can be any of the physical (i.e. non-virtual) variables stored in the NetCDF file. Variables having scalar or vector extensions (i.e. per orbit/per scanline) will be extended to cover the full raster dimension. Data types of the variables will be propagated to the appropriate larger data type required for the calculation automatically.

4.1.2 Mathematical Constants

The virtual variable can contain numbers in all standard notation (i.e. integer, fractional and scientific notation).

Some common constant expression can be used:

Constant	Description
PI	3.1415 … etc, double precision

4.1.3 Mathematical Operators

Logical Operator	Description
&	Logical AND
|	Logical OR
~	Logical NOT

Comparison Operator	Description
<	Less than
<=	Less than or equal
==	Equal
!=	Not equal
>=	Greater than or equal
>	Greater than

Unary arithmetic operator	Description
-	Negation

Binary arithmetic operator	Description
+	Addition
-	Subtraction
*	Multiplication
/	Division
**	Power
%	Modulo

4.1.4 Mathematical Functions

Mathematical Function	Description
sin	Sine (radians)
cos	Cosine (radians)
tan	Tangent (radians)
arcsin	Inverse sine (radians)
arccos	Inverse cosine (radians)
arctan	Inverse tangent (radians)
arctan2	Trigonometric inverse tangent of float1/float2
sinh	Hyperbolic sine
cosh	Hyperbolic cosine
tanh	Hyperbolic tangent
arcsinh	Inverse hyperbolic sine
arccosh	Inverse hyperbolic cosine

arctanh	Inverse hyperbolic tangent
log	Natural logarithm
log10	Base-10 logarithm
log1p	Natural logarithm (1+x)
exp	Exponential
expm1	Exponential minus one
sqrt	Square root
abs	Absolute value

5 Global Metadata

The global metadata contain general metadata that describe the content of the data file. The attribute set below lists the minimal set of attributes that is required to ensure CF conformity.

Table 3: Global metadata definitions

Key	Value/Description	Scope
Conventions	CF-1.6	static
institution	A short description containing the data processing organization	per-user
source	A short description of the data source, i.e. AMSU-B L1C etc …	per-product
title	A succinct description of what is in the dataset.	per-product-set
history	Provides an audit trail for modifications to the original data.	per-product-set
references	Published or web-based references that describe the data or methods used to produce it.	static (probably)
id	Shall hold the product doi	per-product
naming_authority	Institution that publishes the doi	static
licence	This dataset is released for use under CC-BY licence (https://creativecommons.org/licenses/by/4.0/) and was developed in the EC FIDUCEO project “Fidelity and Uncertainty in Climate Data Records from Earth Observations”. Grant Agreement: 638822.	static
writer_version	The version number of the FCDR writer software that created the file	static

5.1 CDR Specific Metadata

In addition to the global metadata fields listed in Table 3 the CDR data product contain these additional metadata fields.

Table 4: CDR specific global metadata fields

Key	Value/Description	Scope
source	A comma separated list of FCDR input data products used for generating the CDR product	per-product
auxiliary_data	A comma separated list of auxiliary data files used for generating the CDR product (e.g. LUTs, ECMWF, …)	per-product
configuration	A text segment describing the processing configuration used to generate the CDR product (e.g. XML, JSON, …)	per-product
time_coverage_start	Time stamp of the earliest contribution data used to generate the CDR product. String format: YYYYMMDDThhmmssZ Example: 20180205T235959Z	per-product
time_coverage_end	Time stamp of the latest contribution data used to generate the CDR product. String format: YYYYMMDDThhmmssZ Example: 20180205T235959Z	per-product
time_coverage_duration	Describes the duration of the time coverage, i.e. the difference between coverage stop and coverage start. Formatted as ISO8601 duration string.	per-product

time_coverage_resolution	Describes the density of the data, i.e. the temporal resolution of the acquisitions. Formatted as ISO8601 duration string.	per-product

Gridded data contains these additional metadatafields.

Table 5: Gridded data geolocation metadata fields

Key	Value/Description	Scope
geospatial_lat_units	Units along the latitude axis	per-product-set
geospatial_lon_units	Units along the longitude axis	per-product-set
geospatial_lat_resolution	Resolution of the latitude axis	per-product-set
geospatial_lon_resolution	Resolution of the longitude axis	per-product-set

6 Common Variables

The following variables are common to most CDF/FCDR data products generated by the FIDUCEO project, except where noted explicitely.

6.1 Geolocation

All geolocation information is stored in the same format with the exception of MVIRI based data. These use a specific static dataset that is described in 7.3. Original data variables are converted to the common format.

6.1.1 Satellite Coordinate System

Data stored in satellite coordinates, i.e. L1 and L2 data contains pixel based geolocation variables for longitude and latitude.

Variable Name	Standard Name	Datatype	Dimensions
latitude	latitude	int16	x, y
longitude	longitude	int16	x, y

latitude	Attribute	Value	Comment
	_FillValue	-32768	
	standard_name	latitude	
	scale_factor	0.0027466658	
	units	degrees_north	

longitude	Attribute	Value	Comment
	_FillValue	-32768	
	standard_name	longitude	
	scale_factor	0.0054933317	
	units	degrees_east	

6.1.2 Grid Coordinate System

Data products containing gridded data store the geolocation information using geolocation coordinate variables, following the CCI data standards (AD 1) and the CF conventions (AD 2). Each coordinate variable is accompanied ba a variable containing the cell boundaries.

Variable Name	Standard Name	Datatype	Dimensions
lat	latitude	float32	y
lat_bnds		float32	y, bounds
lon	longitude	float32	x
lon_bnds		float32	x, bounds

lat	Attribute	Value	Comment
	_FillValue	NaN	
	standard_name	latitude	

	long_name	latitude	
	units	degrees_north	
	bounds	lat_bnds	

lat_bnds	Attribute	Value	Comment
	_FillValue	NaN	
	long_name	latitude cell boundaries	
	units	degrees_north	

lon	Attribute	Value	Comment
	_FillValue	NaN	
	standard_name	longitude	
	long_name	longitude	
	units	degrees_east	
	bounds	lon_bnds	

lon_bnds	Attribute	Value	Comment
	_FillValue	NaN	
	long_name	longitude cell boundaries	
	units	degrees_east	

6.2 Quality Flags

A specific flag-coding scheme for FIDUCEO data to ensure a common project wide per pixel bit-flagging scheme. The setting of a sensor specific flag can trigger the raising of a global flag. Sensor specific and channel specific flagging is subject to the sensor-specific flags defined in sections 6.3.1 to 6.3.6.

Variable Name	Standard Name	Datatype	Dimensions
quality_pixel_bitmask	status_flag	uint16	x, y

quality_pixel_bitmask	Attribute	Value	Comment
	standard_name	status_flag	
	flag_masks	1, 2, 4, 8, 16, 32, 64, 128	
	flag_meanings	invalid use_with_caution invalid_input invalid_geoloc invalid_time sensor_error padded_data incomplete_channel_data	

Flag Name	Bit	Description
invalid	0	General flag for invalid data. Set to TRUE if any of the following is set: invalid_input, invalid_geoloc, invalid_time, sensor_error, padded_data or any sensor specific flag that indicates invalid data.
use_with_caution	1	Input data flags set that indicate potential errors. Set to TRUE if one or more of the original sensor data flags indicate possible (but usually not critical) problems or if data in a single channel is not useable. Definition of this flag combination in sensor specific section.
invalid_input	2	Input data invalid flag. Set to TRUE if a combination of the original sensor data flags indicates unuseable data. Definition of this flag combination in sensor specific section.
invalid_geoloc	3	Flag is raised if the geolocation or viewing-geometry data of this pixel is not valid.
invalid_time	4	Flag is raised if the acquisition time data of the pixel is not valid.
sensor_error	5	Flag is raised if the measurement data or sensor status data is not valid.
padded_data	6	Pixel contains fill value or repeated data; the corresponding measurement data is stored in the previous/next orbit file. Usually this data originates from correlation-calculations overlapping orbit-file boundaries.
incomplete_channel_data	7	Flag is raised if data for one or more channels is incomplete.

6.3 Sensor Input Variables

The original sensor data is stored in all FCDR files. The sensor variables are listed in the following chapters

6.3.1 AMSU-B

Variable Name	Standard Name	Datatype	Dimensions
Ch16_BT	toa_brightness_temperature	int32	x, y
Ch17_BT	toa_brightness_temperature	int32	x, y
Ch18_BT	toa_brightness_temperature	int32	x, y
Ch19_BT	toa_brightness_temperature	int32	x, y
Ch20_BT	toa_brightness_temperature	int32	x, y
Satellite_azimuth_angle	sensor_azimuth_angle	int32	x, y
Satellite_zenith_angle	sensor_zenith_angle	int32	x, y
Solar_azimuth_angle	solar_azimuth_angle	int32	x, y
Solar_zenith_angle	solar_zenith_angle	int32	x, y
Time	*none*	int32	y
data_quality_bitmask	status_flag	int8	x, y
quality_scanline_bitmask	status_flag	int8	y
quality_issue_pixel_Ch16_bitmask	status_flag	int8	x, y
quality_issue_pixel_Ch17_bitmask	status_flag	int8	x, y
quality_issue_pixel_Ch18_bitmask	status_flag	int8	x, y
quality_issue_pixel_Ch19_bitmask	status_flag	int8	x, y
quality_issue_pixel_Ch20_bitmask	status_flag	int8	x, y

SRF_weights	*none*	int16	n_frequencies, channel
SRF_frequencies	*none*	int32	n_frequencies, channel
scanline_map_to_origl1bfile	*none*	uint8	y
scanline_origl1b	*none*	int16	y

Ch16_BT	Attribute	Value	Comment
	_FillValue	-2147483648	
	standard_name	toa_brightness_temperature	
	long_name	channel16-89.0GHz_toa_brightness_temperature	
	units	K	
	scale_factor	0.01	
	coordinates	longitude latitude	
	description	channel 16 brightness temperature per scanline (y) and view (x)	

Ch17_BT	Attribute	Value	Comment
	_FillValue	-2147483648	
	standard_name	toa_brightness_temperature	
	long_name	Channel17-150.0GHz_toa_brightness_temperature	
	units	K	
	scale_factor	0.01	
	coordinates	longitude latitude	
	description	channel 17 brightness temperature per scanline (y) and view (x)	

Ch18_BT	Attribute	Value	Comment
	_FillValue	-2147483648	
	standard_name	toa_brightness_temperature	
	long_name	Channel18-183.31pm1GHz_toa_brightness_temperature	
	units	K	
	scale_factor	0.01	
	coordinates	longitude latitude	
	description	channel 18 brightness temperature per scanline (y) and view (x)	

Ch19_BT	Attribute	Value	Comment
	_FillValue	-2147483648	
	standard_name	toa_brightness_temperature	
	long_name	Channel19-183.31pm3GHz_toa_brightness_temperature	
	units	K	

	scale_factor	0.01	
	coordinates	longitude latitude	
	description	channel 19 brightness temperature per scanline (y) and view (x)	

Ch20_BT	Attribute	Value	Comment
	_FillValue	-2147483648	
	standard_name	toa_brightness_temperature	
	long_name	Channel20-183.31pm7GHz_toa_brightness_temperature	
	units	K	
	scale_factor	0.01	
	coordinates	longitude latitude	
	description	channel 20 brightness temperature per scanline (y) and view (x)	

Satellite_azimuth_angle	Attribute	Value	Comment
	standard_name	sensor_azimuth_angle	
	long_name	satellite_azimuth_angle	
	_FillValue	-2147483648	
	units	degree	
	scale_factor	0.01	
	coordinates	longitude latitude	
	description	Satellite azimuth angle for each view (x) in each scanline (y)	

Satellite_zenith_angle	Attribute	Value	Comment
	standard_name	sensor_zenith_angle	
	long_name	satellite_zenith_angle	
	_FillValue	-2147483648	
	units	degree	
	scale_factor	0.01	
	coordinates	longitude latitude	
	description	Satellite zenith angle for each view (x) in each scanline (y)	

Solar_azimuth_angle	Attribute	Value	Comment
	standard_name	solar_azimuth_angle	
	long_name	solar_azimuth_angle	
	_FillValue	-2147483648	
	units	degree	
	scale_factor	0.01	
	coordinates	longitude latitude	
	description	Solar azimuth angle for each view (x) in each scanline (y)	

Solar_zenith_angle	Attribute	Value	Comment
	standard_name	solar_zenith_angle	
	long_name	solar_zenith_angle	
	_FillValue	-2147483648	
	units	degree	
	scale_factor	0.01	
	coordinates	longitude latitude	
	description	Solar zenith angle for each view (x) in each scanline (y)	

Time	Attribute	Value	Comment
	standard_name	time	
	long_name	Time of Scan line	
	_FillValue	-2147483648	
	units	s	
	description	Acquisition time of the scan line in seconds since 1970-01-01 00:00:00	

data_quality_bitmask	Attribute	Value	Comment
	standard_name	status_flag	
	flag_masks	1, 2, 4, 8, 16, 32	
	flag_meanings	moon_check_fails no_calib_bad_prt no_calib_moon_intrusion susp_calib_bb_temp susp_calib_prt susp_calib_moon_intrusion	
	coordinates	longitude latitude	

quality_scanline_bitmask	Attribute	Value	Comment
	standard_name	status_flag	
	long_name	Bitmask for quality issues per scanline	
	flag_masks	1, 2, 4, 8, 16, 32	
	flag_meanings	STX1_transmitter_on STX2_transmitter_on STX3_transmitter_on STX4_transmitter_on SARR_A_transmitter_on SARR_B_transmitter_on	

quality_issue_pixel_Ch16_bitmask	Attribute	Value	Comment
	standard_name	status_flag	
	long_name	Bitmask for quality issues per pixel	
	flag_masks	1, 2, 4, 8, 16	
	flag_meanings	susp_calib_DSV	

		susp_calib_IWCT no_calib_bad_DSV no_calib_bad_IWCT bad_data_earthview	
	coordinates	longitude latitude	

quality_issue_pixel_Ch17_bitmask	Attribute	Value	Comment
	standard_name	status_flag	
	long_name	Bitmask for quality issues per pixel	
	flag_masks	1, 2, 4, 8, 16	
	flag_meanings	susp_calib_DSV susp_calib_IWCT no_calib_bad_DSV no_calib_bad_IWCT bad_data_earthview	
	coordinates	longitude latitude	

quality_issue_pixel_Ch18_bitmask	Attribute	Value	Comment
	standard_name	status_flag	
	long_name	Bitmask for quality issues per pixel	
	flag_masks	1, 2, 4, 8, 16	
	flag_meanings	susp_calib_DSV susp_calib_IWCT no_calib_bad_DSV no_calib_bad_IWCT bad_data_earthview	
	coordinates	longitude latitude	

quality_issue_pixel_Ch19_bitmask	Attribute	Value	Comment
	standard_name	status_flag	
	long_name	Bitmask for quality issues per pixel	
	flag_masks	1, 2, 4, 8, 16	
	flag_meanings	susp_calib_DSV susp_calib_IWCT no_calib_bad_DSV no_calib_bad_IWCT bad_data_earthview	
	coordinates	longitude latitude	

quality_issue_pixel_Ch20_bitmask	Attribute	Value	Comment
	standard_name	status_flag	
	long_name	Bitmask for quality issues per pixel	

	flag_masks	1, 2, 4, 8, 16	
	flag_meanings	susp_calib_DSV susp_calib_IWCT no_calib_bad_DSV no_calib_bad_IWCT bad_data_earthview	
	coordinates	longitude latitude	

SRF_weights	Attribute	Value	Comment
	long_name	Spectral Response Function weights	
	_FillValue	-32768	
	units	dB	
	scale_factor	0.001	
	description	Per channel: weights for the relative spectral response function.	

SRF_frequencies	Attribute	Value	Comment
	long_name	Spectral Response Function frequencies	
	_FillValue	-2147483648	
	units	MHz	
	scale_factor	0.01	
	description	Per channel: frequencies for the relative spectral response function	

scanline_map_to_origl1bfile	Attribute	Value	Comment
	long_name	Indicator of original file	
	_FillValue	255	
	description	Indicator for mapping each line to its corresponding original level 1b file. See global attribute "source" for the filenames. 0 corresponds to 1st listed file, 1 to 2nd file.	

scanline_origl1b	Attribute	Value	Comment
	long_name	Original_Scan_line_number	
	_FillValue	-32768	
	description	Original scan line numbers from corresponding l1b records	

6.3.1.1 Flag Descriptions

The flag descriptions for the variable “data_quality_bitmask” are listed in the table below.

Flag Name	Bit	Description
moon_check_fails	0	The check for Moon instrusion failed. Hence no valid DSV data. If set, “invalid_input” is also set.
no_calib_bad_prt	1	All PRT measruements are bad. Usable data further away than 5 scan liens. Calibration impossible. If set, “sensor_error” is also set.
no_calib_moon_intrusion	2	Moon intrusion detected. Moon contaminates all four DSV. If set, “sensor_error” and “invalid_input” is also set.
susp_calib_bb_temp	3	Less than the full number of PRT sensors has been used for calibration. An unaccounted for temperature gradient might be missed. If set, “use_with_caution” is also set.
susp_calib_prt	4	PRT data from adjacent scan lines had to be used. OR: Less than the full number of PRT sensors has been used for calibration. OR: Fewer scan lines have been used to get the weighted avergage of the current one. None of those issues impacts the final calibration significantly.
susp_calib_moon_intrusion	5	Moon intrusion detected. At least one DSV could be used for calibration. If set, “use_with_caution” is also set.

The flag descriptions for the variable “quality_scanline_bitmask” are listed in the table below.

Flag Name	Bit	Description
STX1_transmitter_on	0	STX1 transmitter is on. Might cause Radio Frequency Interference. Uncertainty component u_common is increased.
STX2_transmitter_on	1	STX2 transmitter is on. Might cause Radio Frequency Interference. Uncertainty component u_common is increased.
STX3_transmitter_on	2	STX3 transmitter is on. Might cause Radio Frequency Interference. Uncertainty component u_common is increased.
STX4_transmitter_on	3	STX4 transmitter is on. Might cause Radio Frequency Interference. Uncertainty component u_common is increased.
SARR_A_transmitter_on	4	SARR-A transmitter is on. Might cause Radio Frequency Interference. Uncertainty component u_common is increased.
SARR_B_transmitter_on	5	SARR-B transmitter is on. Might cause Radio Frequency Interference. Uncertainty component u_common is increased.

The flag description for the variables “quality_issue_pixel_Ch16_bitmask” to “quality_issue_pixel_Ch20_bitmask” are listed in the table below.

Flag Name	Bit	Description
susp_calib_DSV	0	Bad DSV data for this scanline. Adjacent scanlines had to be used for calibration. OR: Less than 4 DSV could be used for calibration. This includes the case of partial Moon contamination. OR: Less than 7 scanlines have been used to get the weighted avergage of the current one. None of those issues impacts the final calibration significantly.
susp_calib_IWCT	1	Bad IWCT data for this scanline. Adjacent scanlines had to be used for calibration. OR: Less than 4 IWCT views could be used for calibration. OR: Less than 7 scanlines have been used to get the weighted avergage of the

		current one. None of those issues impacts the final calibration significantly.
no_calib_bad_DSV	2	Bad DSV data for this scanline. Too far away from good scanlines. Calibration impossible.
no_calib_bad_IWCT	3	Bad IWCT data for this scanline. Too far away from good scanlines. Calibration impossible.
bad_data_earthview	4	Bad data from Earth views.

6.3.2 MHS

For MHS instruments, which we do not know the SRF for, the variables SRF_weights and SRF frequencies have fill values only.

Variable Name	Standard Name	Datatype	Dimensions
Ch1_BT	toa_brightness_temperature	int32	x, y
Ch2_BT	toa_brightness_temperature	int32	x, y
Ch3_BT	toa_brightness_temperature	int32	x, y
Ch4_BT	toa_brightness_temperature	int32	x, y
Ch5_BT	toa_brightness_temperature	int32	x, y
Satellite_azimuth_angle	sensor_azimuth_angle	int32	x, y
Satellite_zenith_angle	sensor_zenith_angle	int32	x, y
Solar_azimuth_angle	solar_azimuth_angle	int32	x, y
Solar_zenith_angle	solar_zenith_angle	int32	x, y
Time	*none*	int32	y
data_quality_bitmask	status_flag	int8	x, y
quality_scanline_bitmask	status_flag	int8	y
quality_issue_pixel_Ch1_bitmask	status_flag	int8	x, y
quality_issue_pixel_Ch2_bitmask	status_flag	int8	x, y
quality_issue_pixel_Ch3_bitmask	status_flag	int8	x, y
quality_issue_pixel_Ch4_bitmask	status_flag	int8	x, y
quality_issue_pixel_Ch5_bitmask	status_flag	int8	x, y
SRF_weights	*none*	int16	n_frequencies, channel
SRF_frequencies	*none*	int32	n_frequencies, channel
scanline_map_to_origl1bfile	*none*	uint8	y
scanline_origl1b	*none*	int16	y

Ch1_BT	Attribute	Value	Comment
	_FillValue	-2147483648	
	standard_name	toa_brightness_temperature	
	long_name	channel1-89.0GHz_toa_brightness_temperature	
	units	K	
	scale_factor	0.01	

	coordinates	longitude latitude	
	description	channel 1 brightness temperature per scanline (y) and view (x)	

Ch2_BT	Attribute	Value	Comment
	_FillValue	-2147483648	
	standard_name	toa_brightness_temperature	
	long_name	channel2-157.0GHz_toa_brightness_temperature	
	units	K	
	scale_factor	0.01	
	coordinates	longitude latitude	
	description	channel 2 brightness temperature per scanline (y) and view (x)	

Ch3_BT	Attribute	Value	Comment
	_FillValue	-2147483648	
	standard_name	toa_brightness_temperature	
	long_name	channel3-183.31pm1GHz_toa_brightness_temperature	
	units	K	
	scale_factor	0.01	
	coordinates	longitude latitude	
	description	channel 3 brightness temperature per scanline (y) and view (x)	

Ch4_BT	Attribute	Value	Comment
	_FillValue	-2147483648	
	standard_name	toa_brightness_temperature	
	long_name	channel4-183.31pm3GHz_toa_brightness_temperature	
	units	K	
	scale_factor	0.01	
	coordinates	longitude latitude	
	description	channel 4 brightness temperature per scanline (y) and view (x)	

Ch5_BT	Attribute	Value	Comment
	_FillValue	-2147483648	
	standard_name	toa_brightness_temperature	
	long_name	channel5-190.31GHz_toa_brightness_temperature	
	units	K	
	scale_factor	0.01	
	coordinates	longitude latitude	
	description	channel 5 brightness temperature per	

		scanline (y) and view (x)	

Satellite_azimuth_angle	Attribute	Value	Comment
	standard_name	sensor_azimuth_angle	
	long_name	satellite_azimuth_angle	
	_FillValue	-2147483648	
	units	degree	
	scale_factor	0.01	
	coordinates	longitude latitude	
	description	Satellite azimuth angle for each view (x) in each scanline (y)	

Satellite_zenith_angle	Attribute	Value	Comment
	standard_name	sensor_zenith_angle	
	long_name	satellite_zenith_angle	
	_FillValue	-2147483648	
	units	degree	
	scale_factor	0.01	
	coordinates	longitude latitude	
	description	Satellite zenith angle for each view (x) in each scanline (y)	

Solar_azimuth_angle	Attribute	Value	Comment
	standard_name	solar_azimuth_angle	
	long_name	solar_azimuth_angle	
	_FillValue	-2147483648	
	units	degree	
	scale_factor	0.01	
	coordinates	longitude latitude	
	description	Solar azimuth angle for each view (x) in each scanline (y)	

Solar_zenith_angle	Attribute	Value	Comment
	standard_name	solar_zenith_angle	
	long_name	solar_zenith_angle	
	_FillValue	-2147483648	
	units	degree	
	scale_factor	0.01	
	coordinates	longitude latitude	
	description	Solar zenith angle for each view (x) in each scanline (y)	

Time	Attribute	Value	Comment
	standard_name	time	
	long_name	Time of Scan line	

	_FillValue	-2147483648	
	units	s	
	description	Acquisition time of the scan line in seconds since 1970-01-01 00:00:00	

data_quality_bitmask	Attribute	Value	Comment
	standard_name	status_flag	
	flag_masks	1, 2, 4, 8, 16, 32	
	flag_meanings	moon_check_fails no_calib_bad_prt no_calib_moon_intrusion susp_calib_bb_temp susp_calib_prt susp_calib_moon_intrusion	
	coordinates	longitude latitude	

quality_scanline_bitmask	Attribute	Value	Comment
	standard_name	status_flag	
	long_name	Bitmask for quality issues per scanline	
	flag_masks	1, 2, 4, 8, 16, 32	
	flag_meanings	STX1_transmitter_on STX2_transmitter_on STX3_transmitter_on STX4_transmitter_on SARR_A_transmitter_on SARR_B_transmitter_on	

quality_issue_pixel_Ch1_bitmask	Attribute	Value	Comment
	standard_name	status_flag	
	long_name	Bitmask for quality issues per pixel	
	flag_masks	1, 2, 4, 8, 16	
	flag_meanings	susp_calib_DSV susp_calib_IWCT no_calib_bad_DSV no_calib_bad_IWCT bad_data_earthview	
	coordinates	longitude latitude	

quality_issue_pixel_Ch2_bitmask	Attribute	Value	Comment
	standard_name	status_flag	
	long_name	Bitmask for quality issues per pixel	
	flag_masks	1, 2, 4, 8, 16	
	flag_meanings	susp_calib_DSV susp_calib_IWCT	

		no_calib_bad_DSV no_calib_bad_IWCT bad_data_earthview	
	coordinates	longitude latitude	

quality_issue_pixel_Ch3_bitmask	Attribute	Value	Comment
	standard_name	status_flag	
	long_name	Bitmask for quality issues per pixel	
	flag_masks	1, 2, 4, 8, 16	
	flag_meanings	susp_calib_DSV susp_calib_IWCT no_calib_bad_DSV no_calib_bad_IWCT bad_data_earthview	
	coordinates	longitude latitude	

quality_issue_pixel_Ch4_bitmask	Attribute	Value	Comment
	standard_name	status_flag	
	long_name	Bitmask for quality issues per pixel	
	flag_masks	1, 2, 4, 8, 16	
	flag_meanings	susp_calib_DSV susp_calib_IWCT no_calib_bad_DSV no_calib_bad_IWCT bad_data_earthview	
	coordinates	longitude latitude	

quality_issue_pixel_Ch5_bitmask	Attribute	Value	Comment
	standard_name	status_flag	
	long_name	Bitmask for quality issues per pixel	
	flag_masks	1, 2, 4, 8, 16	
	flag_meanings	susp_calib_DSV susp_calib_IWCT no_calib_bad_DSV no_calib_bad_IWCT bad_data_earthview	
	coordinates	longitude latitude	

SRF_weights	Attribute	Value	Comment
	long_name	Spectral Response Function weights	
	_FillValue	-32768	
	units	dB	

	scale_factor	0.001	
	description	Per channel: weights for the relative spectral response function.	

SRF_frequencies	Attribute	Value	Comment
	long_name	Spectral Response Function frequencies	
	_FillValue	-2147483648	
	units	MHz	
	scale_factor	0.01	
	description	Per channel: frequencies for the relative spectral response function	

scanline_map_to_origl1bfile	Attribute	Value	Comment
	long_name	Indicator of original file	
	_FillValue	255	
	description	Indicator for mapping each line to its corresponding original level 1b file. See global attribute "source" for the filenames. 0 corresponds to 1st listed file, 1 to 2nd file.	

scanline_origl1b	Attribute	Value	Comment
	long_name	Original_Scan_line_number	
	_FillValue	-32768	
	description	Original scan line numbers from corresponding l1b records	

6.3.2.1 Flag Descriptions

The flag descriptions for the variable “data_quality_bitmask” are listed in the table below.

Flag Name	Bit	Description
moon_check_fails	0	The check for Moon instrusion failed. Hence no valid DSV data. If set, “invalid_input” is also set.
no_calib_bad_prt	1	All PRT measruements are bad. Usable data further away than 5 scan liens. Calibration impossible. If set, “sensor_error” is also set.
no_calib_moon_intrusion	2	Moon intrusion detected. Moon contaminates all four DSV. If set, “sensor_error” and “invalid_input” is also set.
susp_calib_bb_temp	3	Less than the full number of PRT sensors has been used for calibration. An unaccounted for temperature gradient might be missed. If set, “use_with_caution” is also set.

susp_calib_prt	4	PRT data from adjacent scan lines had to be used. OR: Less than the full number of PRT sensors has been used for calibration. OR: Fewer scan lines have been used to get the weighted avergage of the current one. None of those issues impacts the final calibration significantly.
susp_calib_moon_intrusion	5	Moon intrusion detected. At least one DSV could be used for calibration. If set, “use_with_caution” is also set.

The flag descriptions for the variable “quality_issue_scnlin_bitmask” are listed in the table below.

Flag Name	Bit	Description
STX1_transmitter_on	0	STX1 transmitter is on. Might cause Radio Frequency Interference. Uncertainty component u_common is increased.
STX2_transmitter_on	1	STX2 transmitter is on. Might cause Radio Frequency Interference. Uncertainty component u_common is increased.
STX3_transmitter_on	2	STX3 transmitter is on. Might cause Radio Frequency Interference. Uncertainty component u_common is increased.
STX4_transmitter_on	3	STX4 transmitter is on. Might cause Radio Frequency Interference. Uncertainty component u_common is increased.
SARR_A_transmitter_on	4	SARR-A transmitter is on. Might cause Radio Frequency Interference. Uncertainty component u_common is increased.
SARR_B_transmitter_on	5	SARR-B transmitter is on. Might cause Radio Frequency Interference. Uncertainty component u_common is increased.

The flag description for the variables “quality_issue_pixel_Ch1_bitmask” to “quality_issue_pixel_Ch5_bitmask” are listed in the table below.

Flag Name	Bit	Description
susp_calib_DSV	0	Bad DSV data for this scanline. Adjacent scanlines had to be used for calibration. OR: Less than 4 DSV could be used for calibration. This includes the case of partial Moon contamination. OR: Less than 7 scanlines have been used to get the weighted avergage of the current one. None of those issues impacts the final calibration significantly.
susp_calib_IWCT	1	Bad IWCT data for this scanline. Adjacent scanlines had to be used for calibration. OR: Less than 4 IWCT views could be used for calibration. OR: Less than 7 scanlines have been used to get the weighted avergage of the current one. None of those issues impacts the final calibration significantly.
no_calib_bad_DSV	2	Bad DSV data for this scanline. Too far away from good scanlines. Calibration impossible.
no_calib_bad_IWCT	3	Bad IWCT data for this scanline. Too far away from good scanlines. Calibration impossible.
bad_data_earthview	4	Bad data from Earth views.

6.3.3 SSM/T-2

So far, we have no knowledge of the SRF for the SSM/T-2 instruments. Therefore, the variables SRF_weights and SRF_frequencies have fill values only.

SSM/T-2 does not provide satellite/ solar zenith or azimuth angles.

Variable Name	Standard Name	Datatype	Dimensions
Ch1_BT	toa_brightness_temperature	int32	x, y
Ch2_BT	toa_brightness_temperature	int32	x, y
Ch3_BT	toa_brightness_temperature	int32	x, y
Ch4_BT	toa_brightness_temperature	int32	x, y
Ch5_BT	toa_brightness_temperature	int32	x, y
Time	time	int32	y
data_quality_bitmask	status_flag	int8	x, y
quality_scanline_bitmask	status_flag	int8	y
quality_issue_pixel_Ch1_bitmask	status_flag	int8	x, y
quality_issue_pixel_Ch2_bitmask	status_flag	int8	x, y
quality_issue_pixel_Ch3_bitmask	status_flag	int8	x, y
quality_issue_pixel_Ch4_bitmask	status_flag	int8	x, y
quality_issue_pixel_Ch5_bitmask	status_flag	int8	x, y
SRF_weights	*none*	int16	n_frequencies, channel
SRF_frequencies	*none*	int32	n_frequencies, channel
scanline_map_to_origl1bfile	*none*	uint8	y
scanline_origl1b	*none*	int16	y

Ch1_BT	Attribute	Value	Comment
	_FillValue	-2147483648	
	standard_name	toa_brightness_temperature	
	long_name	channel1-183.31pm3GHz_toa_brightness_temperature	
	units	K	
	scale_factor	0.01	
	coordinates	longitude latitude	
	description	channel 1 brightness temperature per scanline (y) and view (x). This channel corresponds to AMSU-B Ch19.	

Ch2_BT	Attribute	Value	Comment
	_FillValue	-2147483648	
	standard_name	toa_brightness_temperature	
	long_name	channel2-183.31pm1GHz_toa_brightness_temperature	
	units	K	
	scale_factor	0.01	
	coordinates	longitude latitude	
	description	channel 2 brightness temperature per scanline (y)	

		and view (x). This channel corresponds to AMSU-B Ch18.	

Ch3_BT	Attribute	Value	Comment
	_FillValue	-2147483648	
	standard_name	toa_brightness_temperature	
	long_name	channel3-183.31pm7GHz_toa_brightness_temperature	
	units	K	
	scale_factor	0.01	
	coordinates	longitude latitude	
	description	channel 3 brightness temperature per scanline (y) and view (x). This channel corresponds to AMSU-B Ch20.	

Ch4_BT	Attribute	Value	Comment
	_FillValue	-2147483648	
	standard_name	toa_brightness_temperature	
	long_name	channel4-91.655pm1.25GHz_toa_brightness_temperature	
	units	K	
	scale_factor	0.01	
	coordinates	longitude latitude	
	description	channel 4 brightness temperature per scanline (y) and view (x). This channel's frequency is close to AMSU-B Ch16's frequency.	

Ch5_BT	Attribute	Value	Comment
	_FillValue	-2147483648	
	standard_name	toa_brightness_temperature	
	long_name	channel5-150.0GHz_toa_brightness_temperature	
	units	K	
	scale_factor	0.01	
	coordinates	longitude latitude	
	description	channel 5 brightness temperature per scanline (y) and view (x). This channel corresponds to AMSU-B Ch17.	

Time	Attribute	Value	Comment
	standard_name	time	
	long_name	Time of Scan line	
	_FillValue	-2147483648	
	units	s	
	description	Acquisition time of the scan line in seconds since 1970-01-01 00:00:00	

data_quality _bitmask	Attribute	Value	Comment
	standard_name	status_flag	
	flag_masks	1, 2, 4, 8, 16, 32	
	flag_meanings	moon_check_fails no_calib_bad_prt no_calib_moon_intrusion susp_calib_bb_temp susp_calib_prt susp_calib_moon_intrusion	
	coordinates	longitude latitude	

quality_scanline_bitmask	Attribute	Value	Comment
	standard_name	status_flag	
	long_name	Bitmask for quality issues per scanline	
	flag_masks	1, 2, 4, 8, 16, 32	
	flag_meanings	NOT YET KNOWN	

quality_issue_pixel_Ch1_bitmask	Attribute	Value	Comment
	standard_name	status_flag	
	long_name	Bitmask for quality issues per pixel	
	flag_masks	1, 2, 4, 8, 16	
	flag_meanings	susp_calib_DSV susp_calib_IWCT no_calib_bad_DSV no_calib_bad_IWCT bad_data_earthview	
	coordinates	longitude latitude	

quality_issue_pixel_Ch2_bitmask	Attribute	Value	Comment
	standard_name	status_flag	
	long_name	Bitmask for quality issues per pixel	
	flag_masks	1, 2, 4, 8, 16	
	flag_meanings	susp_calib_DSV susp_calib_IWCT no_calib_bad_DSV no_calib_bad_IWCT bad_data_earthview	
	coordinates	longitude latitude	

quality_issue_pixel_Ch3_bitmask	Attribute	Value	Comment
	standard_name	status_flag	
	long_name	Bitmask for quality issues per pixel	
	flag_masks	1, 2, 4, 8, 16	
	flag_meanings	susp_calib_DSV	

		susp_calib_IWCT no_calib_bad_DSV no_calib_bad_IWCT bad_data_earthview	
	coordinates	longitude latitude	

quality_issue_pixel_Ch4_bitmask	Attribute	Value	Comment
	standard_name	status_flag	
	long_name	Bitmask for quality issues per pixel	
	flag_masks	1, 2, 4, 8, 16	
	flag_meanings	susp_calib_DSV susp_calib_IWCT no_calib_bad_DSV no_calib_bad_IWCT bad_data_earthview	
	coordinates	longitude latitude	

quality_issue_pixel_Ch5_bitmask	Attribute	Value	Comment
	standard_name	status_flag	
	long_name	Bitmask for quality issues per pixel	
	flag_masks	1, 2, 4, 8, 16	
	flag_meanings	susp_calib_DSV susp_calib_IWCT no_calib_bad_DSV no_calib_bad_IWCT bad_data_earthview	
	coordinates	longitude latitude	

SRF_weights	Attribute	Value	Comment
	long_name	Spectral Response Function weights	
	_FillValue	-32768	
	units	dB	
	scale_factor	0.001	
	description	Per channel: weights for the relative spectral response function.	

SRF_frequencies	Attribute	Value	Comment
	long_name	Spectral Response Function frequencies	
	_FillValue	-2147483648	
	units	MHz	
	scale_factor	0.01	
	description	Per channel: frequencies for the relative spectral response function	

scanline_map_to_origl1bfile	Attribute	Value	Comment

	long_name	Indicator of original file	
	_FillValue	255	
	description	Indicator for mapping each line to its corresponding original level 1b file. See global attribute "source" for the filenames. 0 corresponds to 1st listed file, 1 to 2nd file.	

scanline_origl1b	Attribute	Value	Comment
	long_name	Original_Scan_line_number	
	_FillValue	-32768	
	description	Original scan line numbers from corresponding l1b records	

6.3.3.1 Flag Descriptions

The flag descriptions for the variable “data_quality_bitmask” are listed in the table below.

Flag Name	Bit	Description
moon_check_fails	0	The check for Moon instrusion failed. Hence no valid DSV data. If set, “invalid_input” is also set. *Questionable whether Moon Check applicable for SSMT2 at all*
no_calib_bad_prt	1	All PRT measruements are bad. Usable data further away than 5 scan liens. Calibration impossible. If set, “sensor_error” is also set.
no_calib_moon_intrusion	2	Moon intrusion detected. Moon contaminates all four DSV. If set, “sensor_error” and “invalid_input” is also set. *Questionable whether Moon Check applicable for SSMT2 at all*
susp_calib_bb_temp	3	Less than the full number of PRT sensors has been used for calibration. An unaccounted for temperature gradient might be missed. If set, “use_with_caution” is also set.
susp_calib_prt	4	PRT data from adjacent scan lines had to be used. OR: Less than the full number of PRT sensors has been used for calibration. OR: Less than 7 scan lines have been used to get the weighted avergage of the current one. None of those issues impacts the final calibration significantly.
susp_calib_moon_intrusion	5	Moon intrusion detected. At least one DSV could be used for calibration. If set, “use_with_caution” is also set. *Questionable whether Moon Check applicable for SSMT2 at all*

The flag descriptions for the variable “quality_scanline_bitmask” are listed in the table below. NOT YET KNOWN!

Flag Name	Bit	Description

The flag description for the variables “quality_issue_pixel_Ch1_bitmask” to “quality_issue_pixel_Ch5_bitmask” are listed in the table below.

Flag Name	Bit	Description
susp_calib_DSV	0	Bad DSV data for this scanline. Adjacent scanlines had to be used for calibration. OR: Less than 4 DSV could be used for calibration. This includes the case of partial Moon contamination. OR: Less than 7 scanlines have been used to get the weighted avergage of the current one. None of those issues impacts the final calibration significantly.
susp_calib_IWCT	1	Bad IWCT data for this scanline. Adjacent scanlines had to be used for calibration. OR: Less than 4 IWCT views could be used for calibration. OR: Less than 7 scanlines have been used to get the weighted avergage of the current one. None of those issues impacts the final calibration significantly.
no_calib_bad_DSV	2	Bad DSV data for this scanline. Too far away from good scanlines. Calibration impossible.
no_calib_bad_IWCT	3	Bad IWCT data for this scanline. Too far away from good scanlines. Calibration impossible.
bad_data_earthview	4	Bad data from Earth views.

Comment [IH1]: Moon check might not be possible for SSMT2

6.3.4 AVHRR

Variable Name	Standard Name	Datatype	Dimensions
Time	time	float64	y
satellite_zenith_angle	sensor_zenith_angle	int16	x, y
solar_zenith_angle	solar_zenith_angle	int16	x, y
Ch1	toa_reflectance	int16	x, y
Ch2	toa_reflectance	int16	x, y
Ch3a	toa_reflectance	int16	x, y
Ch3b	toa_brightness_temperature	int16	x, y
Ch4	toa_brightness_temperature	int16	x, y
Ch5	toa_brightness_temperature	int16	x, y
data_quality_bitmask	status_flag	uint8	x, y
quality_scanline_bitmask	quality_scanline_bitmask	uint8	y
quality_channel_bitmask	quality_channel_bitmask	uint8	y, channel
SRF_weights	*none*	int16	n_frequencies, channel
SRF_wavelengths	*none*	int32	n_frequencies, channel
scanline_map_to_origl1bfile	*none*	uint8	y
scanline_origl1b	*none*	int16	y

Time	Attribute	Value	Comment

	standard_name	time	
	long_name	Acquisition time in seconds since 1970-01-01 00:00:00	
	_FillValue	NaN	
	units	s	

satellite_zenith_angle	Attribute	Value	Comment
	standard_name	sensor_zenith_angle	
	_FillValue	-32767	
	units	degree	
	add_offset	0.0	
	scale_factor	0.01	
	valid_max	9000	
	valid_min	0	
	coordinates	longitude latitude	

solar_zenith_angle	Attribute	Value	Comment
	standard_name	solar_zenith_angle	
	_FillValue	-32767	Changed original input as -32768 is not a valid int16
	units	degree	
	add_offset	0.0	
	scale_factor	0.01	
	valid_max	18000	
	valid_min	0	
	coordinates	longitude latitude	

Ch1	Attribute	Value	Comment
	standard_name	toa_reflectance	
	long_name	Channel 1 Reflectance	
	_FillValue	-32767	
	add_offset	0.0	
	scale_factor	0.0001	
	units	1	
	valid_max	15000	
	valid_min	0	
	coordinates	longitude latitude	

Ch2	Attribute	Value	Comment
	standard_name	toa_reflectance	
	long_name	Channel 2 Reflectance	
	_FillValue	-32767	
	add_offset	0.0	
	scale_factor	0.0001	

	units	1	
	valid_max	15000	
	valid_min	0	
	coordinates	longitude latitude	

Ch3a	Attribute	Value	Comment
	standard_name	toa_reflectance	
	long_name	Channel 3a Reflectance	
	_FillValue	-32767	
	add_offset	0.0	
	scale_factor	0.0001	
	units	1	
	valid_max	15000	
	valid_min	0	
	coordinates	longitude latitude	

Ch3b	Attribute	Value	Comment
	standard_name	toa_brightness_temperature	
	long_name	Channel 3b Brightness Temperature	
	_FillValue	-32767	
	add_offset	273.15	
	scale_factor	0.01	
	units	K	
	valid_max	10000	
	valid_min	-20000	
	coordinates	longitude latitude	

Ch4	Attribute	Value	Comment
	standard_name	toa_brightness_temperature	
	long_name	Channel 4 Brightness Temperature	
	_FillValue	-32767	
	add_offset	273.15	
	scale_factor	0.01	
	units	K	
	valid_max	10000	
	valid_min	-20000	
	coordinates	longitude latitude	

Ch5	Attribute	Value	Comment
	standard_name	toa_brightness_temperature	
	long_name	Channel 5 Brightness Temperature	
	_FillValue	-32767	
	add_offset	273.15	

	scale_factor	0.01	
	units	K	
	valid_max	10000	
	valid_min	-20000	
	coordinates	longitude latitude	

data_quality_bitmask	Attribute	Value	Comment
	standard_name	status_flag	
	long_name	bitmask for quality per pixel	
	flag_masks	1, 2	
	flag_meanings	bad_geolocation_timing_err bad_calibration_radiometer_err	
	coordinates	longitude latitude	

quality_scanline_bitmask	Attribute	Value	Comment
	standard_name	status_flag	
	long_name	bitmask for quality per scanline	
	flag_masks	1, 2, 4, 8, 16, 32, 64	
	flag_meanings	do_not_use bad_time bad_navigation bad_calibration channel3a_present solar_contamination_failure solar_contamination	

quality_channel_bitmask	Attribute	Value	Comment
	standard_name	status_flag	
	long_name	bitmask for quality per channel	
	flag_masks	1, 2	
	flag_meanings	bad_channel some_pixels_not_detected_2sigma	

SRF_weights	Attribute	Value	Comment
	long_name	Spectral Response Function weights	
	_FillValue	-32768	
	scale_factor	0.000033	
	description	Per channel: weights for the relative spectral response function	

SRF_wavelengths	Attribute	Value	Comment
	long_name	Spectral Response Function wavelengths	
	_FillValue	-2147483648	
	units	um	

	scale_factor	0.0001	
	description	Per channel: wavelengths for the relative spectral response function	

scanline_map_to_origl1bfile	Attribute	Value	Comment
	long_name	Indicator of original file	
	_FillValue	255	
	description	Indicator for mapping each line to its corresponding original level 1b file. See global attribute "source" for the filenames. 0 corresponds to 1st listed file, 1 to 2nd file.	

scanline_origl1b	Attribute	Value	Comment
	long_name	Original_Scan_line_number	
	_FillValue	-32767	
	description	Original scan line numbers from corresponding l1b records	

6.3.4.1 Flag Descriptions

The flag descriptions for the variable “data_quality_bitmask” are listed in the table below.

Flag Name	Bit	Description
bad_geolocation_timing_err	0	If set for any channel, “use_with_caution” is also set.
bad_calibration_radiometer_err	1	If set for any channel, “use_with_caution” is also set.

6.3.5 HIRS

Variable Name	Standard Name	Datatype	Dimensions
bt	toa_brightness_temperature	int16	x, y, channel
satellite_zenith_angle	platform_zenith_angle	uint16	x, y
satellite_azimuth_angle	sensor_azimuth_angle	uint16	x, y
solar_zenith_angle	solar_zenith_angle	uint16	x, y
solar_azimuth_angle	solar_azimuth_angle	uint16	x, y
scanline	*none*	int16	y
time	time	uint32	y
data_quality_bitmask	status_flag	uint16	x, y
quality_scanline_bitmask	status_flag	int32	y

quality_channel_bitmask	status_flag	uint8	y, channel
SRF_weights	*none*	int16	n_frequencies, channel
SRF_wavelengths	*none*	int32	n_frequencies, channel
scanline_map_to_origl1bfile	*none*	uint8	Y
scanline_origl1b	*none*	int16	y

bt	Attribute	Value	Comment
	standard_name	toa_brightness_temperature	
	long_name	Brightness temperature, NOAA/EUMETSAT calibrated	
	_FillValue	-999	
	units	kelvin	
	scale_factor	0.01	
	add_offset	150	
	coordinates	longitude latitude	
	ancilliary_variables	quality_scanline_bitmask quality_channel_bitmask	
	coordinates	longitude latitude	

satellite_zenith_angle	Attribute	Value	Comment
	standard_name	platform_zenith_angle	
	_FillValue	65535	CF default
	scale_factor	0.01	
	add_offset	-180.0	
	units	degree	
	coordinates	longitude latitude	

satellite_azimuth_angle	Attribute	Value	Comment
	standard_name	sensor_azimuth_angle	
	long_name	local_azimuth_angle	
	_FillValue	65535	CF default
	scale_factor	0.01	
	add_offset	-180.0	
	units	degree	
	coordinates	longitude latitude	

solar_zenith_angle	Attribute	Value	Comment
	standard_name	solar_zenith_angle	
	orig_name	solar_zenith_angle	
	_FillValue	65535	CF default
	scale_factor	0.01	
	add_offset	-180.0	
	units	degree	
	coordinates	longitude latitude	

solar_azimuth_angle	Attribute	Value	Comment
	standard_name	solar_azimuth_angle	
	_FillValue	65535	CF default
	scale_factor	0.01	
	add_offset	-180.0	
	units	degree	
	coordinates	longitude latitude	

scanline	Attribute	Value	Comment
	long_name	scanline_number	
	_FillValue	-32767	
	units	count	

time	Attribute	Value	Comment
	standard_name	time	
	long_name	Acquisition time in seconds since 1970-01-01 00:00:00	
	_FillValue	4294967295	CD default
	units	s	

data_quality_ bitmask	Attribute	Value	Comment
	standard_name	status_flag	
	flag_masks	1, 2, 4, 8, 16	
	flag_meanings	suspect_mirror suspect_geo suspect_time outlier_nos uncertainty_too_large	
	coordinates	longitude latitude	

quality_scanline_bitmask	Attribute	Value	Comment
	standard_name	status_flag	
	long_name	quality_indicator_bitfield	
	flag_masks	1, 2, 4, 8, 16, 32, 64, 128, 256, 512, 1024, 2048, 65536, 131072, 262144, 524288, 1048576, 2097152, 4194304, 8388608, 16777216, 33554432, 67108864, 134217728, 268435456, 536870912, 1073741824	
	flag_meanings	do_not_use_scan time_sequence_error data_gap_preceding_scan	

		no_calibration no_earth_location clock_update status_changed line_incomplete time_field_bad time_field_bad_not_inf inconsistent_sequence scan_time_repeat uncalib_bad_time calib_few_scans uncalib_bad_prt calib_marginal_prt uncalib_channels uncalib_inst_mode quest_ant_black_body zero_loc bad_loc_time bad_loc_marginal bad_loc_reason bad_loc_ant reduced_context bad_temp_no_rself	

quality_channel_bitmask	Attribute	Value	Comment
	standard_name	status_flag	
	long_name	channel_quality_flags_bitfield	
	flag_masks	1, 2, 4, 8, 16	
	flag_meanings	do_not_use uncertainty_suspicious self_emission_fails calibration_impossible calibration_suspect	

SRF_weights	Attribute	Value	Comment
	long_name	Spectral Response Function weights	
	_FillValue	-32768	
	scale_factor	0.000033	
	description	Per channel: weights for the relative spectral response function	

SRF_wavelengths	Attribute	Value	Comment
	long_name	Spectral Response Function wavelengths	
	_FillValue	-2147483648	
	units	um	
	scale_factor	0.0001	
	description	Per channel: wavelengths for the relative spectral response function	

scanline_map_to_origl1bfile	Attribute	Value	Comment

	long_name	Indicator of original file	
	_FillValue	255	
	description	Indicator for mapping each line to its corresponding original level 1b file. See global attribute "source" for the filenames. 0 corresponds to 1st listed file, 1 to 2nd file.	

scanline_origl1b	Attribute	Value	Comment
	long_name	Original_Scan_line_number	
	_FillValue	-32767	
	description	Original scan line numbers from corresponding l1b records	

Due to a non-consistent original dataset, the HIRS data differs for the sensor history. Specific differences are listed in the following sections.

6.3.5.1 HIRS/2

HIRS/2 does not supply the following variables:

- solar_zenith_angle,
- satellite_azimuth_angle
- quality_scanline_bitmask
- mnfrqualflags

The following variables differ from the standard definition:

- satellite_zenith_angle: this variable is only provided as 1-d dataset (data only present for the first scan position)

6.3.5.2 Flag Descriptions

The flag descriptions for the variable “data_quality_bitmask” are listed in the table below.

Flag Name	Bit	Description
suspect_mirror	0	If set, “use_with_caution” is also set.
suspect_geo	1	If set, “use_with_caution” is also set.
suspect_time	2	If set, “use_with_caution” is also set.
outlier_nos	3	If set for any channel, “use_with_caution” is also set
uncertainty_too_large	4	If set for any channel, “use_with_caution” is also set

The flag descriptions for the variable “quality_scanline_bitmask” are listed in the table below.

Flag Name	Bit	Description
do_not_use_scan	0	TODO
time_sequence_error	1	TODO
data_gap_preceding_scan	2	TODO
no_calibration	3	TODO
no_earth_location	4	TODO
clock_update status_changed	5	TODO
line_incomplete	6	TODO
time_field_bad	7	TODO
time_field_bad_not_inf	8	TODO
inconsistent_sequence	9	TODO
scan_time_repeat	10	TODO
uncalib_bad_time	11	TODO
calib_few_scans	12	TODO
uncalib_bad_prt	13	TODO
calib_marginal_prt	14	TODO
uncalib_channels	15	TODO
uncalib_inst_mode	16	TODO
quest_ant_black_body zero_loc	17	TODO
bad_loc_time	18	TODO
bad_loc_marginal	19	TODO
bad_loc_reason bad_loc_ant	20	TODO
reduced_context	21	TODO If set, “use_with_caution” is also set.
bad_temp_no_rself	22	TODO If set, “invalid” is also set.

The flag descriptions for the variable “quality_channel_bitmask” are listed in the table below.

Flag Name	Bit	Description
do_not_use	0	TODO If set for all channels, “invalid” is also set. If set for one or more channels, but not all, “use_with_caution” is also set.
uncertainty_suspicious	1	TODO If set for one or more channels, “use_with_caution” is also set.
self_emission_fails	2	TODO If set for all channels, “invalid” is also set. If set for one or more channels, but not all, “use_with_caution” is also set.
calibration_impossible	3	TODO If set for all channels, “invalid” is also set. If set for one or more channels, but not all, “use_with_caution” is also set.
calibration_suspect	4	TODO If set for one or more channels, “use_with_caution” is also set.

6.3.6 MVIRI

The MVIRI data contains additional dimensions:

- x_ir_wv, y_ir_wv: dimensions of the infrared data; x_ir_wv = x /2, y_ir_wv = y/2
- “x_tie”: tie-point dimension, holding a value for every 10th pixel in east-west direction
- “y_tie”: tie-point dimension, holding a value for every 10th pixel in north-south direction

The geolocation for MVIRI products does not change; it is stored in an auxiliary file that is supplied with the data. For format and content, please refer to 7.3.

Variable Name	Standard Name	Datatype	Dimensions
time	time	uint32	x_ir_wv, y_ir_wv
solar_azimuth_angle	solar_azimuth_angle	uint16	x_tie, y_tie
solar_zenith_angle	solar_zenith_angle	int16	x_tie, y_tie
satellite_azimuth_angle	*none*	uint16	x_tie, y_tie
satellite_zenith_angle	platform_zenith_angle	uint16	x_tie, y_tie
count_ir	*none*	uint8	x_ir_wv, y_ir_wv
count_wv	*none*	uint8	x_ir, y_ir
data_quality_bitmask	status_flag	uint8	x, y
distance_sun_earth	*none*	float32	scalar
solar_irradiance_vis	solar_irradiance_vis	float32	scalar
u_solar_irradiance_vis	*none*	float32	scalar
SRF_weights	*none*	int16	n_frequencies, channel
SRF_frequencies	*none*	int32	n_frequencies, channel
covariance_spectral_response_function_vis	*none*	float32	n_frequencies, n_frequencies
u_ spectral_response_function_ir	*none*	float32	n_frequencies
u_ spectral_response_function_wv	*none*	float32	n_frequencies
a_ir	*none*	float32	scalar
b_ir	*none*	float32	scalar
u_a_ir	*none*	float32	scalar
u_b_ir	*none*	float32	scalar
a_wv	*none*	float32	scalar
b_wv	*none*	float32	scalar
u_a_wv	*none*	float32	scalar
u_b_wv	*none*	float32	scalar
bt_a_ir	*none*	float32	scalar
bt_b_ir	*none*	float32	scalar
bt_a_wv	*none*	float32	scalar
bt_b_wv	*none*	float32	scalar
years_since_launch	*none*	float32	scalar

time	Attribute	Value	Comment
	standard_name	time	
	long_name	Acquisition time of pixel	
	_FillValue	4294967295	
	add_offset	Set per product	varying
	units	seconds since 1970-01-01	

		00:00:00	

solar_azimuth_angle	Attribute	Value	Comment
	standard_name	solar_azimuth_angle	
	_FillValue	65535	CF default value
	units	degree	
	scale_factor	0.005493164	
	add_offset	0.0	
	tie_points	true	

solar_zenith_angle	Attribute	Value	Comment
	standard_name	solar_zenith_angle	
	_FillValue	-32767	CF default value
	units	degree	
	scale_factor	0.005493248	
	add_offset	0.0	
	tie_points	true	

satellite_azimuth_angle	Attribute	Value	Comment
	standard_name	sensor_azimuth_angle	
	long_name	sensor_azimuth_angle	
	_FillValue	65535	
	scale_factor	0.01	
	add_offset	0.0	
	units	degree	
	tie_points	true	

satellite_zenith_angle	Attribute	Value	Comment
	standard_name	platform_zenith_angle	
	_FillValue	65535	
	scale_factor	0.01	
	add_offset	0.0	
	units	degree	
	tie_points	true	

count_ir	Attribute	Value	Comment
	long_name	Infrared Image Counts	
	_FillValue	255	CF default value
	units	count	

count_wv	Attribute	Value	Comment
	long_name	WV Image Counts	
	_FillValue	255	CF default value
	units	count	

data_quality_bitmask	Attribute	Value	Comment
	standard_name	status_flag	
	flag_masks	1, 2, 4, 8, 16, 32	
	flag_meanings	uncertainty_suspicious uncertainty_too_large space_view_suspicious not_on_earth suspect_time suspect_geo	

distance_sun_earth	Attribute	Value	Comment
	long_name	Sun-Earth distance	
	_FillValue	NaN	
	units	au	

solar_irradiance_vis	Attribute	Value	Comment
	standard_name	solar_irradiance_vis	Not official yet
	long_name	Solar effective Irradiance	
	_FillValue	NaN	
	units	W*m-2	

u_solar_irradiance_vis	Attribute	Value	Comment
	long_name	Uncertainty in Solar Irradiance	
	_FillValue	NaN	
	units	Wm^-2	
	pixel_correlation_form	rectangle_absolute	
	pixel_correlation_units	pixel	
	pixel_correlation_scales	-inf, inf	
	scan_correlation_form	rectangle_absolute	
	scan_correlation_units	line	
	scan_correlation_scales	-inf, inf	
	image_correlation_form	rectangle_absolute	
	image_correlation_units	days	
	image_correlation_scales	-inf, inf	
	pdf_shape	rectangle	
	pdf_parameter	tbd	

SRF_weights	Attribute	Value	Comment
	long_name	Spectral Response Function weights	
	_FillValue	-32768	
	scale_factor	0.000033	
	description	Per channel: weights for the relative spectral response function	

SRF_frequencies	Attribute	Value	Comment
	long_name	Spectral Response Function frequencies	
	_FillValue	-2147483648	
	units	nm	
	scale_factor	0.0001	
	description	Per channel: frequencies for the relative spectral response function	
	source	Filename of SRF	
	Valid(YYYYDDD)	datestring	

covariance_spectral_response_function_vis	Attribute	Value	Comment
	long_name	Covariance of the Visible Band Spectral Response Function	
	_FillValue	NaN	

u_spectral_response_function_ir	Attribute	Value	Comment
	long_name	Uncertainty in Spectral Response Function for IR channel	
	_FillValue	NaN	

u_spectral_response_function_wv	Attribute	Value	Comment
	long_name	Uncertainty in Spectral Response Function for WV channel	
	_FillValue	NaN	

a_ir	Attribute	Value	Comment
	long_name	Calibration parameter a for IR Band	
	_FillValue	NaN	
	units	mWm^-2sr^-1cm^-1	

b_ir	Attribute	Value	Comment
	long_name	Calibration parameter b for IR Band	
	_FillValue	NaN	
	units	mWm^-2sr^-1cm^-1/DC	

u_a_ir	Attribute	Value	Comment
	long_name	Uncertainty of calibration parameter a for IR Band	

	_FillValue	NaN	
	units	mWm^-2sr^-1cm^-1	

u_b_ir	Attribute	Value	Comment
	long_name	Uncertainty of calibration parameter b for IR Band	
	_FillValue	NaN	
	units	mWm^-2sr^-1cm^-1/DC	

a_wv	Attribute	Value	Comment
	long_name	Calibration parameter a for WV Band	
	_FillValue	NaN	
	units	mWm^-2sr^-1cm^-1	

b_wv	Attribute	Value	Comment
	long_name	Calibration parameter b for WV Band	
	_FillValue	NaN	
	units	mWm^-2sr^-1cm^-1/DC	

u_a_wv	Attribute	Value	Comment
	long_name	Uncertainty of calibration parameter a for WV Band	
	_FillValue	NaN	
	units	mWm^-2sr^-1cm^-1	

u_b_wv	Attribute	Value	Comment
	long_name	Uncertainty of calibration parameter b for WV Band	
	_FillValue	NaN	
	units	mWm^-2sr^-1cm^-1/DC	

bt_a_ir	Attribute	Value	Comment
	long_name	IR Band BT conversion parameter A	
	_FillValue	NaN	
	units	1	

bt_b_ir	Attribute	Value	Comment
	long_name	IR Band BT conversion parameter B	
	_FillValue	NaN	
	units	1	

bt_a_wv	Attribute	Value	Comment
	long_name	WV Band BT conversion parameter A	
	_FillValue	NaN	
	units	1	

bt_b_wv	Attribute	Value	Comment
	long_name	WV Band BT conversion parameter B	
	_FillValue	9.96921E36	CF default value
	units	1	

years_since_launch	Attribute	Value	Comment
	long_name	Fractional year since launch of satellite	
	units	years	

6.3.6.1 Flag Descriptions

The flag descriptions for the variable “data_quality_bitmask” are listed in the table below.

Flag Name	Bit	Description
uncertainty_suspicious	0	If set, “use_with_caution” is also set.
uncertainty_too_large	1	If set, “use_with_caution” is also set
space_view_suspicious	2	If set, “use_with_caution” is also set
not_on_earth	3	If set, “invalid” is also set
suspect_time	4	If set, “use_with_caution” and “invalid_time” are is also set.
suspect_geolocation	5	If set, “use_with_caution” and “invalid_geoloc” are also set.

7 FCDR

The FCDR data is supplied in three different formats targeting specific audiences.

7.1 FCDR EASY

The EASY FCDR data format summarizes all sources of uncertainty into two variables that represent the random and the non-random uncertainties.

7.1.1 AMSU-B

The "channel" coordinate variable contains the values ["Ch16_BT", "Ch17_BT", "Ch18_BT", "Ch19_BT", "Ch20_BT"].

Variable Name	Standard Name	Datatype	Dimensions
Common variables as defined in chapter 6.1.1 and 6.2			
Sensor specific variables as defined in 6.3.16.2			
u_independent_Ch16_BT	*none*	uint16	x, y
u_independent_Ch17_BT	*none*	uint16	x, y
u_independent_Ch18_BT	*none*	uint16	x, y
u_independent_Ch19_BT	*none*	uint16	x, y
u_independent_Ch20_BT	*none*	uint16	x, y
u_structured_Ch16_BT	*none*	uint16	x, y
u_structured_Ch17_BT	*none*	uint16	x, y
u_structured_Ch18_BT	*none*	uint16	x, y
u_structured_Ch19_BT	*none*	uint16	x, y
u_structured_Ch20_BT	*none*	uint16	x, y
u_common_Ch16_BT	*none*	uint32	x, y
u_common_Ch17_BT	*none*	uint32	x, y
u_common_Ch18_BT	*none*	uint32	x, y
u_common_Ch19_BT	*none*	uint32	x, y
u_common_Ch20_BT	*none*	uint32	x, y
channel_correlation_matrix_independent	*none*	uint8	channel, channel
channel_correlation_matrix_structured	*none*	uint8	channel, channel
cross_element_correlation_coefficients	*none*	float32	channel, delta_x
cross_line_correlation_coefficients	*none*	float32	channel, delta_y
lookup_table_BT	*none*	float32	channel, lut_size
lookup_table _radiance	*none*	float32	channel, lut_size

u_independent_Ch16_BT	Attribute	Value	Comment
	long_name	uncertainty_of_channel16_toa_brightness_temperature_independent_effects	
	_FillValue	-32768	
	units	K	
	scale_factor	0.0001	
	description	Uncertainty of the TOA brightness temperature. Contains all considered independent effects of uncertainty.	
	coordinates	longitude latitude	

u_independent_Ch17_BT	Attribute	Value	Comment
	long_name	uncertainty_of_channel17_toa_brightness_temperature_independent_effects	
	_FillValue	-32768	
	units	K	
	scale_factor	0.0001	
	description	Uncertainty of the TOA brightness temperature. Contains all considered independent effects of uncertainty.	
	coordinates	longitude latitude	

u_independent_Ch18_BT	Attribute	Value	Comment
	long_name	uncertainty_of_channel18_toa_brightness_temperature_independent_effects	
	_FillValue	-32768	
	units	K	
	scale_factor	0.0001	
	description	Uncertainty of the TOA brightness temperature. Contains all considered independent effects of uncertainty.	
	coordinates	longitude latitude	

u_independent_Ch19_BT	Attribute	Value	Comment
	long_name	uncertainty_of_channel19_toa_brightness_temperature_independent_effects	
	_FillValue	-32768	
	units	K	
	scale_factor	0.0001	
	description	Uncertainty of the TOA brightness temperature. Contains all considered independent effects of uncertainty.	
	coordinates	longitude latitude	

u_independent_Ch20_BT	Attribute	Value	Comment
	long_name	uncertainty_of_channel20_toa_brightness_temperature_independent_effects	
	_FillValue	-32768	
	units	K	
	scale_factor	0.0001	
	description	Uncertainty of the TOA brightness temperature. Contains all considered independent effects of uncertainty.	
	coordinates	longitude latitude	

u_structured_Ch16_BT	Attribute	Value	Comment
	long_name	uncertainty_of_channel16_toa_brightness_temperature_structured_effects	
	_FillValue	-32768	
	units	K	
	scale_factor	0.0001	
	description	Uncertainty of the TOA brightness temperature. Contains all considered structured effects of uncertainty.	
	coordinates	longitude latitude	

u_structured_Ch17_BT	Attribute	Value	Comment
	long_name	uncertainty_of_channel17_toa_brightness_temperature_structured_effects	
	_FillValue	-32768	
	units	K	
	scale_factor	0.0001	
	description	Uncertainty of the TOA brightness temperature. Contains all considered structured effects of uncertainty.	
	coordinates	longitude latitude	

u_structured_Ch18_BT	Attribute	Value	Comment
	long_name	uncertainty_of_channel18_toa_brightness_temperature_structured_effects	
	_FillValue	-32768	
	units	K	
	scale_factor	0.0001	
	description	Uncertainty of the TOA brightness temperature. Contains all considered structured effects of uncertainty.	
	coordinates	longitude latitude	

u_structured_Ch19_BT	Attribute	Value	Comment
	long_name	uncertainty_of_channel19_toa_brightness_temperature_structured_effects	
	_FillValue	-32768	
	units	K	
	scale_factor	0.0001	
	description	Uncertainty of the TOA brightness temperature. Contains all considered structured effects of uncertainty.	
	coordinates	longitude latitude	

u_structured_Ch20_BT	Attribute	Value	Comment
	long_name	uncertainty_of_channel20_toa_brightness_te	

		mpearture_structured_effects	
	_FillValue	-32768	
	units	K	
	scale_factor	0.0001	
	description	Uncertainty of the TOA brightness temperature. Contains all considered structured effects of uncertainty.	
	coordinates	longitude latitude	

u_common_Ch16_BT	Attribute	Value	Comment
	long_name	uncertainty_of_channel16_toa_brightness_tempearture_common_effects	
	_FillValue	4294967295	
	units	K	
	scale_factor	0.0001	
	description	Uncertainty of the TOA brightness temperature. Contains all considered common effects of uncertainty.	
	coordinates	longitude latitude	

u_common_Ch17_BT	Attribute	Value	Comment
	long_name	uncertainty_of_channel17_toa_brightness_tempearture_common_effects	
	_FillValue	4294967295	
	units	K	
	scale_factor	0.0001	
	description	Uncertainty of the TOA brightness temperature. Contains all considered common effects of uncertainty.	
	coordinates	longitude latitude	

u_common_Ch18_BT	Attribute	Value	Comment
	long_name	uncertainty_of_channel18_toa_brightness_tempearture_common_effects	
	_FillValue	4294967295	
	units	K	
	scale_factor	0.0001	
	description	Uncertainty of the TOA brightness temperature. Contains all considered common effects of uncertainty.	
	coordinates	longitude latitude	

u_common_Ch19_BT	Attribute	Value	Comment
	long_name	uncertainty_of_channel19_toa_brightness_tempearture_common_effects	
	_FillValue	4294967295	

	units	K	
	scale_factor	0.0001	
	description	Uncertainty of the TOA brightness temperature. Contains all considered common effects of uncertainty.	
	coordinates	longitude latitude	

u_common_Ch20_BT	Attribute	Value	Comment
	long_name	uncertainty_of_channel20_toa_brightness_tempearture_common_effects	
	_FillValue	4294967295	
	units	K	
	scale_factor	0.0001	
	description	Uncertainty of the TOA brightness temperature. Contains all considered common effects of uncertainty.	
	coordinates	longitude latitude	

channel_correlation_matrix_independent	Attribute	Value	Comment
This variable will be changed certainly!	long_name	Channel_correlation_matrix_independent_effects	
	_FillValue	255	
	units	1	
	scale_factor	1	
	description	Channel error correlation matrix for independent effects. WARNING: filled with dummy values!	

channel_correlation_matrix_structured	Attribute	Value	Comment
This variable will be changed certainly!	long_name	Channel_correlation_matrix_structured_effects	
	_FillValue	255	
	units	1	
	scale_factor	1	
	description	Channel error correlation matrix for structured effects. WARNING: filled with dummy values!	

cross_element_correlation_coefficients	Attribute	Value	Comment
	long_name	cross_element_correlation_coefficients	
	_FillValue	NaN	
	description	Correlation coefficients per channel for scanline correlation	

cross_line_correlation_ coefficients	Attribute	Value	Comment
	long_name	cross_line_correlation_coefficients	
	_FillValue	NaN	
	description	Correlation coefficients per channel for inter scanline correlation	

lookup_table_BT	Attribute	Value	Comment
	_FillValue	NaN	
	description	Lookup table to convert radiance to brightness temperatures	

lookup_table_radiance	Attribute	Value	Comment
	_FillValue	NaN	
	description	Lookup table to convert brightness temperatures to radiance	

7.1.2 MHS

The “channel” coordinate variable contains the values [“Ch1_BT”, “Ch2_BT”, “Ch3_BT”, “Ch4_BT”, “Ch5_BT”].

Variable Name	Standard Name	Datatype	Dimensions
Common variables as defined in chapter 6.1.1 and 6.2			
Sensor specific variables as defined in 6.3.26.2			
u_independent_Ch1_BT	*none*	uint16	x, y
u_independent_Ch2_BT	*none*	uint16	x, y
u_independent_Ch3_BT	*none*	uint16	x, y
u_independent_Ch4_BT	*none*	uint16	x, y
u_independent_Ch5_BT	*none*	uint16	x, y
u_structured_Ch1_BT	*none*	uint16	x, y
u_structured_Ch2_BT	*none*	uint16	x, y
u_structured_Ch3_BT	*none*	uint16	x, y
u_structured_Ch4_BT	*none*	uint16	x, y
u_structured_Ch5_BT	*none*	uint16	x, y
u_common_Ch1_BT	*none*	uint32	x, y
u_common_Ch2_BT	*none*	uint32	x, y
u_common_Ch3_BT	*none*	uint32	x, y
u_common_Ch4_BT	*none*	uint32	x, y
u_common_Ch5_BT	*none*	uint32	x, y
channel_correlation_matrix_independent	*none*	uint8	channel, channel
channel_correlation_matrix_structured	*none*	uint8	channel, channel
cross_element_correlation_coefficients	*none*	float32	channel, delta_x
cross_line_correlation_coefficients	*none*	float32	channel, delta_y

lookup_table_BT	*none*	float32	channel, lut_size
lookup_table_radiance	*none*	float32	channel, lut_size

u_independent_Ch1_BT	Attribute	Value	Comment
	long_name	uncertainty_of_channel1_toa_brightness_temperature_independent_effects	
	_FillValue	-32768	
	units	K	
	scale_factor	0.0001	
	description	Uncertainty of the TOA brightness temperature. Contains all considered independent effects of uncertainty.	
	coordinates	longitude latitude	

u_independent_Ch2_BT	Attribute	Value	Comment
	long_name	uncertainty_of_channel2_toa_brightness_temperature_independent_effects	
	_FillValue	-32768	
	units	K	
	scale_factor	0.0001	
	description	Uncertainty of the TOA brightness temperature. Contains all considered independent effects of uncertainty.	
	coordinates	longitude latitude	

u_independent_Ch3_BT	Attribute	Value	Comment
	long_name	uncertainty_of_channel3_toa_brightness_temperature_independent_effects	
	_FillValue	-32768	
	units	K	
	scale_factor	0.0001	
	description	Uncertainty of the TOA brightness temperature. Contains all considered independent effects of uncertainty.	
	coordinates	longitude latitude	

u_independent_Ch4_BT	Attribute	Value	Comment
	long_name	uncertainty_of_channel4_toa_brightness_temperature_independent_effects	
	_FillValue	-32768	
	units	K	
	scale_factor	0.0001	
	description	Uncertainty of the TOA brightness temperature. Contains all considered independent effects of uncertainty.	
	coordinates	longitude latitude	

u_independent_Ch5_BT	Attribute	Value	Comment
	long_name	uncertainty_of_channel5_toa_brightness_tem pearture_independent_effects	
	_FillValue	-32768	
	units	K	
	scale_factor	0.0001	
	description	Uncertainty of the TOA brightness temperature. Contains all considered independent effects of uncertainty.	
	coordinates	longitude latitude	

u_structured_Ch1_BT	Attribute	Value	Comment
	long_name	uncertainty_of_channel1_toa_brightness_tem pearture_structured_effects	
	_FillValue	-32768	
	units	K	
	scale_factor	0.0001	
	description	Uncertainty of the TOA brightness temperature. Contains all considered structured effects of uncertainty.	
	coordinates	longitude latitude	

u_structured_Ch2_BT	Attribute	Value	Comment
	long_name	uncertainty_of_channel2_toa_brightness_tem pearture_structured_effects	
	_FillValue	-32768	
	units	K	
	scale_factor	0.0001	
	description	Uncertainty of the TOA brightness temperature. Contains all considered structured effects of uncertainty.	
	coordinates	longitude latitude	

u_structured_Ch3_BT	Attribute	Value	Comment
	long_name	uncertainty_of_channel3_toa_brightness_tem pearture_structured_effects	
	_FillValue	-32768	
	units	K	
	scale_factor	0.0001	
	description	Uncertainty of the TOA brightness temperature. Contains all considered structured effects of uncertainty.	
	coordinates	longitude latitude	

u_structured_Ch4_BT	Attribute	Value	Comment
	long_name	uncertainty_of_channel4_toa_brightness_temperature_structured_effects	
	_FillValue	-32768	
	units	K	
	scale_factor	0.0001	
	description	Uncertainty of the TOA brightness temperature. Contains all considered structured effects of uncertainty.	
	coordinates	longitude latitude	

u_structured_Ch5_BT	Attribute	Value	Comment
	long_name	uncertainty_of_channel5_toa_brightness_temperature_structured_effects	
	_FillValue	-32768	
	units	K	
	scale_factor	0.0001	
	description	Uncertainty of the TOA brightness temperature. Contains all considered structured effects of uncertainty.	
	coordinates	longitude latitude	

u_common_Ch1_BT	Attribute	Value	Comment
	long_name	uncertainty_of_channel1_toa_brightness_temperature_common_effects	
	_FillValue	4294967295	
	units	K	
	scale_factor	0.0001	
	description	Uncertainty of the TOA brightness temperature. Contains all considered common effects of uncertainty.	
	coordinates	longitude latitude	

u_common_Ch2_BT	Attribute	Value	Comment
	long_name	uncertainty_of_channel2_toa_brightness_temperature_common_effects	
	_FillValue	4294967295	
	units	K	
	scale_factor	0.0001	
	description	Uncertainty of the TOA brightness temperature. Contains all considered common effects of uncertainty.	
	coordinates	longitude latitude	

u_common_Ch3_BT	Attribute	Value	Comment
	long_name	uncertainty_of_channel3_toa_brightness_tem	

		pearture_common_effects	
	_FillValue	4294967295	
	units	K	
	scale_factor	0.0001	
	description	Uncertainty of the TOA brightness temperature. Contains all considered common effects of uncertainty.	
	coordinates	longitude latitude	

u_common_Ch4_BT	Attribute	Value	Comment
	long_name	uncertainty_of_channel4_toa_brightness_tem pearture_common_effects	
	_FillValue	4294967295	
	units	K	
	scale_factor	0.0001	
	description	Uncertainty of the TOA brightness temperature. Contains all considered common effects of uncertainty.	
	coordinates	longitude latitude	

u_common_Ch5_BT	Attribute	Value	Comment
	long_name	uncertainty_of_channel5_toa_brightness_tem pearture_common_effects	
	_FillValue	4294967295	
	units	K	
	scale_factor	0.0001	
	description	Uncertainty of the TOA brightness temperature. Contains all considered common effects of uncertainty.	
	coordinates	longitude latitude	

channel_correlation_matrix_independent	Attribute	Value	Comment
This variable will be changed certainly!	long_name	Channel_correlation_matrix_independent_effects	
	_FillValue	255	
	units	1	
	scale_factor	1	
	description	Channel error correlation matrix for independent effects. WARNING: filled with dummy values!	

channel_correlation_matrix_structured	Attribute	Value	Comment
This variable will be changed certainly!	long_name	Channel_correlation_matrix_structured_effects	

	_FillValue	255	
	units	1	
	scale_factor	1	
	description	Channel error correlation matrix for structured effects. WARNING: filled with dummy values!	

cross_element_correlation_coefficients	Attribute	Value	Comment
	long_name	cross_element_correlation_coefficients	
	_FillValue	NaN	
	description	Correlation coefficients per channel for scanline correlation	

cross_line_correlation_coefficients	Attribute	Value	Comment
	long_name	cross_line_correlation_coefficients	
	_FillValue	NaN	
	description	Correlation coefficients per channel for inter scanline correlation	

lookup_table_BT	Attribute	Value	Comment
	_FillValue	NaN	
	description	Lookup table to convert radiance to brightness temperatures	

lookup_table_radiance	Attribute	Value	Comment
	_FillValue	NaN	
	description	Lookup table to convert brightness temperatures to radiance	

7.1.3 SSM/T-2

The “channel” coordinate variable contains the values [“Ch1_BT”, “Ch2_BT”, “Ch3_BT”, “Ch4_BT”, “Ch5_BT”].

Variable Name	Standard Name	Datatype	Dimensions
Common variables as defined in chapter 6.1.1 and 6.2			
Sensor specific variables as defined in 6.3.36.2			
u_independent_Ch1_BT	*none*	uint16	x, y
u_independent_Ch2_BT	*none*	uint16	x, y
u_independent_Ch3_BT	*none*	uint16	x, y
u_independent_Ch4_BT	*none*	uint16	x, y
u_independent_Ch5_BT	*none*	uint16	x, y

u_structured_Ch1_BT	*none*	uint16	x, y
u_structured_Ch2_BT	*none*	uint16	x, y
u_structured_Ch3_BT	*none*	uint16	x, y
u_structured_Ch4_BT	*none*	uint16	x, y
u_structured_Ch5_BT	*none*	uint16	x, y
u_common_Ch1_BT	*none*	uint32	x, y
u_common_Ch2_BT	*none*	uint32	x, y
u_common_Ch3_BT	*none*	uint32	x, y
u_common_Ch4_BT	*none*	uint32	x, y
u_common_Ch5_BT	*none*	uint32	x, y
channel_correlation_matrix_independent	*none*	uint8	channel, channel
channel_correlation_matrix_structured	*none*	uint8	channel, channel
cross_element_correlation_coefficients	*none*	float32	channel, delta_x
cross_line_correlation_coefficients	*none*	float32	channel, delta_y
lookup_table_BT	*none*	float32	channel, lut_size
lookup_table_radiance	*none*	float32	channel, lut_size

u_independent_Ch1_BT	Attribute	Value	Comment
	long_name	uncertainty_of_channel1_toa_brightness_temperature_independent_effects	
	_FillValue	-32768	
	units	K	
	scale_factor	0.0001	
	description	Uncertainty of the TOA brightness temperature. Contains all considered independent effects of uncertainty.	
	coordinates	longitude latitude	

u_independent_Ch2_BT	Attribute	Value	Comment
	long_name	uncertainty_of_channel2_toa_brightness_temperature_independent_effects	
	_FillValue	-32768	
	units	K	
	scale_factor	0.0001	
	description	Uncertainty of the TOA brightness temperature. Contains all considered independent effects of uncertainty.	
	coordinates	longitude latitude	

u_independent_Ch3_BT	Attribute	Value	Comment
	long_name	uncertainty_of_channel3_toa_brightness_temperature_independent_effects	
	_FillValue	-32768	
	units	K	
	scale_factor	0.0001	
	description	Uncertainty of the TOA brightness temperature. Contains all considered	

		independent effects of uncertainty.	
	coordinates	longitude latitude	

u_independent_Ch4_BT	Attribute	Value	Comment
	long_name	uncertainty_of_channel4_toa_brightness_temperature_independent_effects	
	_FillValue	-32768	
	units	K	
	scale_factor	0.0001	
	description	Uncertainty of the TOA brightness temperature. Contains all considered independent effects of uncertainty.	
	coordinates	longitude latitude	

u_independent_Ch5_BT	Attribute	Value	Comment
	long_name	uncertainty_of_channel5_toa_brightness_temperature_independent_effects	
	_FillValue	-32768	
	units	K	
	scale_factor	0.0001	
	description	Uncertainty of the TOA brightness temperature. Contains all considered independent effects of uncertainty.	
	coordinates	longitude latitude	

u_structured_Ch1_BT	Attribute	Value	Comment
	long_name	uncertainty_of_channel1_toa_brightness_temperature_structured_effects	
	_FillValue	-32768	
	units	K	
	scale_factor	0.0001	
	description	Uncertainty of the TOA brightness temperature. Contains all considered structured effects of uncertainty.	
	coordinates	longitude latitude	

u_structured_Ch2_BT	Attribute	Value	Comment
	long_name	uncertainty_of_channel2_toa_brightness_temperature_structured_effects	
	_FillValue	-32768	
	units	K	
	scale_factor	0.0001	
	description	Uncertainty of the TOA brightness temperature. Contains all considered structured effects of uncertainty.	
	coordinates	longitude latitude	

u_structured_Ch3_BT	Attribute	Value	Comment
	long_name	uncertainty_of_channel3_toa_brightness_tem pearture_structured_effects	
	_FillValue	-32768	
	units	K	
	scale_factor	0.0001	
	description	Uncertainty of the TOA brightness temperature. Contains all considered structured effects of uncertainty.	
	coordinates	longitude latitude	

u_structured_Ch4_BT	Attribute	Value	Comment
	long_name	uncertainty_of_channel4_toa_brightness_tem pearture_structured_effects	
	_FillValue	-32768	
	units	K	
	scale_factor	0.0001	
	description	Uncertainty of the TOA brightness temperature. Contains all considered structured effects of uncertainty.	
	coordinates	longitude latitude	

u_structured_Ch5_BT	Attribute	Value	Comment
	long_name	uncertainty_of_channel5_toa_brightness_tem pearture_structured_effects	
	_FillValue	-32768	
	units	K	
	scale_factor	0.0001	
	description	Uncertainty of the TOA brightness temperature. Contains all considered structured effects of uncertainty.	
	coordinates	longitude latitude	

u_common_Ch1_BT	Attribute	Value	Comment
	long_name	uncertainty_of_channel1_toa_brightness_tem pearture_common_effects	
	_FillValue	4294967295	
	units	K	
	scale_factor	0.0001	
	description	Uncertainty of the TOA brightness temperature. Contains all considered common effects of uncertainty.	
	coordinates	longitude latitude	

u_common_Ch2_BT	Attribute	Value	Comment
	long_name	uncertainty_of_channel2_toa_brightness_tem pearture_common_effects	
	_FillValue	4294967295	
	units	K	
	scale_factor	0.0001	
	description	Uncertainty of the TOA brightness temperature. Contains all considered common effects of uncertainty.	
	coordinates	longitude latitude	

u_common_Ch3_BT	Attribute	Value	Comment
	long_name	uncertainty_of_channel3_toa_brightness_tem pearture_common_effects	
	_FillValue	4294967295	
	units	K	
	scale_factor	0.0001	
	description	Uncertainty of the TOA brightness temperature. Contains all considered common effects of uncertainty.	
	coordinates	longitude latitude	

u_common_Ch4_BT	Attribute	Value	Comment
	long_name	uncertainty_of_channel4_toa_brightness_tem pearture_common_effects	
	_FillValue	4294967295	
	units	K	
	scale_factor	0.0001	
	description	Uncertainty of the TOA brightness temperature. Contains all considered common effects of uncertainty.	
	coordinates	longitude latitude	

u_common_Ch5_BT	Attribute	Value	Comment
	long_name	uncertainty_of_channel5_toa_brightness_tem pearture_common_effects	
	_FillValue	4294967295	
	units	K	
	scale_factor	0.0001	
	description	Uncertainty of the TOA brightness temperature. Contains all considered common effects of uncertainty.	
	coordinates	longitude latitude	

channel_correlation_ma trix_independent	Attribute	Value	Comment

This variable will be changed certainly!	long_name	Channel_correlation_matrix_independent_effects	
	_FillValue	255	
	units	1	
	scale_factor	1	
	description	Channel error correlation matrix for independent effects. WARNING: filled with dummy values!	

channel_correlation_matrix_structured	Attribute	Value	Comment
This variable will be changed certainly!	long_name	Channel_correlation_matrix_structured_effects	
	_FillValue	255	
	units	1	
	scale_factor	1	
	description	Channel error correlation matrix for structured effects. WARNING: filled with dummy values!	

cross_element_correlation_coefficients	Attribute	Value	Comment
	long_name	cross_element_correlation_coefficients	
	_FillValue	NaN	
	description	Correlation coefficients per channel for scanline correlation	

cross_line_correlation_coefficients	Attribute	Value	Comment
	long_name	cross_line_correlation_coefficients	
	_FillValue	NaN	
	description	Correlation coefficients per channel for inter scanline correlation	

lookup_table_BT	Attribute	Value	Comment
	_FillValue	NaN	
	description	Lookup table to convert radiance to brightness temperatures	

lookup_table_radiance	Attribute	Value	Comment
	_FillValue	NaN	
	description	Lookup table to convert brightness temperatures to radiance	

7.1.4 AVHRR

The “channel” coordinate variable contains the values [“Ch1”, “Ch2”, “Ch3a”, “Ch3b”, “Ch4”, “Ch5”].

Variable Name	Standard Name	Datatype	Dimensions
Common variables as defined in chapter 6.1.1 and 6.2			
Sensor specific variables as defined in 6.3.46.2			
u_independent_Ch1	*none*	int16	x, y
u_structured_Ch1	*none*	int16	x, y
u_common_Ch1	*none*	int16	x, y
u_independent_Ch2	*none*	int16	x, y
u_structured_Ch2	*none*	int16	x, y
u_common_Ch2	*none*	int16	x, y
u_independent_Ch3a	*none*	int16	x, y
u_structured_Ch3a	*none*	int16	x, y
u_common_Ch3a	*none*	int16	x, y
u_independent_Ch3b	*none*	int16	x, y
u_structured_Ch3b	*none*	int16	x, y
u_common_Ch3b	*none*	int16	x, y
u_independent_Ch4	*none*	int16	x, y
u_structured_Ch4	*none*	int16	x, y
u_common_Ch4	*none*	int16	x, y
u_independent_Ch5	*none*	int16	x, y
u_structured_Ch5	*none*	int16	x, y
u_common_Ch5	*none*	int16	x, y
channel_correlation_matrix_independent	*none*	int16	channel, channel
channel_correlation_matrix_structured	*none*	int16	channel, channel
cross_element_correlation_coefficients	*none*	float32	channel, delta_x
cross_line_correlation_coefficients	*none*	float32	channel, delta_y
lookup_table_BT	*none*	float32	channel, lut_size
lookup_table_radiance	*none*	float32	channel, lut_size

u_independent_Ch1	Attribute	Value	Comment
	long_name	independent uncertainty per pixel for channel 1	
	_FillValue	-32767	
	scale_factor	0.00001	
	valid_min	10	
	valid_max	1000	
	units	Percent	
	coordinates	longitude latitude	

u_structured_Ch1	Attribute	Value	Comment
	long_name	structured uncertainty per pixel for channel 1	
	_FillValue	-32767	
	scale_factor	0.01	
	valid_min	3	
	valid_max	5	

	units	Percent	
	coordinates	longitude latitude	

u_common_Ch1	Attribute	Value	Comment
	long_name	common uncertainty per pixel for channel 1	
	_FillValue	-32767	
	scale_factor	0.00001	
	valid_min	10	
	valid_max	1000	
	units	Percent	
	coordinates	longitude latitude	

u_independent_Ch2	Attribute	Value	Comment
	long_name	independent uncertainty per pixel for channel 2	
	_FillValue	-32767	
	scale_factor	0.00001	
	valid_min	10	
	valid_max	1000	
	units	Percent	
	coordinates	longitude latitude	

u_structured_Ch2	Attribute	Value	Comment
	long_name	structured uncertainty per pixel for channel 2	
	_FillValue	-32767	
	scale_factor	0.01	
	valid_min	3	
	valid_max	5	
	units	Percent	
	coordinates	longitude latitude	

u_common_Ch2	Attribute	Value	Comment
	long_name	common uncertainty per pixel for channel 2	
	_FillValue	-32767	
	scale_factor	0.00001	
	valid_min	10	
	valid_max	1000	
	units	Percent	
	coordinates	longitude latitude	

u_independent_Ch3a	Attribute	Value	Comment
	long_name	independent uncertainty	

		per pixel for channel 3a	
	_FillValue	-32767	
	scale_factor	0.00001	
	valid_min	10	
	valid_max	1000	
	units	Percent	
	coordinates	longitude latitude	

u_structured_Ch3a	Attribute	Value	Comment
	long_name	structured uncertainty per pixel for channel 3a	
	_FillValue	-32767	
	scale_factor	0.01	
	valid_min	3	
	valid_max	5	
	units	Percent	
	coordinates	longitude latitude	

u_common_Ch3a	Attribute	Value	Comment
	long_name	common uncertainty per pixel for channel 3a	
	_FillValue	-32767	
	scale_factor	0.00001	
	valid_min	10	
	valid_max	1000	
	units	Percent	
	coordinates	longitude latitude	

u_independent_Ch3b	Attribute	Value	Comment
	long_name	independent uncertainty per pixel for channel 3b	
	_FillValue	-32767	
	scale_factor	0.001	
	valid_min	1	
	valid_max	15000	
	units	K	
	coordinates	longitude latitude	

u_structured_Ch3b	Attribute	Value	Comment
	long_name	structured uncertainty per pixel for channel 3b	
	_FillValue	-32767	
	scale_factor	0.001	
	valid_min	1	
	valid_max	15000	
	units	K	

	coordinates	longitude latitude	

u_common_Ch3b	Attribute	Value	Comment
	long_name	common uncertainty per pixel for channel 3b	
	_FillValue	-32767	
	scale_factor	0.001	
	valid_min	1	
	valid_max	15000	
	units	K	
	coordinates	longitude latitude	

u_independent_Ch4	Attribute	Value	Comment
	long_name	independent uncertainty per pixel for channel 4	
	_FillValue	-32767	
	scale_factor	0.001	
	valid_min	1	
	valid_max	15000	
	units	K	
	coordinates	longitude latitude	

u_structured_Ch4	Attribute	Value	Comment
	long_name	structured uncertainty per pixel for channel 4	
	_FillValue	-32767	
	scale_factor	0.001	
	valid_min	1	
	valid_max	15000	
	units	K	
	coordinates	longitude latitude	

u_common_Ch4	Attribute	Value	Comment
	long_name	common uncertainty per pixel for channel 4	
	_FillValue	-32767	
	scale_factor	0.001	
	valid_min	1	
	valid_max	15000	
	units	K	
	coordinates	longitude latitude	

u_independent_Ch5	Attribute	Value	Comment

	long_name	independent uncertainty per pixel for channel 5	
	_FillValue	-32767	
	scale_factor	0.001	
	valid_min	1	
	valid_max	15000	
	units	K	
	coordinates	longitude latitude	

u_structured_Ch5	Attribute	Value	Comment
	long_name	structured uncertainty per pixel for channel 5	
	_FillValue	-32767	
	scale_factor	0.001	
	valid_min	1	
	valid_max	15000	
	units	K	
	coordinates	longitude latitude	

u_common_Ch5	Attribute	Value	Comment
	long_name	common uncertainty per pixel for channel 5	
	_FillValue	-32767	
	scale_factor	0.001	
	valid_min	1	
	valid_max	15000	
	units	K	
	coordinates	longitude latitude	

channel_correlation_matrix_independent	Attribute	Value	Comment
	long_name	Channel_correlation_matrix_independent_effects	
	_FillValue	-32768	
	scale_factor	0.0001	
	units	1	
	valid_min	-10000	
	valid_max	10000	
	description	Channel error correlation matrix for independent effects	

channel_correlation_matrix_structured	Attribute	Value	Comment
	long_name	Channel_correlation_matrix_structured_effects	
	_FillValue	-32768	

	scale_factor	0.0001	
	units	1	
	valid_min	-10000	
	valid_max	10000	
	description	Channel error correlation matrix for structured effects.	

cross_element_correlation_coefficients	Attribute	Value	Comment
	long_name	cross_element_correlation_coefficients	
	_FillValue	NaN	
	description	Correlation coefficients per channel for scanline correlation	

cross_line_correlation_coefficients	Attribute	Value	Comment
	long_name	cross_line_correlation_coefficients	
	_FillValue	NaN	
	description	Correlation coefficients per channel for inter scanline correlation	

lookup_table_BT	Attribute	Value	Comment
	_FillValue	NaN	
	description	Lookup table to convert radiance to brightness temperatures	

lookup_table_radiance	Attribute	Value	Comment
	_FillValue	NaN	
	description	Lookup table to convert brightness temperatures to radiance	

7.1.5 HIRS

The “channel” coordinate variable contains the values [“Ch1”, … ”Ch20”].

Variable Name	Standard Name	Datatype	Dimensions
Common variables as defined in chapter 6.1.1 and 6.2			
Sensor specific variables as defined in 6.3.5			
u_independent	*none*	uint16	x, y, channel
u_structured	*none*	uint16	x, y, channel
u_common	*none*	uint16	x, y, channel
channel_correlation_matrix_independent	*none*	int16	channel, channel
channel_correlation_matrix_structured	*none*	int16	channel, channel
cross_element_correlation_coefficients	*none*	float32	channel, delta_x

cross_line_correlation_coefficients	*none*	float32	channel, delta_y
lookup_table_BT	*none*	float32	channel, lut_size
lookup_table_radiance	*none*	float32	channel, lut_size

u_independent	Attribute	Value	Comment
	long_name	uncertainty from independent errors	
	_FillValue	65535	
	units	K	
	scale_factor	0.001	
	valid_min	1	
	valid_max	65534	
	coordinates	longitude latitude	

u_structured	Attribute	Value	Comment
	long_name	uncertainty from structured errors	
	_FillValue	65535	
	units	K	
	scale_factor	0.001	
	valid_min	1	
	valid_max	65534	
	coordinates	longitude latitude	

u_common	Attribute	Value	Comment
	long_name	uncertainty from common errors	
	_FillValue	65535	
	units	K	
	scale_factor	0.001	
	valid_min	1	
	valid_max	65534	
	coordinates	longitude latitude	

channel_correlation_matrix_independent	Attribute	Value	Comment
	long_name	Channel_correlation_matrix_independent_effects	
	_FillValue	-32768	
	scale_factor	0.0001	
	units	1	
	valid_min	-10000	
	valid_max	10000	
	description	Channel error correlation matrix for independent effects	

channel_correlation_matrix_structured	Attribute	Value	Comment
	long_name	Channel_correlation_matrix_structured_effects	
	_FillValue	-32768	
	scale_factor	0.0001	
	units	1	
	valid_min	-10000	
	valid_max	10000	
	description	Channel error correlation matrix for structured effects.	
cross_element_correlation_coefficients	Attribute	Value	Comment
	long_name	cross_element_correlation_coefficients	
	_FillValue	NaN	
	description	Correlation coefficients per channel for scanline correlation	

cross_line_correlation_coefficients	Attribute	Value	Comment
	long_name	cross_line_correlation_coefficients	
	_FillValue	NaN	
	description	Correlation coefficients per channel for inter scanline correlation	

lookup_table_BT	Attribute	Value	Comment
	_FillValue	NaN	
	description	Lookup table to convert radiance to brightness temperatures	

lookup_table_radiance	Attribute	Value	Comment
	_FillValue	NaN	
	description	Lookup table to convert brightness temperatures to radiance	

7.1.6 MVIRI

The “channel” coordinate variable contains the values [“vis”, ”wv”, “ir”].

Variable Name	Standard Name	Datatype	Dimensions
Common variables as defined in chapter 6.1 and 6.2			

Sensor specific variables as defined in 6.3.6			
toa_bidirectional_reflectance_vis	toa_bidirectional_reflectance_vis	uint16	x, y
u_independent_toa_bidirectional_reflectance	*none*	uint16	x, y
u_structured_ toa_bidirectional_reflectance	*none*	uint16	x, y
u_common_ toa_bidirectional_reflectance	*none*	float32	scalar
sub_satellite_latitude_start	*none*	float	scalar
sub_satellite_longitude_start	*none*	float	scalar
sub_satellite_latitude_end	*none*	float	scalar
sub_satellite_longitude_end	*none*	float	scalar
channel_correlation_matrix_independent	*none*	int16	channel, channel
channel_correlation_matrix_structured	*none*	int16	channel, channel
cross_element_correlation_coefficients	*none*	float32	channel, delta_x
cross_line_correlation_coefficients	*none*	float32	channel, delta_y
lookup_table_BT	*none*	float32	channel, lut_size
lookup_table_radiance	*none*	float32	channel, lut_size

toa_bidirectional_reflectance_vis	Attribute	Value	Comment
	standard_name	toa_bidirectional_reflectance_vis	
	long_name	top of atmosphere bidirectional reflectance factor per pixel of the visible band with central wavelength 0.7	
	_FillValue	65535	CF default value
	units	1	
	scale_factor	3.05176E-05	
	add_offset	0.0	

u_independent_toa_bidirectional_reflectance	Attribute	Value	Comment
	long_name	independent uncertainty per pixel	
	_FillValue	65535	CF default value
	scale_factor	3.05176E-05	
	add_offset	0.0	
	units	1	

u_structured_ toa_bidirectional_reflectance	Attribute	Value	Comment
	long_name	structured uncertainty per pixel	
	_FillValue	65535	CF default value
	scale_factor	3.05176E-05	
	add_offset	0.0	
	units	1	

u_common_ toa_bidirectional_reflectance	Attribute	Value	Comment
	long_name	common uncertainty per slot	
	units	1	

sub_satellite_latitude_start	Attribute	Value	Comment
	long_name	Latitude of the sub satellite point at image start	
	_FillValue	NaN	
	units	degrees_north	

sub_satellite_longitude_start	Attribute	Value	Comment
	long_name	Longitude of the sub satellite point at image start	
	_FillValue	NaN	
	units	degrees_east	

sub_satellite_latitude_end	Attribute	Value	Comment
	long_name	latitude of the sub satellite point at image end	
	_FillValue	NaN	
	units	degree_north	

sub_satellite_longitude_end	Attribute	Value	Comment
	long_name	Longitude of the sub satellite point at image end	
	_FillValue	NaN	
	units	degrees_east	

channel_correlation_matrix_independent	Attribute	Value	Comment
	long_name	Channel_correlation_matrix_independent_effects	
	_FillValue	-32768	
	scale_factor	0.0001	
	units	1	
	valid_min	-10000	
	valid_max	10000	
	description	Channel error correlation matrix for independent effects	

channel_correlation_matrix_structured	Attribute	Value	Comment
	long_name	Channel_correlation_matrix_structured_effects	
	_FillValue	-32768	
	scale_factor	0.0001	
	units	1	
	valid_min	-10000	
	valid_max	10000	
	description	Channel error correlation matrix for structured effects.	

cross_element_correlation_coefficients	Attribute	Value	Comment
	long_name	cross_element_correlation_coefficients	
	_FillValue	NaN	
	description	Correlation coefficients per channel for scanline correlation	

cross_line_correlation_coefficients	Attribute	Value	Comment
	long_name	cross_line_correlation_coefficients	
	_FillValue	NaN	
	description	Correlation coefficients per channel for inter scanline correlation	

lookup_table_BT	Attribute	Value	Comment
	_FillValue	NaN	
	description	Lookup table to convert radiance to brightness temperatures	

lookup_table_radiance	Attribute	Value	Comment
	_FillValue	NaN	
	description	Lookup table to convert brightness temperatures to radiance	

7.2 FCDR FULL

The FULL FCDR data format contains all sources of uncertainty. The file content varies significantly from sensor to sensor.

7.2.1 AMSU-B

Variable Name	Standard Name	Datatype	Dimensions
Common variables as defined in chapter 6.1.1			
Sensor specific variables as defined in 6.3.1			
u_btemps	*none*	float32	x, y, channel
u_syst_btemps	*none*	float32	x, y, channel
u_random_btemps	*none*	float32	x, y, channel
u_instrtemp	*none*	float32	y
u_latitude	*none*	float32	x, y
u_longitude	*none*	float32	x, y
u_satellite_azimuth_angle	*none*	float32	x, y
u_satellite_zenith_angle	*none*	float32	x, y
u_solar_azimuth_angle	*none*	float32	x, y
u_solar_zenith_angle	*none*	float32	x, y

u_btemps	Attribute	Value	Comment
	long_name	total uncertainty of brightness temperature	
	_FillValue	NaN	
	units	K	
	coordinates	longitude latitude	

u_syst_btemps	Attribute	Value	Comment
	long_name	systematic uncertainty of brightness temperature	
	_FillValue	NaN	
	units	K	
	coordinates	longitude latitude	

u_random_btemps	Attribute	Value	Comment
	long_name	noise on brightness temperature	
	_FillValue	NaN	
	units	K	
	coordinates	longitude latitude	

u_instrtemp	Attribute	Value	Comment
	long_name	noise on brightness temperature	
	_FillValue	NaN	
	units	K	

u_latitude	Attribute	Value	Comment
	long_name	uncertainty of latitude	
	_FillValue	NaN	
	units	degree	
	coordinates	longitude latitude	

u_longitude	Attribute	Value	Comment
	long_name	uncertainty of longitude	
	_FillValue	NaN	
	units	degree	
	coordinates	longitude latitude	

u_satellite_azimuth_angle	Attribute	Value	Comment
	long_name	uncertainty of satellite azimuth angle	
	_FillValue	NaN	
	units	degree	
	coordinates	longitude latitude	

u_satellite_zenith_angle	Attribute	Value	Comment
	long_name	uncertainty of satellite zenith angle	
	_FillValue	NaN	
	units	degree	
	coordinates	longitude latitude	

u_solar_azimuth_angle	Attribute	Value	Comment
	long_name	uncertainty of solar azimuth angle	
	_FillValue	NaN	
	units	degree	
	coordinates	longitude latitude	

u_solar_zenith_angle	Attribute	Value	Comment
	long_name	uncertainty of solar zenith angle	
	_FillValue	NaN	
	units	degree	
	coordinates	longitude latitude	

7.2.2 MHS

TODO

7.2.3 SSM/T-2

The SSM/T-2 data contains additional dimensions:

- housekeeping: the number of thermistors used in housekeeping data
- ancil_val: the number of ancilliary variables
- calib_number: the number of calibration points

Variable Name	Standard Name	Datatype	Dimensions
Common variables as defined in chapter 6.1.1			
Sensor specific variables as defined in 6.3.3			
u_Temperature_misc_housekeeping	*none*	float32	y, housekeeping
u_cold_counts	*none*	float32	x, y, calib_number
u_counts_to_tb_gain	*none*	float32	y, channel
u_counts_to_tb_offset	*none*	float32	y, channel
u_gain_control	*none*	float32	y, channel
u_tb	*none*	float32	x, y, channel
u_thermal_reference	*none*	float32	y
u_warm_counts	*none*	float32	x, y, calib_number

u_Temperature_misc_housekeeping	Attribute	Value	Comment
	long_name	TODO	UHH to suggest
	_FillValue	NaN	UHH to confirm
	units	TODO	UHH to suggest

u_cold_counts	Attribute	Value	Comment
	long_name	TODO	UHH to suggest
	_FillValue	NaN	UHH to confirm
	coordinates	longitude latitude	

u_counts_to_tb_gain	Attribute	Value	Comment
	long_name	TODO	UHH to suggest
	_FillValue	NaN	UHH to confirm

u_counts_to_tb_offset	Attribute	Value	Comment
	long_name	TODO	UHH to suggest
	_FillValue	NaN	UHH to confirm

u_gain_control	Attribute	Value	Comment

	long_name	TODO	UHH to suggest
	_FillValue	NaN	UHH to confirm

u_tb	Attribute	Value	Comment
	long_name	TODO	UHH to suggest
	_FillValue	NaN	UHH to confirm
	units	K	
	coordinates	longitude latitude	

u_thermal_reference	Attribute	Value	Comment
	long_name	TODO	UHH to suggest
	_FillValue	NaN	UHH to confirm
	units	TODO	UHH to suggest

u_warm_counts	Attribute	Value	Comment
	long_name	TODO	UHH to suggest
	_FillValue	NaN	UHH to confirm
	coordinates	longitude latitude	

7.2.4 AVHRR

AVHRR FULL FCDR contains additional dimensions:

- n_prt: number of platinum resistance thermometers

Variable Name	Standard Name	Datatype	Dimensions
Common variables as defined in chapter 6.1.1 and 6.2			
Sensor specific variables as defined in 6.3.4			
u_latitude	*none*	float32	x, y
u_longitude	*none*	float32	x, y
u_time	*none*	float64	y
u_satellite_azimuth_angle	*none*	float32	x, y
u_satellite_zenith_angle	*none*	float32	x, y
u_solar_azimuth_angle	*none*	float32	x, y
u_solar_zenith_angle	*none*	float32	x, y
PRT_C	*none*	int16	n_prt, y
u_prt	*none*	float32	n_prt, y
R_ICT	*none*	float32	n_prt, y
T_instr	*none*	float32	y
Ch1_Csp	*none*	int32	x, y
Ch2_Csp	*none*	int32	x, y
Ch3a_Csp	*none*	int32	x, y
Ch3b_Csp	*none*	int32	x, y

Ch4_Csp	*none*	int32	x, y
Ch5_Csp	*none*	int32	x, y
Ch3b_Cict	*none*	int32	x, y
Ch4_Cict	*none*	int32	x, y
Ch5_Cict	*none*	int32	x, y
Ch1_Ce	*none*	int32	x, y
Ch2_Ce	*none*	int32	x, y
Ch3a_Ce	*none*	int32	x, y
Ch3b_Ce	*none*	int32	x, y
Ch4_Ce	*none*	int32	x, y
Ch5_Ce	*none*	int32	x, y
Ch1_u_Csp	*none*	float32	x, y
Ch2_u_Csp	*none*	float32	x, y
Ch3a_u_Csp	*none*	float32	x, y
Ch3b_u_Csp	*none*	float32	x, y
Ch4_u_Csp	*none*	float32	x, y
Ch5_u_Csp	*none*	float32	x, y
Ch3b_u_Cict	*none*	float32	x, y
Ch4_u_Cict	*none*	float32	x, y
Ch5_u_Cict	*none*	float32	x, y
Ch1_u_Ce	*none*	float32	x, y
Ch2_u_Ce	*none*	float32	x, y
Ch3a_u_Ce	*none*	float32	x, y
Ch3b_u_Ce	*none*	float32	x, y
Ch4_u_Ce	*none*	float32	x, y
Ch5_u_Ce	*none*	float32	x, y
Ch1_u_Refl	*none*	int16	x, y
Ch2_u_Refl	*none*	int16	x, y
Ch3a_u_Refl	*none*	int16	x, y
Ch3b_u_Bt	*none*	int16	x, y
Ch4_u_Bt	*none*	int16	x, y
Ch5_u_Bt	*none*	int16	x, y
Ch3b_ur_Bt	*none*	int16	x, y
Ch4_ur_Bt	*none*	int16	x, y
Ch5_ur_Bt	*none*	int16	x, y
Ch3b_us_Bt	*none*	int16	x, y
Ch4_us_Bt	*none*	int16	x, y
Ch5_us_Bt	*none*	int16	x, y

u_latitude	Attribute	Value	Comment
	long_name	uncertainty of latitude	
	_FillValue	NaN	
	units	degree	
	coordinates	longitude latitude	

u_longitude	Attribute	Value	Comment
	long_name	uncertainty of longitude	

	_FillValue	NaN	
	units	degree	
	coordinates	longitude latitude	

u_time	Attribute	Value	Comment
	long_name	uncertainty of acquisition time	
	_FillValue	NaN	
	units	s	

u_satellite_azimuth_angle	Attribute	Value	Comment
	long_name	uncertainty of satellite azimuth angle	
	_FillValue	NaN	
	units	degree	
	coordinates	longitude latitude	

u_satellite_zenith_angle	Attribute	Value	Comment
	long_name	uncertainty of satellite zenith angle	
	_FillValue	NaN	
	units	degree	
	coordinates	longitude latitude	

u_solar_azimuth_angle	Attribute	Value	Comment
	long_name	uncertainty of solar azimuth angle	
	_FillValue	NaN	
	units	degree	
	coordinates	longitude latitude	

u_solar_zenith_angle	Attribute	Value	Comment
	long_name	uncertainty of solar azimuth angle	
	_FillValue	NaN	
	units	degree	
	coordinates	longitude latitude	

PRT_C	Attribute	Value	Comment
	long_name	Prt counts	
	_FillValue	-32767	CF default value
	units	count	

u_prt	Attribute	Value	Comment
	long_name	Uncertainty on the PRT counts	
	_FillValue	NaN	CF default value
	units	count	
	pixel_correlation_form	rectangle_absolute	
	pixel_correlation_units	pixel	
	pixel_correlation_scales	-inf, inf	
	scan_correlation_form	rectangle_absolute	
	scan_correlation_units	line	
	scan_correlation_scales	-inf, inf	
	pdf_shape	rectangle	
	pdf_parameter	tbd	

R_ICT	Attribute	Value	Comment
	long_name	Radiance of the PRT	
	_FillValue	NaN	
	units	mW m^-2 sr^-1 cm	

T_instr	Attribute	Value	Comment
	long_name	Instrument temperature	
	_FillValue	NaN	
	units	K	

Ch1_Csp	Attribute	Value	Comment
	long_name	Ch1 Space counts	
	_FillValue	-2147483647	CF default value
	units	count	
	coordinates	longitude latitude	

Ch2_Csp	Attribute	Value	Comment
	long_name	Ch2 Space counts	
	_FillValue	-2147483647	CF default value
	units	count	
	coordinates	longitude latitude	

Ch3a_Csp	Attribute	Value	Comment
	long_name	Ch3a Space counts	
	_FillValue	-2147483647	CF default value
	units	count	
	coordinates	longitude latitude	

Ch3b_Csp	Attribute	Value	Comment
	long_name	Ch3b Space counts	

	_FillValue	-2147483647	CF default value
	units	count	
	coordinates	longitude latitude	

Ch4_Csp	Attribute	Value	Comment
	long_name	Ch4 Space counts	
	_FillValue	-2147483647	CF default value
	units	count	
	coordinates	longitude latitude	

Ch5_Csp	Attribute	Value	Comment
	long_name	Ch5 Space counts	
	_FillValue	-2147483647	CF default value
	units	count	
	coordinates	longitude latitude	

Ch3b_Cict	Attribute	Value	Comment
	long_name	Ch3b ICT counts	
	_FillValue	-2147483647	CF default value
	units	count	
	coordinates	longitude latitude	

Ch4_Cict	Attribute	Value	Comment
	long_name	Ch4 ICT counts	
	_FillValue	-2147483647	CF default value
	units	count	
	coordinates	longitude latitude	

Ch5_Cict	Attribute	Value	Comment
	long_name	Ch5 ICT counts	
	_FillValue	-2147483647	CF default value
	units	count	
	coordinates	longitude latitude	

Ch1_Ce	Attribute	Value	Comment
	long_name	Ch1 Earth counts	
	_FillValue	-2147483647	CF default value
	units	count	
	pdf_shape	digitised_gaussian	
	pdf_parameter	tbd	
	coordinates	longitude latitude	

Ch2_Ce	Attribute	Value	Comment

	long_name	Ch2 Earth counts	
	_FillValue	-2147483647	CF default value
	units	count	
	pdf_shape	digitised_gaussian	
	pdf_parameter	tbd	
	coordinates	longitude latitude	

Ch3a_Ce	Attribute	Value	Comment
	long_name	Ch3a Earth counts	
	_FillValue	-2147483647	CF default value
	units	count	
	pdf_shape	digitised_gaussian	
	pdf_parameter	tbd	
	coordinates	longitude latitude	

Ch3b_Ce	Attribute	Value	Comment
	long_name	Ch3b Earth counts	
	_FillValue	-2147483647	CF default value
	units	count	
	pdf_shape	digitised_gaussian	
	pdf_parameter	tbd	
	coordinates	longitude latitude	

Ch4_Ce	Attribute	Value	Comment
	long_name	Ch4 Earth counts	
	_FillValue	-2147483647	CF default value
	units	count	
	pdf_shape	digitised_gaussian	
	pdf_parameter	tbd	
	coordinates	longitude latitude	

Ch5_Ce	Attribute	Value	Comment
	long_name	Ch5 Earth counts	
	_FillValue	-2147483647	CF default value
	units	count	
	pdf_shape	digitised_gaussian	
	pdf_parameter	tbd	
	coordinates	longitude latitude	

Ch1_u_Csp	Attribute	Value	Comment
	long_name	Ch1 Uncertainty on space counts	
	_FillValue	NaN	
	units	count	
	pixel_correlation_form	rectangle_absolute	

	pixel_correlation_units	pixel	
	pixel_correlation_scales	-inf, inf	
	scan_correlation_form	triangle_relative	
	scan_correlation_units	line	
	scan_correlation_scales	-25, 25	
	pdf_shape	digitised_gaussian	
	pdf_parameter	tbd	
	coordinates	longitude latitude	

Ch2_u_Csp	Attribute	Value	Comment
	long_name	Ch2 Uncertainty on space counts	
	_FillValue	NaN	
	units	count	
	pixel_correlation_form	rectangle_absolute	
	pixel_correlation_units	pixel	
	pixel_correlation_scales	-inf, inf	
	scan_correlation_form	triangle_relative	
	scan_correlation_units	line	
	scan_correlation_scales	-25, 25	
	pdf_shape	digitised_gaussian	
	pdf_parameter	tbd	
	coordinates	longitude latitude	

Ch3a_u_Csp	Attribute	Value	Comment
	long_name	Ch3a Uncertainty on space counts	
	_FillValue	NaN	
	units	count	
	pixel_correlation_form	rectangle_absolute	
	pixel_correlation_units	pixel	
	pixel_correlation_scales	-inf, inf	
	scan_correlation_form	triangle_relative	
	scan_correlation_units	line	
	scan_correlation_scales	-25, 25	
	pdf_shape	digitised_gaussian	
	pdf_parameter	tbd	
	coordinates	longitude latitude	

Ch3b_u_Csp	Attribute	Value	Comment
	long_name	Ch3b Uncertainty on space counts	
	_FillValue	NaN	
	units	count	
	pixel_correlation_form	rectangle_absolute	
	pixel_correlation_units	pixel	
	pixel_correlation_scales	-inf, inf	

	scan_correlation_form	triangle_relative	
	scan_correlation_units	line	
	scan_correlation_scales	-25, 25	
	pdf_shape	digitised_gaussian	
	pdf_parameter	tbd	
	coordinates	longitude latitude	

Ch4_u_Csp	Attribute	Value	Comment
	long_name	Ch4 Uncertainty on space counts	
	_FillValue	NaN	
	units	count	
	pixel_correlation_form	rectangle_absolute	
	pixel_correlation_units	pixel	
	pixel_correlation_scales	-inf, inf	
	scan_correlation_form	triangle_relative	
	scan_correlation_units	line	
	scan_correlation_scales	-25, 25	
	pdf_shape	digitised_gaussian	
	pdf_parameter	tbd	
	coordinates	longitude latitude	

Ch5_u_Csp	Attribute	Value	Comment
	long_name	Ch5 Uncertainty on space counts	
	_FillValue	NaN	
	units	count	
	pixel_correlation_form	rectangle_absolute	
	pixel_correlation_units	pixel	
	pixel_correlation_scales	-inf, inf	
	scan_correlation_form	triangle_relative	
	scan_correlation_units	line	
	scan_correlation_scales	-25, 25	
	pdf_shape	digitised_gaussian	
	pdf_parameter	tbd	
	coordinates	longitude latitude	

Ch3b_u_Cict	Attribute	Value	Comment
	long_name	Ch3b Uncertainty on ICT counts	
	_FillValue	NaN	
	units	count	
	pixel_correlation_form	rectangle_absolute	
	pixel_correlation_units	pixel	
	pixel_correlation_scales	-inf, inf	
	scan_correlation_form	triangle_relative	
	scan_correlation_units	line	

	scan_correlation_scales	-25, 25	
	pdf_shape	digitised_gaussian	
	pdf_parameter	tbd	
	coordinates	longitude latitude	

Ch4_u_Cict	Attribute	Value	Comment
	long_name	Ch4 Uncertainty on ICT counts	
	_FillValue	NaN	
	units	count	
	pixel_correlation_form	rectangle_absolute	
	pixel_correlation_units	pixel	
	pixel_correlation_scales	-inf, inf	
	scan_correlation_form	triangle_relative	
	scan_correlation_units	line	
	scan_correlation_scales	-25, 25	
	pdf_shape	digitised_gaussian	
	pdf_parameter	tbd	
	coordinates	longitude latitude	

Ch5_u_Cict	Attribute	Value	Comment
	long_name	Ch5 Uncertainty on ICT counts	
	_FillValue	NaN	
	units	count	
	pixel_correlation_form	rectangle_absolute	
	pixel_correlation_units	pixel	
	pixel_correlation_scales	-inf, inf	
	scan_correlation_form	triangle_relative	
	scan_correlation_units	line	
	scan_correlation_scales	-25, 25	
	pdf_shape	digitised_gaussian	
	pdf_parameter	tbd	
	coordinates	longitude latitude	

Ch1_u_Ce	Attribute	Value	Comment
	long_name	Ch1 Uncertainty on earth counts	
	_FillValue	NaN	
	units	count	
	coordinates	longitude latitude	

Ch2_u_Ce	Attribute	Value	Comment
	long_name	Ch2 Uncertainty on earth counts	
	_FillValue	NaN	

	units	count	
	coordinates	longitude latitude	

Ch3a_u_Ce	Attribute	Value	Comment
	long_name	Ch3a Uncertainty on earth counts	
	_FillValue	NaN	
	units	count	
	coordinates	longitude latitude	

Ch3b_u_Ce	Attribute	Value	Comment
	long_name	Ch3b Uncertainty on earth counts	
	_FillValue	NaN	CF default value
	units	count	
	coordinates	longitude latitude	

Ch4_u_Ce	Attribute	Value	Comment
	long_name	Ch4 Uncertainty on earth counts	
	_FillValue	9.96921E36	
	units	count	
	coordinates	longitude latitude	

Ch5_u_Ce	Attribute	Value	Comment
	long_name	Ch5 Uncertainty on earth counts	
	_FillValue	NaN	
	units	count	
	coordinates	longitude latitude	

Ch1_u_Refl	Attribute	Value	Comment
	long_name	Ch1 Total uncertainty on toa reflectance	
	_FillValue	-32767	
	scale_factor	0.01	
	units	percent	
	valid_min	3	
	valid_max	5	
	coordinates	longitude latitude	

Ch2_u_Refl	Attribute	Value	Comment
	long_name	Ch2 Total uncertainty on toa reflectance	

	_FillValue	-32767	
	scale_factor	0.01	
	units	percent	
	valid_min	3	
	valid_max	5	
	coordinates	longitude latitude	

Ch3a_u_Refl	Attribute	Value	Comment
	long_name	Ch3a Total uncertainty on toa reflectance	
	_FillValue	-32767	
	scale_factor	0.01	
	units	percent	
	valid_min	3	
	valid_max	5	
	coordinates	longitude latitude	

Ch3b_u_Bt	Attribute	Value	Comment
	long_name	Ch3b Total uncertainty on brightness temperature	
	_FillValue	-32767	
	scale_factor	0.001	
	units	K	
	valid_min	1	
	valid_max	15000	
	coordinates	longitude latitude	

Ch4_u_Bt	Attribute	Value	Comment
	long_name	Ch4 Total uncertainty on brightness temperature	
	_FillValue	-32767	
	scale_factor	0.001	
	units	K	
	valid_min	1	
	valid_max	15000	
	coordinates	longitude latitude	

Ch5_u_Bt	Attribute	Value	Comment
	long_name	Ch5 Total uncertainty on brightness temperature	
	_FillValue	-32767	
	scale_factor	0.001	
	units	K	
	valid_min	1	
	valid_max	15000	
	coordinates	longitude latitude	

Ch3b_ur_Bt	Attribute	Value	Comment
	long_name	Ch3b Random uncertainty on brightness temperature	
	_FillValue	-32767	
	scale_factor	0.001	
	units	K	
	valid_min	1	
	valid_max	15000	
	coordinates	longitude latitude	

Ch4_ur_Bt	Attribute	Value	Comment
	long_name	Ch4 Random uncertainty on brightness temperature	
	_FillValue	-32767	
	scale_factor	0.001	
	units	K	
	valid_min	1	
	valid_max	15000	
	coordinates	longitude latitude	

Ch5_ur_Bt	Attribute	Value	Comment
	long_name	Ch5 Random uncertainty on brightness temperature	
	_FillValue	-32767	
	scale_factor	0.001	
	units	K	
	valid_min	1	
	valid_max	15000	
	coordinates	longitude latitude	

Ch3b_us_Bt	Attribute	Value	Comment
	long_name	Ch3b Systematic uncertainty on brightness temperature	
	_FillValue	-32767	
	scale_factor	0.001	
	units	K	
	valid_min	1	
	valid_max	15000	
	coordinates	longitude latitude	

Ch4_us_Bt	Attribute	Value	Comment
	long_name	Ch4 Systematic uncertainty on brightness temperature	

	_FillValue	-32767	
	scale_factor	0.001	
	units	K	
	valid_min	1	
	valid_max	15000	
	coordinates	longitude latitude	

Ch5_us_Bt	Attribute	Value	Comment
	long_name	Ch5 Systematic uncertainty on brightness temperature	
	_FillValue	-32767	
	scale_factor	0.001	
	units	K	
	valid_min	1	
	valid_max	15000	
	coordinates	longitude latitude	

7.2.5 HIRS

HIRS FULL FCDR contains additional dimensions:

- channel: number of IR channels
- rad_channel: number of IR and visible channels
- coeffs: number of calibration coefficients
- calibration_cycle: tbd
- prt_number: tbd
- prt_number_iwt: tbd
- prt_reading: tbd
- width_todo: tbd
- num_scan_angles: tbd
- minor_frame: an additional dimension that describes the whole scan. It consists of 56 scan positions and 8 additional measurements

Variable Name	Standard Name	Datatype	Dimensions
Common variables as defined in chapter 6.1.1			
Sensor specific variables as defined in 6.3.5			
c_earth	*none*	uint16	x, y, rad_channel
L_earth	toa_outgoing_inband_radiance	uint32	x, y, rad_channel
u_lat	uncertainty_latitude	uint16	x, y
u_lon	uncertainty_longitude	uint16	x, y
u_time	uncertainty_time	uint16	x, y
u_c_earth	*none*	uint16	channel, calibration_cycle
u_L_earth_independent	uncertainty_radiance_Earth_random	uint32	x, y, rad_channel
u_L_earth_structured	uncertainty_radiance_Earth_structured	uint32	x, y, rad_channel

u_L_earth_systematic	uncertainty_radiance_Earth_systematic	uint32	x, y, rad_channel
u_L_earth_total	uncertainty_radiance_Earth_total	uint32	x, y, rad_channel
S_u_L_earth	covariance_radiance_Earth	uint32	rad_channel, rad_channel
u_bt_random	uncertainty_bt_random	uint16	x, y, channel
u_bt_structured	uncertainty_bt_structured	uint16	x, y, channel
u_bt_systematic	uncertainty_bt_systematic	uint16	x, y, channel
u_bt_total	uncertainty_bt_total	uint16	x, y, channel
S_bt	covariance_brightness_temperature	uint16	rad_channel, rad_channel
l1b_calcof	calibration_coefficients	int32	y, coeffs
Tc_baseplate	temperature_baseplate_counts	int32	y
Tc_ch	temperature_coolerhousing_counts	int32	y
Tc_elec	temperature_electronics_counts	int32	y
Tc_fsr	temperature_first_stage_radiator_counts	int32	y
Tc_fwh	temperature_filter_wheel_housing_counts	int32	y
Tc_fwm	temperature_filter_wheel_monitor_counts	int32	y
Tc_icct	temperature_internal_cold_calibration_target_counts	int32	y
Tc_iwct	temperature_internal_warm_calibration_target_counts	int32	y
Tc_patch_exp	temperature_patch_expanded_scale_counts	int32	y
Tc_patch_full	temperature_patch_full_range_counts	int32	y
Tc_tlscp_prim	temperature_telescope_primary_counts	int32	y
Tc_tlscp_sec	temperature_telescope_secondary_counts	int32	y
Tc_tlscp_tert	temperature_telescope_tertiary_counts	int32	y
Tc_scanmirror	temperature_scanmirror_counts	int32	Y
Tc_scanmotor	temperature_scanmotor_counts	int32	y
u_Tc_baseplate	uncertainty_temperature_baseplate_counts	uint16	y
u_Tc_ch	uncertainty_temperature_coolerhousing_counts	uint16	y
u_Tc_elec	uncertainty_temperature_electronics_counts	uint16	y
u_Tc_fsr	uncertainty_temperature_first_stage_radiator_counts	uint16	y
u_Tc_fwh	uncertainty_temperature_filter_wheel_housing_counts	uint16	y
u_Tc_fwm	uncertainty_temperature_filter_wheel_monitor_counts	uint16	y
u_Tc_icct	uncertainty_temperature_internal_cold_calibration_target_counts	uint32	y
u_Tc_iwct	uncertainty_temperature_internal_warm_calibration_target_counts	uint32	y

u_Tc_patch_exp	uncertainty_temperature_patch_expanded_scale_counts	uint32	y
u_Tc_patch_full	uncertainty_temperature_patch_full_range_counts	uint32	y
u_Tc_tlscp_prim	uncertainty_temperature_telescope_primary_counts	uint32	y
u_Tc_tlscp_sec	uncertainty_temperature_telescope_secondary_counts	uint32	y
u_Tc_tlscp_tert	uncertainty_temperature_telescope_tertiary_counts	uint32	y
u_Tc_scanmirror	uncertainty_temperature_scanmirror_counts	uint32	y
u_Tc_scanmotor	uncertainty_temperature_scanmotor_counts	uint32	y
navigation_status	status_flag	int32	y
platform_altitude	*none*	uint16	y
platform_pitch_angle	*none*	int16	y
platform_roll_angle	*none*	int16	y
platform_yaw_angle	*none*	int16	y
quality_flags	status_flag	int32	y
scan_angles	*none*	uint16	y, num_scan_angles
l1b_scanline_number	*none*	int16	y
scanline_position	*none*	int8	y
l1b_second__original_calibration_coefficients	*none*	int32	y, width_todo
u_sol_za	uncertainty_solar_zenith_angle	uint16	x, y
u_sol_aa	uncertainty_solar_azimuth_angle	uint16	x, y
u_sat_za	uncertainty_satellite_zenith_angle	uint16	x, y
u_sat_aa	uncertainty_local_azimuth_angle	uint16	x, y
u_c_earth_chan_corr	*none*	int16	channel, channel
u_c_space	*none*	uint16	channel, calibration_cycle
u_c_space_chan_corr	*none*	uint16	channel, channel
u_Earthshine	*none*	uint16	y, channel
u_O_Re	*none*	uint16	y, channel
u_O_TWICT	*none*	uint16	y
u_O_TPRT	*none*	uint16	y
u_Rself	*none*	uint16	y, channel
u_SRF_calib	*none*	uint16	y, channel
u_d_PRT	*none*	uint16	prt_number_iwt, prt_reading
u_electronics	*none*	uint16	y, channel
u_periodic_noise	*none*	uint16	y, channel
u_nonlinearity	*none*	uint16	channel
emissivity	*none*	float32	scalar
temp_corr_slope	*none*	float32	scalar
temp_corr_offset	*none*	float32	scalar
mnfrqualflags	status_flag	int32	y, minor_frame
scnlintime	time	int32	y

scnlinf	status_flag	int16	y
scantype	status_flag	int8	y

c_earth	Attribute	Value	Comment
	long_name	counts_earth	
	_FillValue	65535	CF default
	units	count	
	ancilliary_variables	scnlinf quality_scanline_bitmask quality_channel_bitmask mnfrqualflags	

L_earth	Attribute	Value	Comment
	standard_name	toa_outgoing_inband_radiance	
	long_name	Channel radiance, NOAA/EUMETSAT calibrated	
	_FillValue	NaN	
	units	W / Hz / m ** 2 / sr	
	ancilliary_variables	scnlinf quality_scanline_bitmask quality_channel_bitmask mnfrqualflags	
	scale_factor	0.0001	

u_lat	Attribute	Value	Comment
	standard_name	uncertainty_latitude	
	_FillValue	65535	
	units	degree	
	scale_factor	0.01	

u_lon	Attribute	Value	Comment
	standard_name	uncertainty_longitude	
	_FillValue	65535	
	units	degree	
	scale_factor	0.01	

u_time	Attribute	Value	Comment
	standard_name	uncertainty_time	
	_FillValue	65535	
	units	s	
	scale_factor	0.01	

u_c_earth	Attribute	Value	Comment
	long_name	uncertainty counts for	

		Earth views	
	_FillValue	65535	CF default value
	units	count	
	ancilliary_variables	u_c_earth_chan_corr	
	channels_affected	all	
	parameter	C_E	
	pdf_shape	gaussian	

u_L_earth_independent	Attribute	Value	Comment
	standard_name	uncertainty_radiance_Earth_random	
	_FillValue	4294967295	
	units	mW m^-2 sr^-1 cm	
	scale_factor	0.01	

u_L_earth_structured	Attribute	Value	Comment
	standard_name	uncertainty_radiance_Earth_structured	
	_FillValue	4294967295	
	units	mW m^-2 sr^-1 cm	
	scale_factor	0.01	

u_L_earth_systematic	Attribute	Value	Comment
	standard_name	uncertainty_radiance_Earth_systematic	
	_FillValue	4294967295	
	units	mW m^-2 sr^-1 cm	
	scale_factor	0.01	

u_L_earth_total	Attribute	Value	Comment
	standard_name	uncertainty_radiance_Earth_total	
	_FillValue	4294967295	
	units	mW m^-2 sr^-1 cm	
	scale_factor	0.01	

S_u_L_earth	Attribute	Value	Comment
	standard_name	covariance_radiance_Earth	
	_FillValue	4294967295	
	scale_factor	0.01	

u_bt_random	Attribute	Value	Comment
	standard_name	uncertainty_bt_random	
	_FillValue	65535	
	units	K	
	scale_factor	0.01	

u_bt_structured	Attribute	Value	Comment
	standard_name	uncertainty_bt_structured	
	_FillValue	65535	
	units	K	
	scale_factor	0.01	

u_bt_systematic	Attribute	Value	Comment
	standard_name	uncertainty_bt_systematic	
	_FillValue	65535	
	units	K	
	scale_factor	0.01	

u_bt_total	Attribute	Value	Comment
	standard_name	uncertainty_bt_total	
	_FillValue	65535	
	units	K	
	scale_factor	0.01	

S_bt	Attribute	Value	Comment
	standard_name	covariance_brightness_temperature	
	_FillValue	65535	
	scale_factor	0.01	

calcof	Attribute	Value	Comment
	standard_name	calibration_coefficients	
	_FillValue	-2147483647	
	scale_factor	0.01	

Tc_baseplate	Attribute	Value	Comment
	standard_name	temperature_baseplate_counts	
	_FillValue	-2147483647	CF default value
	units	count	

Tc_ch	Attribute	Value	Comment
	standard_name	temperature_coolerhousing_counts	
	_FillValue	-2147483647	CF default value
	units	count	

Tc_elec	Attribute	Value	Comment
	standard_name	temperature_electronics_counts	
	_FillValue	-2147483647	CF default value
	units	count	

Tc_fsr	Attribute	Value	Comment
	standard_name	temperature_first_stage_radiator_counts	
	_FillValue	-2147483647	CF default value
	units	count	

Tc_fwh	Attribute	Value	Comment
	standard_name	temperature_filter_wheel_housing_counts	
	_FillValue	-2147483647	CF default value
	units	count	

Tc_fwm	Attribute	Value	Comment
	standard_name	temperature_filter_wheel_monitor_counts	
	_FillValue	-2147483647	CF default value
	units	count	

Tc_icct	Attribute	Value	Comment
	standard_name	temperature_internal_cold_calibration_target_counts	
	_FillValue	-2147483647	CF default value
	units	count	

Tc_iwct	Attribute	Value	Comment
	standard_name	temperature_internal_warm_calibration_target_counts	
	_FillValue	-2147483647	CF default value
	units	count	

Tc_patch_exp	Attribute	Value	Comment
	standard_name	temperature_patch_expanded_scale_counts	
	_FillValue	-2147483647	CF default value
	units	count	

Tc_patch_full	Attribute	Value	Comment
	standard_name	temperature_patch_full_range_counts	
	_FillValue	-2147483647	CF default value
	units	count	

Tc_tlscp_prim	Attribute	Value	Comment

	standard_name	temperature_telescope_primary_counts	
	_FillValue	-2147483647	CF default value
	units	count	

Tc_tlscp_sec	Attribute	Value	Comment
	standard_name	temperature_telescope_secondary_counts	
	_FillValue	-2147483647	CF default value
	units	count	

Tc_tlscp_tert	Attribute	Value	Comment
	standard_name	temperature_telescope_tertiary_counts	
	_FillValue	-2147483647	CF default value
	units	count	

Tc_scanmirror	Attribute	Value	Comment
	standard_name	temperature_scanmirror_counts	
	_FillValue	-2147483647	CF default value
	units	count	

Tc_scanmotor	Attribute	Value	Comment
	standard_name	temperature_scanmotor_counts	
	_FillValue	-2147483647	CF default value
	units	count	

u_Tc_baseplate	Attribute	Value	Comment
	standard_name	uncertainty_temperature_baseplate_counts	
	_FillValue	65535	
	scale_factor	0.01	
	units	count	

u_Tc_ch	Attribute	Value	Comment
	standard_name	uncertainty_temperature_coolerhousing_counts	
	_FillValue	65535	
	scale_factor	0.01	
	units	count	

u_Tc_elec	Attribute	Value	Comment
	standard_name	uncertainty_temperature_electronics_counts	
	_FillValue	65535	

	scale_factor	0.01	
	units	count	

u_Tc_fsr	Attribute	Value	Comment
	standard_name	uncertainty_temperature_first_stage_radiator_counts	
	_FillValue	65535	
	scale_factor	0.01	
	units	count	

u_Tc_fwh	Attribute	Value	Comment
	standard_name	uncertainty_temperature_filter_wheel_housing_counts	
	_FillValue	65535	
	scale_factor	0.01	
	units	count	

u_Tc_fwm	Attribute	Value	Comment
	standard_name	uncertainty_temperature_filter_wheel_monitor_counts	
	_FillValue	65535	
	scale_factor	0.01	
	units	count	

u_Tc_icct	Attribute	Value	Comment
	standard_name	uncertainty_temperature_internal_cold_calibration_target_counts	
	_FillValue	4294967295	
	scale_factor	0.01	
	units	count	

u_Tc_iwct	Attribute	Value	Comment
	standard_name	uncertainty_temperature_internal_warm_calibration_target_counts	
	_FillValue	4294967295	
	scale_factor	0.01	
	units	count	

u_Tc_patch_exp	Attribute	Value	Comment
	standard_name	uncertainty_temperature_patch_expanded_scale_counts	
	_FillValue	4294967295	
	scale_factor	0.01	
	units	count	

u_Tc_patch_full	Attribute	Value	Comment
	standard_name	uncertainty_temperature_patch_full_range_counts	
	_FillValue	4294967295	
	scale_factor	0.01	
	units	count	

u_Tc_tlscp_prim	Attribute	Value	Comment
	standard_name	uncertainty_temperature_telescope_primary_counts	
	_FillValue	4294967295	
	scale_factor	0.01	
	units	count	

u_Tc_tlscp_sec	Attribute	Value	Comment
	standard_name	uncertainty_temperature_telescope_secondary_counts	
	_FillValue	4294967295	
	scale_factor	0.01	
	units	count	

u_Tc_tlscp_tert	Attribute	Value	Comment
	standard_name	uncertainty_temperature_telescope_tertiary_counts	
	_FillValue	4294967295	
	scale_factor	0.01	
	units	count	

u_Tc_scanmirror	Attribute	Value	Comment
	standard_name	uncertainty_temperature_scanmirror_counts	
	_FillValue	4294967295	
	scale_factor	0.01	
	units	count	

u_Tc_scanmotor	Attribute	Value	Comment
	standard_name	uncertainty_temperature_scanmotor_counts	
	_FillValue	4294967295	
	scale_factor	0.01	
	units	count	

navigation_status	Attribute	Value	Comment
	standard_name	status_flag	
	long_name	Navigation status bit field	

	orig_name	hrs_navstat	
	flag_masks	tbd	
	flag_meanings	tbd	

platform_altitude	Attribute	Value	Comment
	long_name	Platform altitude	
	orig_name	hrs_scalti	
	_FillValue	65535	
	scale_factor	0.01	
	units	km	

platform_pitch_angle	Attribute	Value	Comment
	long_name	Platform pitch angle	
	orig_name	hrs_pitchang	
	_FillValue	-32767	
	scale_factor	0.01	
	units	degree	

platform_roll_angle	Attribute	Value	Comment
	long_name	Platform roll angle	
	orig_name	hrs_rollang	
	_FillValue	-32767	
	scale_factor	0.01	
	units	degree	

platform_yaw_angle	Attribute	Value	Comment
	long_name	Platform yaw angle	
	orig_name	hrs_yawang	
	_FillValue	-32767	
	scale_factor	0.01	
	units	degree	

quality_flags	Attribute	Value	Comment
	standard_name	status_flag	
	long_name	Quality indicator bit field	
	orig_name	hrs_qualind	
	flag_masks	tbd	
	flag_meanings	tbd	

scan_angles	Attribute	Value	Comment
	long_name	Scan angles	
	orig_name	hrs_ang	
	_FillValue	NaN	
	units	degree	

l1b_scanline_number	Attribute	Value	Comment
	long_name	scanline number	
	orig_name	hrs_scnlin	
	_FillValue	-32767	

scanline_position	Attribute	Value	Comment
	long_name	Scanline position number in 32 second cycle	
	orig_name	hrs_scnpos	
	_FillValue	-127	

l1b_second_original_calibration_coefficients	Attribute	Value	Comment
	long_name	Second original calibration coefficients (unsorted)	
	orig_name	hrs_scalcof	
	_FillValue	-2147483647	
	scale_factor	0.01	

u_sol_za	Attribute	Value	Comment
	standard_name	uncertainty_solar_zenith_angle	
	_FillValue	-999.0	
	scale_factor	0.01	
	units	degree	

u_sol_aa	Attribute	Value	Comment
	standard_name	uncertainty_solar_azimuth_angle	
	_FillValue	-999.0	
	scale_factor	0.01	
	units	degree	

u_sat_za	Attribute	Value	Comment
	standard_name	uncertainty_satellite_zenith_angle	
	_FillValue	-999.0	
	scale_factor	0.01	
	units	degree	

u_sat_aa	Attribute	Value	Comment
	standard_name	uncertainty_local_azimuth_angle	
	_FillValue	-999.0	
	scale_factor	0.01	

	units	degree	

u_c_earth_chan_corr	Attribute	Value	Comment
	long_name	u_c_earth channel correlations	
	_FillValue	-32767	
	scale_factor	0.01	

u_c_space	Attribute	Value	Comment
	long_name	IWCT type B	
	short_name	O_TPRT	
	units	K	
	_Unsigned	true	
	channels_affected	all	
	pixel_correlation_form	rectangle_absolute	
	pixel_correlation_units	pixel	
	pixel_correlation_scales	-inf, inf	
	scan_correlation_form	rectangle_absolute	
	scan_correlation_units	line	
	scan_correlation_scales	-inf, inf	
	image_correlation_form	rectangle_absolute	
	image_correlation_units	images	
	image_correlation_scales	-inf, inf	
	parameter	O_TPRT	
	pdf_shape	gaussian	
	scale_factor	0.01	
	ancilliary_variables	u_c_space_chan_corr	

u_c_space_chan_corr	Attribute	Value	Comment
	long_name	u_c_space channel correlations	
	_FillValue	65535	
	scale_factor	0.01	

u_Earthshine	Attribute	Value	Comment
	_FillValue	65535	
	scale_factor	0.01	

u_O_Re	Attribute	Value	Comment
	_FillValue	65535	
	scale_factor	0.01	

u_O_TWICT	Attribute	Value	Comment
	_FillValue	65535	

	scale_factor	0.01	

u_O_TPRT	Attribute	Value	Comment
	long_name	IWCT type B	
	short_name	O_TPRT	
	_FillValue	65535	
	units	K	
	channels_affected	all	
	scan_correlation_form	rectangle	
	scan_correlation_units	pixel	
	scan_correlation_scales	-inf, inf	
	time_correlation_form	rectangle	
	time_correlation_units	line	
	time_correlation_scales	-inf, inf	
	image_correlation_form	rectangle	
	image_correlation_units	images	
	image_correlation_scales	-inf, inf	
	parameter	O_TPRT	
	pdf_shape	gaussian	
	scale_factor	0.01	
	ancilliary_variables	u_O_TPRT_chan_corr	

u_Rself	Attribute	Value	Comment
	_FillValue	65535	
	scale_factor	0.01	

u_SRF_calib	Attribute	Value	Comment
	_FillValue	65535	
	scale_factor	0.01	

u_d_PRT	Attribute	Value	Comment
	_FillValue	65535	
	scale_factor	0.01	

u_electronics	Attribute	Value	Comment
	_FillValue	65535	
	scale_factor	0.01	

u_periodic_noise	Attribute	Value	Comment
	_FillValue	65535	
	scale_factor	0.01	

u_nonlinearity	Attribute	Value	Comment

	_FillValue	65535	
	scale_factor	0.01	

emissivity	Attribute	Value	Comment
	long_name	emissivity	
	_FillValue	NaN	
	units	1	

temp_corr_slope	Attribute	Value	Comment
	long_name	Slope for effective temperature correction	
	_FillValue	NaN	
	units	1	

temp_corr_offset	Attribute	Value	Comment
	long_name	Offset for effective temperature correction	
	_FillValue	NaN	
	units	1	

mnfrqualflags	Attribute	Value	Comment
	standard_name	status_flag	
	long_name	minor_frame_quality_flags_bitfield	
	flag_masks	tbd	
	flag_meanings	tbd	

scnlintime	Attribute	Value	Comment
	standard_name	time	
	long_name	Scan line time of day	
	orig_name	hrs_scnlintime	
	_FillValue	-2147483647	
	units	ms	

scnlinf	Attribute	Value	Comment
	standard_name	status_flag	
	long_name	scanline_bitfield	
	flag_masks	16384, 32768	
	flag_meanings	clock_drift_correction southbound_data	

scantype	Attribute	Value	Comment

	standard_name	status_flag	
	long_name	scantype_bitfield	
	flag_values	0, 1, 2, 3	
	flag_meanings	earth_view space_view cold_bb_view main_bb_view	

7.2.6 MVIRI

MVIRI FULL FCDR contains additional dimensions:

- srf_size_vis: length of the spectral response function for visible channel
- srf_size_ir_wv: length of the spectral response function for infrared channel
- Ne: Number of Effects that are included. This is a named dimension with the values: [“u_solar_irradiance_vis”, “u_a0_vis”, “u_a1_vis”, “u_a2_vis”, “u_zero_vis”, “u_solar_zenith_angle”, “U_mean_count_space_vis”]
- x_tie, y_tie: as x, y but only every 10th value (=tie-points)
- cov_size: size of covariance matrix for coefficients

Variable Name	Standard Name	Datatype	Dimensions
Common variables as defined in chapter 6.2			
Sensor specific variables as defined in 6.3.6			
count_vis	*none*	uint8	x, y
u_latitude	*none*	uint16	x, y
u_longitude	*none*	uint16	x, y
u_time	*none*	uint16	y_ir_wv
u_satellite_zenith_angle	*none*	uint16	x_tie, y_tie
u_satellite_azimuth_angle	*none*	uint16	x_tie, y_tie
u_solar_zenith_angle	*none*	uint16	x_tie, y_tie
u_solar_azimuth_angle	*none*	uint16	x_tie, y_tie
a0_vis	*none*	float32	scalar
a1_vis	*none*	float32	scalar
a2_vis	*none*	float32	scalar
mean_count_space_vis	*none*	float32	scalar
u_a0_vis	*none*	float32	scalar
u_a1_vis	*none*	float32	scalar
u_a2_vis	*none*	float32	scalar
u_zero_vis	*none*	float32	scalar
covariance_a _vis	*none*	float32	cov_size, cov_size
u_electronics_counts_vis	*none*	float32	scalar
u_digitization_counts_vis	*none*	float32	scalar
allan_deviation_counts_space_vis	*none*	float32	scalar
u_mean_count_space_vis	*none*	float32	scalar
sensitivity_solar_irradiance_vis	*none*	float32	x, y
sensitivity_count_vis	*none*	float32	x, y

sensitivity_count_space	*none*	float32	x, y
sensitivity_a0_vis	*none*	float32	x, y
sensitivity_a1_vis	*none*	float32	x, y
sensitivity_a2_vis	*none*	float32	x, y
effect_correlation_matrix	*none*	int16	Ne,Ne

count_vis	Attribute	Value	Comment
	long_name	Image counts	
	_FillValue	255	CF default value
	units	count	

u_latitude	Attribute	Value	Comment
	long_name	Uncertainty in Latitude	
	_FillValue	65535	
	units	degree	
	scale_factor	1.5E-05	
	add_offset	0.0	
	pixel_correlation_form	triangle_relative	
	pixel_correlation_units	pixel	
	pixel_correlation_scales	-250, 250	
	scan_correlation_form	triangle_relative	
	scan_correlation_units	line	
	scan_correlation_scales	-250, 250	
	image_correlation_form	triangle_relative	
	image_correlation_units	images	
	image_correlation_scales	-12, 0	
	pdf_shape	gaussian	
	pdf_parameter	tbd	

u_longitude	Attribute	Value	Comment
	long_name	Uncertainty in Longitude	
	_FillValue	65535	
	units	degree	
	scale_factor	1.5E-05	
	add_offset	0.0	
	pixel_correlation_form	triangle_relative	
	pixel_correlation_units	pixel	
	pixel_correlation_scales	-250, 250	
	scan_correlation_form	triangle_relative	
	scan_correlation_units	line	
	scan_correlation_scales	-250, 250	
	image_correlation_form	triangle_relative	
	image_correlation_units	images	
	image_correlation_scales	-12, 0	
	pdf_shape	gaussian	

	pdf_parameter	tbd	

u_time	Attribute	Value	Comment
	long_name	Uncertainty in Time	
	_FillValue	65535	CF default value
	units	s	
	scale_factor	0.009155273	
	add_offset	0.0	
	pdf_shape	rectangle	
	pdf_parameter	tbd	

u_satellite_zenith_angle	Attribute	Value	Comment
	long_name	Uncertainty in Satellite Zenith Angle	
	_FillValue	65535	CF default value
	units	degree	
	scale_factor	7.62939E-05	
	add_offset	0.0	

u_satellite_azimuth_angle	Attribute	Value	Comment
	long_name	Uncertainty in Satellite Azimuth Angle	
	_FillValue	65535	CF default value
	units	degree	
	scale_factor	7.62939E-05	
	add_offset	0.0	

u_solar_zenith_angle	Attribute	Value	Comment
	long_name	Uncertainty in Solar Zenith Angle	
	_FillValue	65535	CF default value
	units	degree	
	scale_factor	7.62939E-05	
	add_offset	0.0	

u_solar_azimuth_angle	Attribute	Value	Comment
	long_name	Uncertainty in Solar Azimuth Angle	
	_FillValue	65535	CF default value
	units	degree	
	scale_factor	7.62939E-05	
	add_offset	0.0	

a0_vis	Attribute	Value	Comment

	long_name	Calibration Coefficient at Launch	
	_FillValue	NaN	
	units	Wm^-2sr^-1/count	

a1_vis	Attribute	Value	Comment
	long_name	Time variation of a0	
	_FillValue	NaN	
	units	Wm^-2sr^-1/count day^-1 10^5	

a2_vis	Attribute	Value	Comment
	long_name	Time variation of a0, quadratic term	
	_FillValue	NaN	
	units	Wm^-2sr^-1/count year^-2	

mean_count_space_vis	Attribute	Value	Comment
	long_name	Space count	
	_FillValue	NaN	
	units	count	

u_a0_vis	Attribute	Value	Comment
	long_name	Uncertainty in a0	
	_FillValue	NaN	
	units	Wm^-2sr^-1/count	
	pixel_correlation_form	rectangle_absolute	
	pixel_correlation_units	pixel	
	pixel_correlation_scales	-inf, inf	
	scan_correlation_form	rectangle_absolute	
	scan_correlation_units	line	
	scan_correlation_scales	-inf, inf	
	image_correlation_form	triangle_relative	
	image_correlation_units	months	
	image_correlation_scales	-1.5, 1.5	
	pdf_shape	gaussian	
	pdf_parameter	tbd	

u_a1_vis	Attribute	Value	Comment
	long_name	Uncertainty in a1	
	_FillValue	NaN	
	units	Wm^-2sr^-1/count day^-1 10^5	
	pixel_correlation_form	rectangle_absolute	
	pixel_correlation_units	pixel	

	pixel_correlation_scales	-inf, inf	
	scan_correlation_form	rectangle_absolute	
	scan_correlation_units	line	
	scan_correlation_scales	-inf, inf	
	image_correlation_form	triangle_relative	
	image_correlation_units	months	
	image_correlation_scales	-1.5, 1.5	
	pdf_shape	gaussian	
	pdf_parameter	tbd	

u_a2_vis	Attribute	Value	Comment
	long_name	Uncertainty in a2	
	_FillValue	NaN	
	units	Wm^-2sr^-1/count year^-2	
	pixel_correlation_form	rectangle_absolute	
	pixel_correlation_units	pixel	
	pixel_correlation_scales	-inf, inf	
	scan_correlation_form	rectangle_absolute	
	scan_correlation_units	line	
	scan_correlation_scales	-inf, inf	
	image_correlation_form	triangle_relative	
	image_correlation_units	months	
	image_correlation_scales	-1.5, 1.5	
	pdf_shape	gaussian	
	pdf_parameter	tbd	

u_zero_vis	Attribute	Value	Comment
	long_name	Uncertainty in zero term	
	_FillValue	NaN	
	units	Wm^-2sr^-1/count	
	pixel_correlation_form	rectangle_absolute	
	pixel_correlation_units	pixel	
	pixel_correlation_scales	-inf, inf	
	scan_correlation_form	rectangle_absolute	
	scan_correlation_units	line	
	scan_correlation_scales	-inf, inf	
	image_correlation_form	triangle_relative	
	image_correlation_units	months	
	image_correlation_scales	-inf,inf	
	pdf_shape	gaussian	
	pdf_parameter	tbd	

covariance_a _vis	Attribute	Value	Comment
	long_name	Covariance of calibration coefficients from fit to calibration runs	
	_FillValue	NaN	

	units	Wm^-2sr^-1/count	
	pixel_correlation_form	rectangle_absolute	
	pixel_correlation_units	pixel	
	pixel_correlation_scales	-inf, inf	
	scan_correlation_form	rectangle_absolute	
	scan_correlation_units	line	
	scan_correlation_scales	-inf, inf	
	image_correlation_form	triangle_relative	
	image_correlation_units	months	
	image_correlation_scales	-inf, inf	
	pdf_shape	gaussian	
	pdf_parameter	tbd	

u_electronics_counts_vis	Attribute	Value	Comment
	long_name	Uncertainty due to Electronics noise	
	_FillValue	NaN	
	units	count	

u_digitization_counts_vis	Attribute	Value	Comment
	long_name	Uncertainty due to digitization	
	_FillValue	NaN	
	units	count	

allan_deviation_counts_space_vis	Attribute	Value	Comment
	long_name	Uncertainty of space count	
	_FillValue	NaN	
	units	count	
	scan_correlation_form	rectangle_absolute	
	scan_correlation_units	line	
	scan_correlation_scales	-inf, inf	
	pdf_shape	digitised_gaussian	
	pdf_parameter	tbd	

u_mean_counts_space_vis	Attribute	Value	Comment
	long_name	Uncertainty of space count	
	_FillValue	NaN	
	units	count	
	pixel_correlation_form	rectangle_absolute	
	pixel_correlation_units	pixel	
	pixel_correlation_scales	-inf, inf	
	scan_correlation_form	rectangle_absolute	
	scan_correlation_units	line	

	scan_correlation_scales	-inf, inf	
	pdf_shape	digitised_gaussian	
	pdf_parameter	tbd	

sensitivity_solar_irradiance_vis	Attribute	Value	Comment
	virtual	true	
	dimension	y, x	
	expression	distance_sun_earth * distance_sun_earth * PI * (count_vis - mean_count_space_vis) * (a2_vis * years_since_launch * years_since_launch + a1_vis * years_since_launch + a0_vis) / (cos(solar_zenith_angle * PI / 180.0) * solar_irradiance_vis * solar_irradiance_vis)	

sensitivity_count_vis	Attribute	Value	Comment
	virtual	true	
	dimension	y, x	
	expression	distance_sun_earth * distance_sun_earth * PI * (a2_vis * years_since_launch * years_since_launch + a1_vis * years_since_launch + a0_vis) / (cos(solar_zenith_angle * PI / 180.0) * solar_irradiance_vis)	

sensitivity_count_space	Attribute	Value	Comment
	virtual	true	
	dimension	y, x	
	expression	-1.0 * distance_sun_earth * distance_sun_earth * PI * (a2_vis * years_since_launch * years_since_launch + a1_vis *	

		years_since_launch + a0_vis) / (cos(solar_zenith_angle * PI / 180.0) * solar_irradiance_vis)	

sensitivity_a0_vis	Attribute	Value	Comment
	virtual	true	
	dimension	y, x	
	expression	distance_sun_earth * distance_sun_earth * PI * (count_vis - mean_count_space_vis) / (cos(solar_zenith_angle * PI / 180.0) * solar_irradiance_vis)	

sensitivity_a1_vis	Attribute	Value	Comment
	virtual	true	
	dimension	y, x	
	expression	distance_sun_earth * distance_sun_earth * PI * (count_vis - mean_count_space_vis) *years_since_launch/ (cos(solar_zenith_angle * PI / 180.0) * solar_irradiance_vis)	

sensitivity_a2_vis	Attribute	Value	Comment
	virtual	true	
	dimension	y, x	
	expression	distance_sun_earth * distance_sun_earth * PI * (count_vis - mean_count_space_vis) *years_since_launch*years_since_launch/ (cos(solar_zenith_angle * PI / 180.0) * solar_irradiance_vis)	

effect_correlation_matrix	Attribute	Value	Comment
	long_name	Channel error correlation matrix for structured effects.	
	_FillValue	-32768	
	scale_factor	3.05176E-05	
	units	1	
	valid_min	-1	
	valid_max	1	

	description	Matrix_describing correlations between errors of the uncertainty_effects due to spectral response function errors (determined using Monte Carlo approach)	

7.3 FCDR STATIC

The STATIC FCDR data format exists only for the geostationary instruments. It contains all geolocation information as well as the viewing-geometry.

It contains additional dimensions:

- ssp_x
- ssp_y
- x_ir_wv
- y_wv_ir

Variable Name	Standard Name	Datatype	Dimensions
latitude_vis	*none*	int16	x, y
longitude_vis	*none*	int16	x, y
latitude_ir_wv	*none*	int16	x_ir_wv, y_ir_wv
longitude_ir_wv	*none*	int16	x_ir_wv, y_ir_wv

latitude_vis	Attribute	Value	Comment
	_FillValue	-32768	
	standard_name	latitude	
	scale_factor	0.0027466658	
	add_offset	0.0	
	units	degrees_north	

longitude_vis	Attribute	Value	Comment
	_FillValue	-32768	
	standard_name	longitude	
	scale_factor	0.0054933317	
	add_offset	0.0	
	units	degrees_east	

latitude_ir_wv	Attribute	Value	Comment
	_FillValue	-32768	
	standard_name	latitude	
	scale_factor	0.0027466658	
	add_offset	0.0	
	units	degrees_north	

longitude_ir_wv	Attribute	Value	Comment
	_FillValue	-32768	
	standard_name	longitude	
	scale_factor	0.0054933317	
	add_offset	0.0	
	units	degrees_east	

8 CDR

8.1 Albedo

Variable Name	Standard Name	Datatype	Dimensions
Common variables as defined in chapters 6.1.1 and 156.2			
6.2			
time	time	int32	y
surface_albedo	surface_albedo	float32	x, y
u_independent_surface_albedo	*none*	float32	x, y
u_structured_surface_albedo	*none*	float32	x, y
u_common_surface_albedo	*none*	float32	x, y

time	Attribute	Value	Comment
	standard_name	time	
	long_name	Acquisition time in seconds since 1970-01-01 00:00:00	
	_FillValue	-1	
	units	s	

surface_albedo	Attribute	Value	Comment
	standard_name	surface_albedo	
	long_name	TODO	
	description	TODO	
	_FillValue	NaN	
	coordinates	longitude latitude	

u_independent_surface_albedo	Attribute	Value	Comment
	_FillValue	NaN	
	description	Uncertainty of surface_albedo due to independent effects	
	coordinates	longitude latitude	

u_structured_surface_albedo	Attribute	Value	Comment
	_FillValue	NaN	
	description	Uncertainty of surface_albedo due to structured effects	
	coordinates	longitude latitude	

u_common_surface_albedo	Attribute	Value	Comment
	_FillValue	NaN	
	description	Uncertainty of surface_albedo due to common effects	
	coordinates	longitude latitude	

8.2 AOT

Variable Name	Standard Name	Datatype	Dimensions
Common variables as defined in chapter 6.1.1 and 156.2			
6.2			
time	time	int32	y
aot	*none*	float32	x, y
u_independent_aot	*none*	float32	x, y
u_structured_ aot	*none*	float32	x, y
u_common_ aot	*none*	float32	x, y

time	Attribute	Value	Comment
	standard_name	time	
	long_name	Acquisition time in seconds since 1970-01-01 00:00:00	
	_FillValue	4294967295	
	units	s	

aot	Attribute	Value	Comment
	long_name	TODO	
	description	TODO	
	_FillValue	NaN	
	coordinates	longitude latitude	

u_independent_aot	Attribute	Value	Comment
	_FillValue	NaN	
	description	Uncertainty of aot due to independent effects	
	coordinates	longitude latitude	

u_structured_aot	Attribute	Value	Comment
	_FillValue	NaN	
	description	Uncertainty of aot due to structured effects	
	coordinates	longitude latitude	

u_common_aot	Attribute	Value	Comment
	_FillValue	NaN	
	description	Uncertainty of aot due to common effects	
	coordinates	longitude latitude	

8.3 SST

Variable Name	Standard Name	Datatype	Dimensions
Common variables as defined in chapter 6.1.1 and 156.2			
6.2			
time	time	int32	y
sst	sea_surface_temperature	float32	x, y
u_independent_sst	*none*	float32	x, y
u_structured_ sst	*none*	float32	x, y
u_common_ sst	*none*	float32	x, y

time	Attribute	Value	Comment
	standard_name	time	
	long_name	Acquisition time in seconds since 1970-01-01 00:00:00	
	_FillValue	4294967295	
	units	s	

sst	Attribute	Value	Comment
	standard_name	sea_surface_temperature	
	long_name	TODO	
	_FillValue	NaN	
	units	K	
	coordinates	longitude latitude	

u_independent_sst	Attribute	Value	Comment
	_FillValue	NaN	
	description	Uncertainty of sst due to independent effects	
	coordinates	longitude latitude	

u_structured_sst	Attribute	Value	Comment
	_FillValue	NaN	
	description	Uncertainty of sst due to structured effects	
	coordinates	longitude latitude	

u_common_sst	Attribute	Value	Comment
	_FillValue	NaN	
	description	Uncertainty of sst due to common effects	
	coordinates	longitude latitude	

8.4 SST Ensemble

TODO Additional ensemble metadata

Variable Name	Standard Name	Datatype	Dimensions
Common variables as defined in chapter 6.1.1 and 156.2			
6.2			
time	time	int32	y
sst	sea_surface_temperature	float32	x, y, ensemble

time	Attribute	Value	Comment
	standard_name	time	
	long_name	Acquisition time in seconds since 1970-01-01 00:00:00	
	_FillValue	4294967295	
	units	s	

sst	Attribute	Value	Comment
	standard_name	sea_surface_temperature	
	long_name	TODO	
	_FillValue	NaN	
	units	K	
	coordinates	longitude latitude	

8.5 UTH

Variable Name	Standard Name	Datatype	Dimensions
Common variables as defined in chapter 6.1.2 and 156.2			
6.2			
time_ranges_ascend	*none*	int32	x, y, bounds
time_ranges_descend	*none*	int32	x, y, bounds
observation_count_ascend	*none*	int16	x, y
observation_count_descend	*none*	int16	x, y
overpass_count_ascend	*none*	uint8	x, y
overpass_count_descend	*none*	uint8	x, y
uth_ascend	*none*	float32	x, y
uth_descend	*none*	float32	x, y

u_independent_uth_ascend	*none*	float32	x, y
u_independent_uth_descend	*none*	float32	x, y
u_structured_ uth_ascend	*none*	float32	x, y
u_structured_ uth_descend	*none*	float32	x, y
u_common_ uth_ascend	*none*	float32	x, y
u_common_ uth_descend	*none*	float32	x, y
uth_inhomogeneity_ascend	*none*	float32	x, y
uth_inhomogeneity_descend	*none*	float32	x, y
BT_ascend	toa_brightness_temperature	float32	x, y
BT_descend	toa_brightness_temperature	float32	x, y
u_independent_BT_ascend	*none*	float32	x, y
u_independent_BT_descend	*none*	float32	x, y
u_structured_BT_ascend	*none*	float32	x, y
u_structured_BT_descend	*none*	float32	x, y
u_common_BT_ascend	*none*	float32	x, y
u_common_BT_descend	*none*	float32	x, y
BT_inhomogeneity_ascend	*none*	float32	x, y
BT_inhomogeneity_descend	*none*	float32	x, y
observation_count_all_ascend	*none*	int16	x, y
observation_count_all_descend	*none*	int16	x, y

time_ranges_ascend	Attribute	Value	Comment
	description	Minimum and maximum seconds of day pixel contribution time, ascending nodes	
	_FillValue	4294967295	
	units	s	
	coordinates	lon lat	

time_ranges_descend	Attribute	Value	Comment
	description	Minimum and maximum seconds of day pixel contribution time, descending nodes	
	_FillValue	4294967295	
	units	s	
	coordinates	lon lat	

observation_count_ascend	Attribute	Value	Comment
	description	Number of UTH/brightness temperature observations in a grid box for ascending passes	
	_FillValue	-32767	
	coordinates	lon lat	

observation_count_descend	Attribute	Value	Comment
	description	Number of UTH/ brightness temperature observations in a grid box for descending passes	
	_FillValue	-32767	
	coordinates	lon lat	

overpass_count_ascend	Attribute	Value	Comment
	description	Number of satellite overpasses in a grid box for ascending passes	
	_FillValue	255	
	coordinates	lon lat	

overpass_count_descend	Attribute	Value	Comment
	description	Number of satellite overpasses in a grid box for descending passes	
	_FillValue	255	
	coordinates	lon lat	

uth_ascend	Attribute	Value	Comment
	long_name	upper_tropospheric_humidity	
	description	Monthly average of all UTH retrievals in a grid box for ascending passes (calculated from daily averages)	
	_FillValue	NaN	
	units	%	
	coordinates	lon lat	

uth_descend	Attribute	Value	Comment
	long_name	upper_tropospheric_humidity	
	description	Monthly average of all UTH retrievals in a grid box for descending passes (calculated from daily averages)	
	_FillValue	NaN	
	units	%	
	coordinates	lon lat	

u_independent_uth_ascend	Attribute	Value	Comment
	_FillValue	NaN	
	description	Uncertainty of UTH due to independent	

		effects for ascending passes	
	coordinates	lon lat	
	units	%	

u_independent_uth_descend	Attribute	Value	Comment
	_FillValue	NaN	
	description	Uncertainty of UTH due to independent effects for descending passes	
	coordinates	lon lat	
	units	%	

u_structured_uth_ascend	Attribute	Value	Comment
	_FillValue	NaN	
	description	Uncertainty of UTH due to structured effects for ascending passes	
	coordinates	lon lat	
	units	%	

u_structured_uth_descend	Attribute	Value	Comment
	_FillValue	NaN	
	description	Uncertainty of UTH due to structured effects for descending passes	
	coordinates	lon lat	
	units	%	

u_common_uth_ascend	Attribute	Value	Comment
	_FillValue	NaN	
	description	Uncertainty of UTH due to common effects for ascending passes	
	coordinates	lon lat	
	units	%	

u_common_uth_descend	Attribute	Value	Comment
	_FillValue	NaN	
	description	Uncertainty of UTH due to common effects for descending passes	
	coordinates	lon lat	
	units	%	

uth_inhomogeneity_ascend	Attribute	Value	Comment
	_FillValue	NaN	
	description	Standard deviation of all daily UTH averages which were used to calculate the monthly UTH	

		average in a grid box for ascending passes	
	coordinates	lon lat	
	units	%	

uth_inhomogeneity_descend	Attribute	Value	Comment
	_FillValue	NaN	
	description	Standard deviation of all daily UTH averages which were used to calculate the monthly UTH average in a grid box for descending passes	
	coordinates	lon lat	
	units	%	

BT_ascend	Attribute	Value	Comment
	standard_name	toa_brightness_temperature	
	_FillValue	NaN	
	description	Monthly average of all brightness temperatures which were used to retrieve UTH in a grid box for ascending passes (calculated from daily averages)	
	coordinates	lon lat	
	units	K	

BT_descend	Attribute	Value	Comment
	standard_name	toa_brightness_temperature	
	_FillValue	NaN	
	description	Monthly average of all brightness temperatures which were used to retrieve UTH in a grid box for descending passes (calculated from daily averages)	
	coordinates	lon lat	
	units	K	

u_independent_BT_ascend	Attribute	Value	Comment
	_FillValue	NaN	
	description	Uncertainty of brightness temperature due to independent effects for ascending passes	
	coordinates	lon lat	
	units	K	

u_independent_BT_descend	Attribute	Value	Comment
	_FillValue	NaN	
	description	Uncertainty of brightness temperature due to independent effects for descending	

		passes	
	coordinates	lon lat	
	units	K	

u_structured_BT_ascend	Attribute	Value	Comment
	_FillValue	NaN	
	description	Uncertainty of brightness temperature due to structured effects for ascending passes	
	coordinates	lon lat	
	units	K	

u_structured_BT_descend	Attribute	Value	Comment
	_FillValue	NaN	
	description	Uncertainty of brightness temperature due to structured effects for descending passes	
	coordinates	lon lat	
	units	K	

u_common_BT_ascend	Attribute	Value	Comment
	_FillValue	NaN	
	description	Uncertainty of brightness temperature due to common effects for ascending passes	
	coordinates	lon lat	
	units	K	

u_common_BT_descend	Attribute	Value	Comment
	_FillValue	NaN	
	description	Uncertainty of brightness temperature due to common effects for descending passes	
	coordinates	lon lat	
	units	K	

BT_inhomogeneity_ascend	Attribute	Value	Comment
	_FillValue	NaN	
	description	Standard deviation of all brightness temperatures which were use to retrieve UTH in a grid box for ascending passes	
	coordinates	lon lat	
	units	K	

BT_inhomogeneity_descend	Attribute	Value	Comment
	_FillValue	NaN	

	description	Standard deviation of all brightness temperatures which were use to retrieve UTH in a grid box for descending passes	
	coordinates	lon lat	
	units	K	

observation_count_all_ascend	Attribute	Value	Comment
	description	Number of all observations in a grid box for ascending passes – no filtering done	
	_FillValue	-32767	
	coordinates	lon lat	

observation_count_all_descend	Attribute	Value	Comment
	description	Number of all observations in a grid box for descending passes – no filtering done	
	_FillValue	-32767	
	coordinates	lon lat	