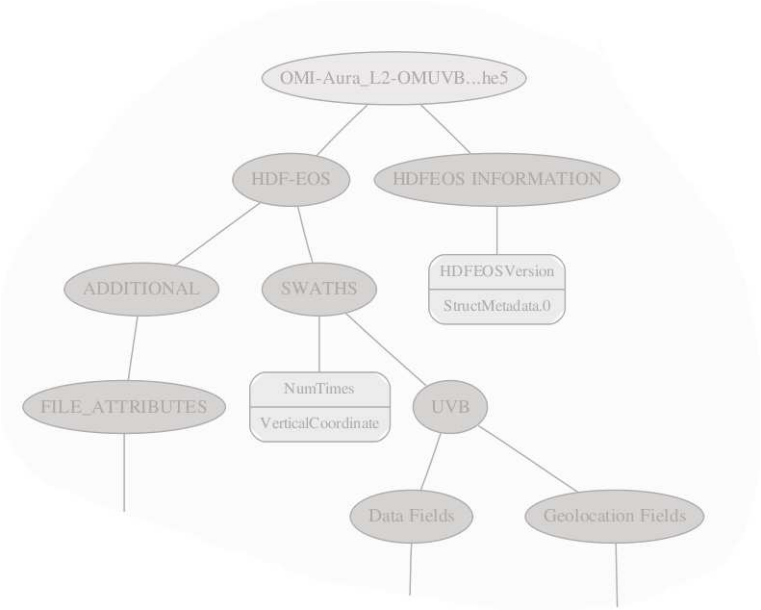
FINNISH METEOROLOGICAL INSTITUTE

OMI UVB Level 2 HDF-EOS5

Finnish Meteorological Institute, 2008



Format Specification Document

Reference: TN-OMIGS-0800-FMIMET-01
Date: 2.10.2008
Version: 2.0

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DOCUMENT STATUS

Issue	Date	Notes
Version 1.0	2004-05-03	First formal release
Version 2.0	2008-10-02	Revision for V003

Contents

1 Introduction

1.1 Purpose of this document

This document specifies the format of the OMI UVB Level 2 product. Please note that this revised document is only applicable to the global OMUVB product, while the Level 2 OMUVB data produced by the Very Fast Delivery system are still in accordance with the previous Version 1.1 format document. The archive format is based on HDF-EOS5 format, which is an extension to standard HDF5 file format.

1.2 Definitions, acronyms and abbreviations

DAAC	Distributed Active Archive Center
EOS	Earth Observing System
ECS	EOS Core System
FMI	Finnish Meteorological Institute
HDF	Hierarchical Data Format
HDF-EOS	HDF - Earth Observation System, extension to HDF
LER	Lambertian Equivalent Reflectivity
MLER	Climatological Nimbus-7/TOMS data based table of minimum Lambertian equivalent reflectivity developed by NASA/GSFC
NASA/GSFC	National Aeronautics & Space Administration / Goddard Space Flight Center
O3	Either of the ozone algorithms
OMDOAO3	Level 2 total ozone product based on the DOAS algorithm
OMI	Ozone Motinoring Instrument
OMTO3	Level 2 total ozone product based on the TOMS algorithm
SSF	Space Systems Finland Ltd
TAI93	International standard atomic time
TBA	To Be Added
TBC	To Be Confirmed
TBD	To Be Defined
TOMS	Total Ozone Mapping Spectrometer
VFD	Very Fast Delivery

2 OMI Level 2 Surface UV Irradiance Product Format

2.1 Overview of the product

The OMI UVB Level 2 product contains geolocated surface UV irradiance and dose quantities. Additionally, it includes information about input data and processing quality, some intermediate results for diagnostics and metadata for data search. The format of the product is HDF-EOS5.

2.2 Product identifier

The identifier for the OMI surface UV irradiance product is OMUVB.

2.3 File name convention

The basis of the OMUVB product filenames are constructed from 4 section delimited by an underscore. This basis is followed by a suffix delimited by a period. Thus, the product file names are of the form:

<Instrument ID> _ <Data Type> _ <Data ID> _ <Version> . <Suffix>

Table 1: Description of the file name sections

Section	Format	Description
Instrument ID	"OMI-Aura"	ID for instrument and spacecraft
Data Type	"L2-OMUVB-VFD" for local very fast delivery products, "L2-OMUVB" for global offline products	product type
Data ID	<yyyy>m<mmdd>t<hhmm>-o<nnnnn>	Granule start date and time, and the orbit number
Version	v<nnn> – <yyyy>m<mmdd>t<hhmm>	Product version and the production data and time
Suffix	".he5"	Product file suffix

2.4 File structure

The data files follow the HDF-EOS swath format. Figure 1 shows the overall structure of the OMUVB data file. The metadata are stored as HDF-EOS file level attributes in the FILE_ATTRIBUTES group. The product contains only one swath structure.

2.5 Swath structure

The OMUVB product swath structure comprises Data Fields and Geolocation Fields groups within the UVB group. All data and geolocation fields are defined by their type, dimension and attributes. Table 2 shows the dimensions of the data and geolocation field structures. Because the number of the OMI measurements is not known when the HDF file is created, its dimension must be unlimited. However, the actual dimension of the swath structures are stored as swath level attributes.

Additionally, the mandatory swath level attribute VerticalCoordinate is set to UVB to indicate that the datafields do not have vertical dimension. The swath level attributes are listed in Table 3, and the attributes of the data and geolocation fields are shown in Table 4. The fill values for missing data are listed in Table 5.

Table 2: Dimensions of the swath structure

Name	Size	Description
nTimes	unlimited	Number of OMI measurements
nXtrack	fixed	Number of ground pixels per measurement

Table 3: Swath level attributes

Name	Type	Description
NumTimes	H5T_STD_I32LE	The actual size of the nTimes dimension
VerticalCoordinate	H5T_STRING	"Surface Data"

Table 4: Data and geolocation level attributes

Name	Type	Description
MissingValue	same as the data type	The value for missing data from Table 5.
Title	H5T_STRING	Title of the field
Units	H5T_STRING	Units

Table 5: Fill values

Data type	Fill value
H5T_STRING	
H5T_STD_I32LE	-2147483647
H5T_IEEE_F32LE	-1.26765e+030
H5T_IEEE_F64LE	-1.26765e+030

2.6 Global attributes

Name	Type	Unit	Source	Notes
InstrumentName	H5T_STRING		PGE	"OMI"
PlatformName	H5T_STRING		PGE	"Aura"
ProcessLevel	H5T_STRING		PGE	"2"
GranuleMonth	H5T_STD_I32LE		OMTO3	Month of start granule (1-12)
GranuleDay	H5T_STD_I32LE		OMTO3	Day of start granule (1-31)
GranuleYear	H5T_STD_I32LE		OMTO3	Year of start granule (YYYY)
TAI93At0zOfGranule	H5T_IEEE_F64LE	sec	OMTO3	TAI93 time at 00:00 UTC at date of start granule
PGEVersion	H5T_STRING		PGE	UV PGE processing version
LUTLibraryVersion	H5T_STRING		PGE	Look-Up-Table versions
ProductType	H5T_STRING		PGE	"Global"
ProcessingCenter	H5T_STRING		PGE	"FIN-GS"
ShortName	H5T_STRING		PGE	"OMUVB"
ProductionDateTime	H5T_STRING		PGE	Date and time when the OMUVB product file was created
PctSuspiciousInputData	H5T_STD_I32LE		PGE	% of suspicious input data
PctFatalInputData	H5T_STD_I32LE		PGE	% of fatal input data
PctSuspiciousOutputData	H5T_STD_I32LE		PGE	% of suspicious output data
PctFatalOutputData	H5T_STD_I32LE		PGE	% of fatal output data
LocalGranuleId	H5T_STRING		PGE	Filename of the OMUVB product
OrbitNumber	H5T_STD_I16LE		OMTO3	Orbit number

EquatorCrossingDate	H5T_STRING		OMTO3	“YYYY-MM-DD”
EquatorCrossingTime	H5T_STRING		OMTO3	“HH:MM:SS.000000”
EquatorCrossingLongitude	H5T_STRING	deg	OMTO3	degrees (-180...+180)
RangeBeginningDate	H5T_STRING		OMTO3	“YYYY-MM-DD”
RangeBeginningTime	H5T_STRING		OMTO3	“HH:MM:SS.000000”
RangeEndingDate	H5T_STRING		OMTO3	“YYYY-MM-DD”
RangeEndingTime	H5T_STRING		OMTO3	“HH:MM:SS.000000”
InputVersions	H5T_STRING		OMTO3	“OMTO3:1.0.0” or so

2.7 Geolocation fields

Name	Type	Unit	Dimension	Valid range	Description
GroundPixelQualityFlags	H5T_STD_I32LE		nXtrack nTimes		From the OMTO3 product
Latitude	H5T_IEEE_F32LE	deg	nXtrack nTimes	-90..90	Geodetic latitude
Longitude	H5T_IEEE_F32LE	deg	nXtrack nTimes	-180..180	Geodetic longitude
SolarZenithAngle	H5T_IEEE_F32LE	deg	nXtrack nTimes	0..90	Solar Zenith Angle
TerrainHeight	H5T_STD_I32LE		nXtrack nTimes		From the OMTO3 product
Time	H5T_IEEE_F64LE	sec	nTimes	0..inf	From the OMTO3 product

2.8 Data fields

Name	Type	Unit	Valid range	Description
CSErythemalDailyDose	H5T_IEEE_F32LE	J\m^2	0..11000	Clear sky erythemally weighted daily dose
CSErythemalDoseRate	H5T_IEEE_F32LE	mW\m^2	0..500	Clear sky erythemally weighted irradiance at local Solar noon
CSIrradiance305	H5T_IEEE_F32LE	mW\m^2\nm	0..150	Clear sky spectral irradiance at 305 nm at local Solar noon
CSIrradiance310	H5T_IEEE_F32LE	mW\m^2\nm	0..200	Clear sky spectral irradiance at 310 nm at local Solar noon
CSIrradiance324	H5T_IEEE_F32LE	mW\m^2\nm	0..600	Clear sky spectral irradiance at 324 nm at local Solar noon

CSIrradiance380	H5T_IEEE_F32LE	mW\m^2\nm	0..1200	Clear sky spectral irradiance at 380 nm at local Solar noon
ErythemalDailyDose	H5T_IEEE_F32LE	J\m^2	0..11000	Erythemally weighted daily dose
ErythemalDoseRate	H5T_IEEE_F32LE	mW\m^2	0..500	Erythemally weighted irradiance at local Solar noon
Irradiance305	H5T_IEEE_F32LE	mW\m^2\nm	0..150	Spectral irradiance at 305 nm at local Solar noon
Irradiance310	H5T_IEEE_F32LE	mW\m^2\nm	0..200	Spectral irradiance at 310 nm at local Solar noon
Irradiance324	H5T_IEEE_F32LE	mW\m^2\nm	0..600	Spectral irradiance at 324 nm at local Solar noon
Irradiance380	H5T_IEEE_F32LE	mW\m^2\nm	0..1200	Spectral irradiance at 380 nm at local Solar noon
CloudOpticalThickness	H5T_IEEE_F32LE		0..100	Cloud optical thickness
LambertianEquivalent Reflectivity	H5T_IEEE_F32LE		0..1	Lambertian equivalent reflectivity
OMTO3AlgorithmFlags	H5T_STD_I32LE		0..13	From the OMTO3 product
OMTO3ColumnAmountO3	H5T_IEEE_F32LE	DU	0..700	From the OMTO3 product
OMTO3QualityFlags	H5T_STD_I32LE		0..65534	From the OMTO3 product
OPErythemalDoseRate	H5T_IEEE_F32LE	mW\m^2	0..500	Erythemally weighted irradiance at observation time
OPIrradiance305	H5T_IEEE_F32LE	mW\m^2\nm	0..150	Spectral irradiance at 305 nm at observation time
OPIrradiance310	H5T_IEEE_F32LE	mW\m^2\nm	0..200	Spectral irradiance at 310 nm at observation time

OPIrradiance324	H5T_IEEE_F32LE	mW\m^2\nm	0..600	Spectral irradiance at 324 nm at observation time
OPIrradiance380	H5T_IEEE_F32LE	mW\m^2\nm	0..1200	Spectral irradiance at 380 nm at observation time
SurfaceAlbedo	H5T_IEEE_F32LE		0..1	Assumed surface albedo

Name	Type	bit	Description
OMUVBQuality	H5T_STD_I32LE		UV algorithm quality flags, bit 0 the least significant bit
		0	Fatal input data
		1	Suspicious input data
		2	MLER climatology used for surface albedo
		3	Negative surface albedo was detected and reset to 0.0
		4	Surface albedo that was higher than 1.0 was detected and reset to 1.0
		5	Negative LER was detected and set to 0.0
		6	LER that was higher than 1.0 was detected and reset to 1.0
		7	Unable to determine the optical thickness because the top-of-the-atmosphere is not a monotonic
		8	Negative cloud optical thickness was detected and reset to 0.0
		9	Cloud optical thickness that was higher than 100 was detected and reset to 100.0
		10	Negative cloud correction factor was detected and reset to 0.0
		11	Cloud correction factor higher than 1.0 was detected and reset to 1.0
		12	Aerosol correction used
		13	Solar zenith angle at noon exceed 88 degrees
		14	AMTW climatology used for surface albedo
		15	Indicates missing data (fill value)

2.9 Data file size

The size of the product file depends on the number of OMI measurements and dominantly on the amount of two dimensional data arrays in the data and geolocation groups. The current format occupies some 100 bytes per each gound pixel. Assuming that one orbit consists of about 100 000 measurements it can be estimated that the nominal OMUVB data file size is of the order of 11 Mbytes.

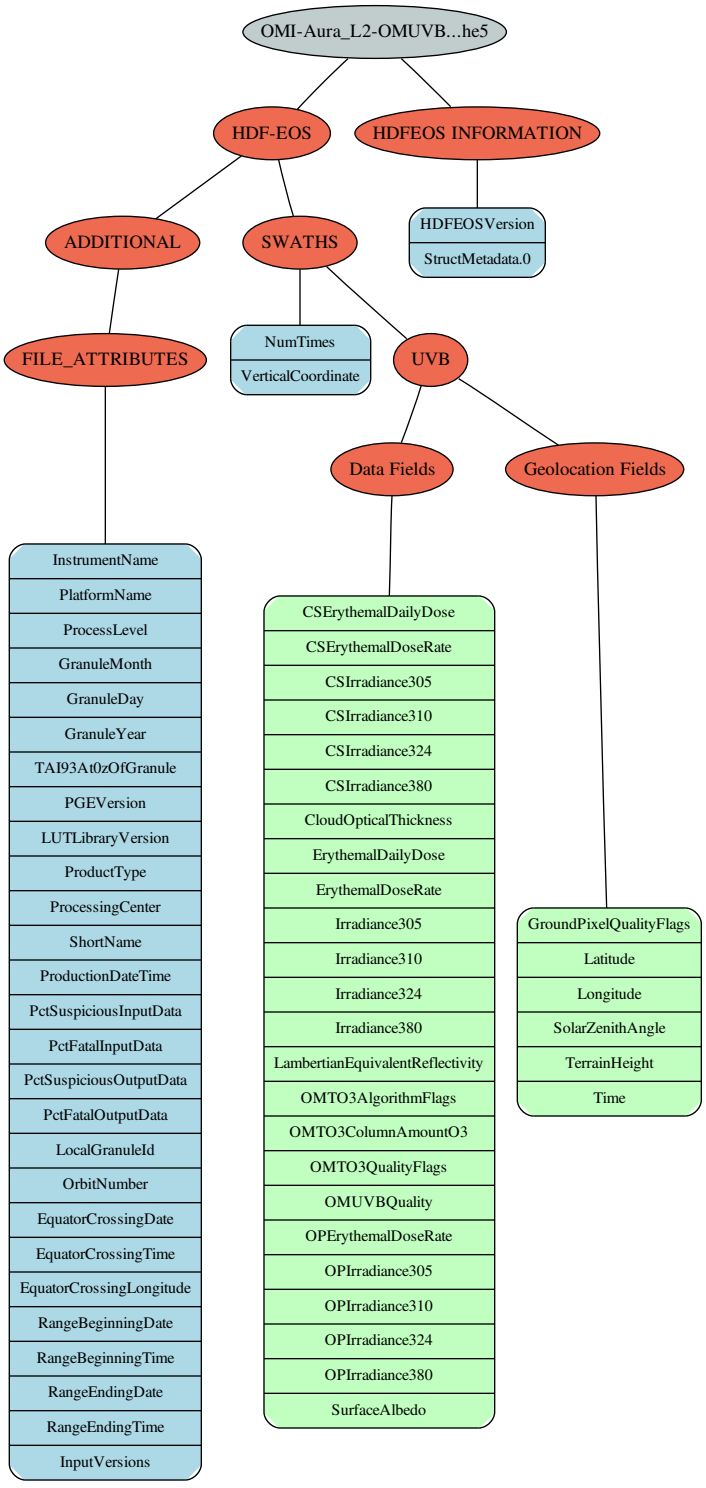

Figure 1: Structure of the OMUVB product file. Colors indicate groups (red), attributes (blue) and datafields (green).