OMI UVB Level 2G HDF-EOS5

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Format Specification Document

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DOCUMENT STATUS

Document version	Date	Notes
1.0	2010-01-20	Initial release for v003 product
1.1	2010-06-10	Added the UV index and viewing zenith angle data fields.
1.2	2010-10-06	Corrections to data types and descriptions
1.3	2012-10-04	Updated for data version 1.3.0
2.0	2016-03-16	Updated for data version 2.0.0

Contents

1 Introduction

1.1 Purpose of this document

This document specifies the format of the OMI UVB Level 2G product. The archive format is based on HDF-EOS format, which is an extension to standard HDF5 file format.

1.2 OMI row anomaly

A row anomaly is an anomaly which affects the quality of the level 1B radiance data at all wavelengths for a particular viewing direction of OMI. This corresponds to a row on the CCD detectors, and hence the term Row Anomaly. The OMI row anomaly is dynamic, it changes over time. The row anomaly affects the quality of the Level 1B radiance data and consequently the Level 2 data products.

IMPORTANT NOTE: Row anomaly has not been corrected or screened in OMUVB Level 2G product. However, observations affected by the row anomaly have been flagged. Users should note that any observations for which XTrackQualityFlags $\neq 0$ are not recommended for use.

1.3 Definitions, acronyms and abbreviations

EOS	Earth Observing System
FMI	Finnish Meteorological Institute
HDF	Hierarchical Data Format
HDF-EOS	HDF - Earth Observation System, extension to HDF
OMI	Ozone Monitoring Instrument
OMTO3	Level 2 total ozone product based on the TOMS algorithm
OMUVB	Level 2 surface UV irradiance product
OMUVBd	Level 3 surface UV irradiance product
OMUVBG	Level 2G surface UV irradiance product
TOMS	Total Ozone Mapping Spectrometer

2 OMI Level 2G Surface UV Irradiance Product Format

2.1 Overview of the product

The OMI level 2G surface UV irradiance product contains gridded 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 based on HDF-EOS5.

2.2 Product identifier

The identifier of the OMI Level 2G surface UV irradiance product is OMUVBG.

2.3 Data file size

The size of the product file is usually 140-150 Mbytes.

2.4 File name convention

OMUVBd filenames are constructed from sections delimited by 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> _ <Product date> _ <Version>.<Suffix>

Table 1: Description of the file name sections

Section	Format	Description
Instrument ID	"OMI-Aura"	ID for the instrument and spacecraft
Data Type	"L2G-OMUVBG"	Product type
Product date	<yyyy>m<mmdd>	Product date
Version	v<nnn>-<yyyy>m<mmdd>t<hhmmss>	Collection number and processing time
Suffix	"he5"	Product file suffix

2.5 File structure

The data files follow the HDF-EOS grid format. Data field groups are stored within /HDFEOS/GRIDS/OMI UVB Product/ group. The metadata are stored as HDF-EOS file level attributes in the /HDFEOS/ADDITIONAL/FILE_ATTRIBUTES group. The product contains only one grid structure.

2.6 Grid structure

The OMUVBG product grid structure consists of Data Field groups within the OMI UVB Product group. Table 2 shows the dimensions of the data field structures. Data level attributes are shown in table 3 and fill values for missing data are shown in table 4. Grid structure metadata are stored in /HDFEOS INFORMATION/StructMetadata.0.

Table 2: Dimensions of the grid structure

Name	Size	Description
XDim	1440	X-dimension, longitudes [-180:180] from left to right
YDim	720	Y-dimension, latitudes [-90:90] from bottom to top
nCandidate	15	Number of candidate scenes

Table 3: Data level attributes

Name	Type	Description
MissingValue	same as the data type	The value for missing data from table 4
Title	H5T_STRING	Title of the field
Units	H5T_STRING	Units
ScaleFactor	H5T_IEEE_F64LE	Scale Factor = 1.0
Offset	H5T_IEEE_F64LE	Offset = 0.0

Table 4: Fill values

Data type	Fill value
H5T_STRING	
H5T_STD_I16LE	-2147483647
H5T_STD_I32LE	-2147483647
H5T_IEEE_F32LE	-1.26765e+030
H5T_IEEE_F64LE	-1.26765e+030

2.7 File attributes

File attributes can be found at path /HDFEOS/ADDITIONAL/FILE_ATTRIBUTES.

Name	Type	Unit	Source	Notes
OrbitNumber	H5T_STD_I32LE		OMUVB	Orbit numbers
FirstLineInOrbit	H5T_STD_I32LE		OMUVB	First line used from each orbit
LastLineInOrbit	H5T_STD_I32LE		OMUVB	Last line used from each orbit
NumberOfLinesMissingGeolocation	H5T_STD_I32LE		OMUVB	Number of lines missing geolocation
InstrumentName	H5T_STRING		PGE	“OMI”
ProcessLevel	H5T_STRING		PGE	“2G”
GranuleMonth	H5T_STD_I32LE		OMUVB	Month of start granule (1-12)
GranuleDay	H5T_STD_I32LE		OMUVB	Day of start granule (1-31)
GranuleYear	H5T_STD_I32LE		OMUVB	Year of start granule (YYYY)
GranuleDayOfYear	H5T_STD_I32LE		OMUVB	Day of year of start granule (1-366)
TAI93At0zOfGranule	H5T_IEEE_F64LE	sec	OMUVB	TAI93 time at 00:00 UTC at date of start granule
PGEVersion	H5T_STRING		PGE	OMUVBG PGE processing version
StartUTC	H5T_STRING		OMUVB	Start UTC time of first orbit
EndUTC	H5T_STRING		OMUVB	End UTC time of last orbit
Period	H5T_STRING		PGE	“Daily”

2.8 Data fields

Name	Type	Unit	Description
CSErythemalDailyDose	H5T_IEEE_F32LE	J/m^2	Clear sky erythemally weighted daily dose
CSErythemalDoseRate	H5T_IEEE_F32LE	mW/m^2	Clear sky erythemally weighted irradiance at local solar noon time
CSIrradiance305	H5T_IEEE_F32LE	$mW/m^2/nm$	Clear sky spectral irradiance at 305 nm at local solar noon time
CSIrradiance310	H5T_IEEE_F32LE	$mW/m^2/nm$	Clear sky spectral irradiance at 310 nm at local solar noon time
CSIrradiance324	H5T_IEEE_F32LE	$mW/m^2/nm$	Clear sky spectral irradiance at 324 nm at local solar noon time
CSIrradiance380	H5T_IEEE_F32LE	$mW/m^2/nm$	Clear sky spectral irradiance at 380 nm at local solar noon time
CSUVindex	H5T_IEEE_F32LE	unitless	Clear sky UV index at local solar noon time
CloudOpticalThickness	H5T_IEEE_F32LE	unitless	Cloud optical thickness
ErythemalDailyDose	H5T_IEEE_F32LE	J/m^2	Erythemally weighted daily dose
ErythemalDoseRate	H5T_IEEE_F32LE	mW/m^2	Erythemally weighted irradiance at local solar noon time
GroundPixelQualityFlags	H5T_STD_I32LE		Ground pixel quality flags from OMTO3 product. Bits 0 to 3 together contain the land/water flags: 0 - shallow ocean 1 - land 2 - shallow inland water 3 - ocean coastline/lake shoreline 4 - ephemeral (intermittent) water 5 - deep inland water 6 - continental shelf ocean 7 - deep ocean 8-14 - not used 15 - error flag for land/water Bits 4 to 6 are flags that are set to 0 for FALSE, or 1 for TRUE: Bit 4 - sun glint possibility flag Bit 5 - solar eclipse possibility flag Bit 6 - geolocation error flag Bit 7 is reserved for future use (currently set to 0). Bits 8 to 14 together contain the snow/ice flags (based on NISE): 0 - snow-free land 1-100 - sea ice concentration (percent) 101 - permanent ice (Greenland, Antarctica) 102 - not used 103 - dry snow 104 - ocean (NISE-255) 105-123 - reserved for future use 124 - mixed pixels at coastline (NISE-252) 125 - suspect ice value (NISE-253) 126 - corners undefined (NISE-254) 127 - error Bit 15 - NISE nearest neighbor filling flag.
Irradiance305	H5T_IEEE_F32LE	$mW/m^2/nm$	Spectral irradiance at 305 nm at local solar noon time
Irradiance310	H5T_IEEE_F32LE	$mW/m^2/nm$	Spectral irradiance at 310 nm at local solar noon time

Data fields (continued)

Irradiance324	H5T_IEEE_F32LE	mW/m^2/nm	Spectral irradiance at 324 nm at local solar noon time
Irradiance380	H5T_IEEE_F32LE	mW/m^2/nm	Spectral irradiance at 380 nm at local solar noon time
LambertianEquivalent Reflectivity	H5T_IEEE_F32LE	unitless	Lambertian equivalent reflectivity
Latitude	H5T_IEEE_F32LE	degree	From OMTO3 product
LineNumber	H5T_STD_I32LE		Line number of candidate scene
Longitude	H5T_IEEE_F32LE	degree	From OMTO3 product
NumberOfCandidateScenes	H5T_STD_I32LE		Number of candidate scenes
OMTO3AlgorithmFlags	H5T_STD_I32LE		Algorithm flag from OMTO3 product associated with the ground pixel: 0 - skipped 1 - standard 2 - adjusted for profile shape 3 - based on C-pair (331 and 360 nm) Add 10 for snow/ice.
OMTO3ColumnAmountO3	H5T_IEEE_F32LE	DU	Total column ozone from OMTO3 product
OMTO3QualityFlags	H5T_STD_I32LE		Quality flags from OMTO3 product. Bits 0 to 3 together contain several output error flags: 0 - good sample 1 - glint contamination (corrected) 2 - sza >84 (degree) 3 - 360 residual >threshold 4 - residual at unused ozone wavelength >4 sigma 5 - SOI >4 sigma (SO2 present) 6 - non-convergence 7 - abs(residual) >16.0 (fatal) 8 - row anomaly error (same as bit 6 in this field) Add 10 for descending data. Bits 4 to 5 are reserved for future use (currently set to 0). Bit 6 - set to 0 when row anomlay error has not been detected, set to 1 when row anomaly error has been found. Bit 7 - set to 0 when OMI cloud (OMCLDRR or OMCLDO2) pressure is used, set to 1 when climatolgical cloud pressure is used. Bits 8 to 15 are flags that are set to 0 for FALSE (good value), or 1 for TRUE (bad value): Bit 8 - geolocation error (anomalous FOV Earth location) Bit 9 - sza >88 (degree) Bit 10 - missing input radiance Bit 11 - error input radiance Bit 12 - warning input radiance Bit 13 - missing input irradiance Bit 14 - error input irradiance Bit 15 - warning input irradiance

Data fields (continued)

OMUVBQuality	H5T_STD_I32LE		OMUVB L2 algorithm quality flags. Bit 0 - Fatal input data Bit 1 - Suspicious input data Bit 2 - MLER climatology used for surface albedo Bit 3 - Negative surface albedo was detected and reset to 0.0 Bit 4 - Surface albedo that was higher than 1.0 was detected and reset to 1.0 Bit 5 - Negative LER was detected and set to 0.0 Bit 6 - LER that was higher than 1.0 was detected and reset to 1.0 Bit 7 - Unable to determine the optical thickness because the top- of-the-atmosphere is not a monotonic Bit 8 - Negative cloud optical thickness was detected and reset to 0.0 Bit 9 - Cloud optical thickness that was higher than 100 was detected and reset to 100.0 Bit 10 - Negative cloud correction factor was detected and reset to 0.0 Bit 11 - Cloud correction factor higher than 1.0 was detected and reset to 1.0 Bit 12 - Aerosol correction used Bit 13 - Solar zenith angle at noon exceed 88 degrees Bit 14 - AMTW climatology used for surface albedo Bit 15 - Indicates missing data (fill value)
OPErythemalDoseRate	H5T_IEEE_F32LE	mW/m^2	Erythemally weighted irradiance at satellite over pass time
OPIrradiance305	H5T_IEEE_F32LE	$mW/m^2/nm$	Spectral irradiance at 305 nm at satellite over pass time
OPIrradiance310	H5T_IEEE_F32LE	$mW/m^2/nm$	Spectral irradiance at 310 nm at satellite over pass time
OPIrradiance324	H5T_IEEE_F32LE	$mW/m^2/nm$	Spectral irradiance at 324 nm at satellite over pass time
OPIrradiance380	H5T_IEEE_F32LE	$mW/m^2/nm$	Spectral irradiance at 380 nm at satellite over pass time
OPUVindex	H5T_IEEE_F32LE	unitless	UV index at satellite over pass time
OrbitNumber	H5T_STD_I32LE		Orbit number of candidate scene
Pathlength	H5T_IEEE_F32LE		Path length
SceneNumber	H5T_STD_I32LE		Scene number of candidate scene
SecondsInDay	H5T_IEEE_F32LE	sec	Seconds in day
SolarZenithAngle	H5T_IEEE_F32LE	Degree	Solar zenith angle
SurfaceAlbedo	H5T_IEEE_F32LE		Surface albedo at 360 nm
TerrainHeight	H5T_STD_I32LE	m	Terrain height for center co-ordinate of ground pixel
Time	H5T_IEEE_F64LE	sec	TAI93 time
UVindex	H5T_IEEE_F32LE	unitless	Local noon UV index
ViewingZenithAngle	H5T_IEEE_F32LE	Degree	Viewing zenith angle

Data fields (continued)

XTrackQualityFlags	H5T_STD_I32LE	unitless	Row anomaly flag from OMTO3 product. Bits 0 to 2 together indicate row anomaly status: 0 - Not affected 1 - Affected, Not corrected, do not use 2 - Slightly affected, not corrected, use with caution 3 - Affected, corrected, use with caution 4 - Affected, corrected, use pixel 5 - Not used 6 - Not used 7 - Error during anomaly detection processing Bit 3 - Reserved for future use. Bit 4 - Possibly affected by wavelength shift Bit 5 - Possibly affected by blockage Bit 6 - Possibly affected by stray sunlight Bit 7 - Possibly affected by stray earthshine