# OMI Level 2 Ozone Profile Data Product Specification

| | | Date | Signature |
|---|---|---|---|
| **Author:** | J.P. Veefkind | | |
| **Checked:** | J.F. de Haan | | |
| **Approved:** | P.F. Levelt | | |
| **Archive:** | R. Noordhoek | | |

## Distribution list:

***OMI Science team***

| | | | |
|---|---|---|---|
| Pieternel Levelt | KNMI | Bert van den Oord | KNMI |
| Bert van den Oord | KNMI | | |
| John van de Vegte | KNMI | | |

***Agencies***

| | | | |
|---|---|---|---|
| Joost Carpay | NIVR | Jussi Johansson | SSF |

***Industry***

***Other***s

***EOS-Aura project***

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# 1 Introduction

## 1.1 Purpose of the document

This document specifies the OMI Level 2 Ozone Profile data product. This product will be produced by the OMI Ozone Profile software, as described in AD1.

## 1.2 Definitions, acronyms and abbreviations

| | |
|---|---|
| ECS | EOS Core System |
| HDF | Hierarchical Data Format |
| HDF-EOS | Hierarchical Data Format - Earth Observing System |
| NRT | Near Real Time |
| ODL | Object Description Language |
| OMI | Ozone Monitoring Instrument |
| ONVS | Ozone Near-real-time and Very-fast-delivery System. |
| PGE | Product Generation Executive |
| SDP | Science Data Production |
| SAA | South Atlantic Anomaly |
| TAI | International Atomic Time |

## 1.3 References

### 1.3.1 Applicable Documents

AD1 URD for the OMI Ozone Profile PGE, RS-OMIE-KNMI-541, 02-02-2004.

AD2 HDF-EOS Aura File Format Guidelines, NCAR SW-NCA-079, Version 1.3, 27 August 2003.

### 1.3.2 Reference Documents

RD1 HDF-EOS Interface Based on HDF5, 175-TP-511-003, May 2002.

RD2 Release 6A.07 SDP Toolkit Users Guide for the ECS Project, 333-CD-605-001, May 2002.

RD3 OMI Level 1B Product Format Specification, SE-OMIE-0562-DS/02, issue 1 (draft 7), 9 August, 2002.

RD4 Near Real-Time SSM/I EASE-Grid Daily Global Ice Concentration and Snow Extent, March 2002, URL: http://nsidc.org/data/docs/daac/nise1_nise.gd.html

RD5 OMIS Activity Definitions, RP-OMIE-KNMI-335, Issue 1, June 17 2002.

RD6 Release 6A.07 Toolkit Users Guide for the ECS Project, 333-CD-605-001, p. 6-310, May 2002.

## 1.4 Overview of the document

This document is laid out as follows:
Chapter 1 is the introduction.
Chapter 2 gives a general overview of the product.
Chapter 3 describes the product data file format and contents.
Chapter 4 describes the product metadata file.

# 2 Overview of the product.

The OMI Level 2 Ozone Profile Product contains geolocated ozone concentrations at approximately 19 levels. In addition, it also contains intermediate results, such as cloud information, diagnostics, etc.. Also, the product contains metadata. Every OMI Level 2 Ozone Profile Product consists of two files: the data file which contains the actual data and metadata, and a metadata file which contains a subset of the metadata. The metadata file is used to search data archives like the NASA DAAC. The format of the data files are developed according to the guidelines given in AD2. The metadata file is produced by calling the SDP Toolkit [RD2] library.

## 2.1 Product Identifier

The identifier for the OMI Ozone Profile product as provided by the OMI Science Support Team is "OMO3PR" for global products and "OMO3PRZ" for zoom products.

## 2.2 File Names

The file name convention is specified in AD2. OMI file names will have 4 sections within the basis of the file name. Each section will be delimited by an *underscore*. The suffix will follow the basis and be delimited by a period. The four sections in the basis are Instrument ID, Data Type, Data ID and Version. Thus, the filename is constructed in the following way:

<InstrumentID>_<DataType>_<DataID>_<Version>.<Suffix>

In Table 1 details the contents of the four sections and the suffix are given. The following is an example of a file name:

OMI-Aura_L2-OMO3PR_2004m0601t0732-o01696_v002-2004m0612t124127.he5

**Table 1.** Description of the different sections and the suffix of the filename.

| Section | Format | Description |
|---|---|---|
| InstrumentID | "OMI-Aura" | ID for instrument and spacecraft. |
| DataType | "L2-OMO3PR" for global products<br>"L2-OMO3PRZ" for zoom products | Level and product indicators |
| DataID | <start date and time>-o<orbit> | date and orbit indicators:<br>date-time format: <yyyy>m<mmdd>t<hhmm><br>orbit format o<nnnnn> |
| Version | v<version>-<production date and time> | version indicators:<br>version format <nnn><br>date-time format: <yyyy>m<mmdd>t<hhmmss> |
| Suffix | "he5" or "he5.met" | Suffixes for product file and metadata file. |

# 3 The Data File

## 3.1 Description

The OMI Level 2 Ozone Profile product data file contains the data and metadata produced by the OMI Ozone Profile software, as described in AD1. The input for this product can either be Global or Zoom-in OMI Level 1B products.

## 3.2 Format

The format of the data file is HDF-EOS 5, as described in RD1. To ease the use of Aura data sets, the Aura teams have agreed to make their files match as closely as reasonably possible. To this end, the Aura teams have agreed on a set of guidelines for their file formats, which are described in AD2.

## 3.3 Structure

The data file uses HDF-EOS Swath[1] format. The number of Swath structures used in the data file depends on the L1B input product. If the product is produced from an OMI Global Level 1B product, the file contains a single swath structure named "ProfileO3". Figure 1 shows an example of the structure of a data file produced from Global data.
If the product is produced from an OMI Zoom-in Product the file may contain more than one swath structures. The names of these swaths always starts with "ProfileO3", and is followed by the <Size> identifier that follows the swath naming for the UV1 swaths in L1B Zoom product [RD3]. The purpose of the <Size> identifier is to make the swath name unique. The <Size> identifier has the following format:

"<nXtrack>"x"<nWavel>"x"<binning_factor>.

An example of a swath name in case of a zoom product is:

"ProfileO3 60x123x4".


Figure 1. Structure of a product data file.

## 3.4 Swath Structure

Each Swath structure consists of data fields, geolocation fields and profile fields. In this product no profile fields are used. All data and geolocation fields are defined by their type, dimension and attributes. The dimensions that are used are listed in Table 2. The nTimes, nXtrack and nTimesSmallPixel dimensions are identical to those used in the Level 1B radiance files. In addition to these dimensions, there are several dimensions added. The

[1] Note that in the OMI community 'swath' is often referred to as the across track direction. However, in this document the 'swath' is only used for HDF-EOS elements, see RD1.

nSmallPixelPointer dimension is by definition equal to 2 and is used for the SmallPixelPointer data field only. The nLayers dimensions is used for the number of layers of the retrieved ozone profile. The pressure grid is given at the boundaries between the layers, as well as at the top and bottom of the atmosphere. For the pressure grid the nLevels dimensions is used, where per definition nLevels = nLayers +1.The nMatrix dimension is used for symmetric matrices of size nLevel x nLevel. For these symmetric matrices it would be a waste of storage space if the complete matrix would be stored. Therefore, only the diagonal elements and the lower triangle matrix is stored, as illustrate in Figure 2. The last dimension is the nResiduals dimension which is used for the number of wavelengths for which the radiance residual is stored in the product.

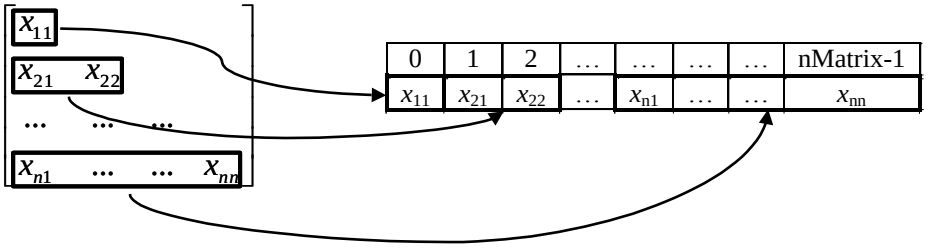


*Figure 2. Mapping from a symmetric matrix to an array with dimension nMatrix.*

In HDF a dimension can either be fixed or unlimited. Fixed indicates that the dimension is determined when the file is created (but they may vary from file to file). Unlimited indicates that the dimension can grow and thus not has to be determined when the file is created. For the dimensions nTimes and nTimesSmallPixel the size is not known at file creation, because parts of the orbit can be processed by the Level 1-2 software, therefore these dimensions are set to unlimited. As a service to the user, the actual size of the nTimes and nTimesSmallPixel are stored as the Swath level attributes NumTimes and NumTimesSmallPixel. The reason for this is that the size of unlimited dimension can otherwise not be retrieved using the HDF-EOS library. Note that this is possible using the plain HDF library calls. Besides the size of the unlimited dimensions, there is also a swath level attribute to indicate the vertical coordinate. This is a mandatory attribute from AD2 and is set to "Pressure" to indicate that the data fields contain profile information and the vertical coordinate used is atmospheric pressure. The pressure levels at which the profile is given is provided in the swath attribute "Pressure". The Swath level attributes are listed in Table 3, their names and types follow the Level 1B products.

All data and geolocation fields have attributes. The attributes for data and geolocation fields are listed in Table 4. In case the data is missing, fill values are used. These fill values depend on the data type. Table 5 shows a list of the fill values for all the types used in the product.

**Table 2.** Dimensions of the Swath structures.

| Dimension Name | Size | Dimension Description |
|---|---|---|
| nTimes | unlimited | Number of OMI measurements |
| nXtrack | fixed | Number of ground pixels per measurement |
| nTimesSmallPixel | unlimited | Number of OMI small pixel measurements |
| nTimesSmallPixelPointer | fixed (2) | Dimension used for the SmallPixelPointer data field |
| nLevels | fixed | Number of levels for which the profile is given |
| nLayers | fixed | Number of layers for which the profile is given |
| nMatrix | fixed | Dimension used for storing symmetric matrices. |
| nResiduals | fixed | Number of residuals. |
| nStateVectorParam | fixed | Maximum number of elements of the optical estimation state vector, nominally set to 6. |

**Table 3.** Swath level attributes.

| Dimension Name | Size | Dimension Description |
|---|---|---|
| NumTimes | HE5T_NATIVE_INT32 | Actual size of the dimension nTimes |

| | | |
|---|---|---|
| NumTimesSmallPixel | HE5T_NATIVE_INT32 | Actual size of the dimension nTimesSmallPixel |
| VerticalCoordinate | HE5T_NATIVE_CHAR | "Pressure" |
| Pressure | HE5T_NATIVE_FLOAT | Array containing the nLevels pressure levels in hPa. |

**Table 4.** Data and geolocation field attributes.

| Attribute name | Attribute Type | Attribute Description |
|---|---|---|
| MissingValue | Same type as data Field | Contains the value for missing data |
| Title | HE5T_NATIVE_CHAR | Title of the field |
| Units | HE5T_NATIVE_CHAR | Units after applying scales and offsets. |
| ScaleFactor | HE5T_NATIVE_FLOAT | Factor for scaling data |
| Offset | HE5T_NATIVE_FLOAT | Value to add to the data |
| UniqueFieldDefinition | HE5T_NATIVE_CHAR | Describes if definition of field is shared with other Aura Instruments ("Aura-Shared", "X-Specific", where X=Instrument Name, "X-Y[-Z]-Shared" where X,Y, and optional Z are instrument names (in alphabetical order) |

**Table 5.** Fill values.

| Data Type | Fill Value |
|---|---|
| HE5T_NATIVE_INT8 | -127 |
| HE5T_NATIVE_UINT8 | 255 |
| HE5T_NATIVE_INT16 | -32767 |
| HE5T_NATIVE_UINT16 | 65535 |
| HE5T_NATIVE_INT32 | -2147483647 |
| HE5T_NATIVE_UINT32 | 4294967295 |
| HE5T_NATIVE_FLOAT | $-2^{100}$ (-0X1P+100) |
| HE5T_NATIVE_DOUBLE | $-2^{100}$ (-0X1P+100) |

### 3.4.1 Geolocation Fields

The geolocation fields are stored in the Geolocation Fields group of the Swath structure. Table 6 Gives a description of the Geolocation Fields. In Table 7 the usage of the bit fields of the GroundPixelQualityFlags geolocation field are given. For detailed information of the Snow/Ice flags and the Land/Water flags used in the GroundPixelQualityFlags, see RD4 and RD6. For each of the fields the UniqueFieldDefinition (see Table 4) indicates if a filed is shared with other instruments, see AD2. The default value is "OMI-Specific". In case of a shared field, this is indicated as note in the first column of Table 6.

**Table 6**. The Geolocation Fields.

| Name | Type | Dimensions | Unit | Description |
|---|---|---|---|---|
| Time [s] | HE5T_NATIVE_DOUBLE | nTimes | s | Time in TAI-93 format. |
| Latitude [s] | HE5T_NATIVE_FLOAT | nTimes, nXtrack | deg | Latitude of the center of the groundpixel |
| Longitude [s] | HE5T_NATIVE_FLOAT | nTimes, nXtrack | deg (-180 to 180) | Longitude of the center of the groundpixel |
| Pressure | HE5T_NATIVE_FLOAT | nTimes, nXtrack, nLevels | hPa | Pressures at the interfaces between the layers for which the profile is given. |
| Temperature | HE5T_NATIVE_FLOAT | nTimes, nXtrack, nLevels | K | Temperature at the interfaces between the layers for which the ozone profile is given |
| Altitude | HE5T_NATIVE_FLOAT | nTimes, nXtrack, | km check | Altitude grid for the interfaces between the layers for which the |

| | | | | |
|---|---|---|---|---|
| | | nLevels | | ozone profile is given |
| SpacecraftLatitude [hot] | HE5T_NATIVE_FLOAT | nTimes | deg | Geodetic Latitude above WGS84 ellipsoid |
| SpacecraftLongitude [hot] | HE5T_NATIVE_FLOAT | nTimes | deg (-180 to 180) | Geodetic Longitude above WGS84 ellipsoid |
| SpacecraftAltitude [hot] | HE5T_NATIVE_FLOAT | nTimes | m | Altitude above WGS84 ellipsoid |
| SolarZenithAngle [s] | HE5T_NATIVE_INT16 | nTimes, nXtrack | deg | Solar zenith angle at WGS84 ellipsoid for center co-ordinate of the ground pixel. Scaled by a factor 100. |
| SolarAzimuthAngle [hot] | HE5T_NATIVE_INT16 | nTimes, nXtrack | deg | Solar azimuth angle at WGS84 ellipsoid for center co-ordinate of the ground pixel, defined East-of-North. Scaled by a factor 100. |
| ViewingZenithAngle | HE5T_NATIVE_INT16 | nTimes, nXtrack | deg | Viewing zenith angle at WGS84 ellipsoid for center co-ordinate of the ground pixel. Scaled by a factor 100. |
| ViewingAzimuthAngle | HE5T_NATIVE_INT16 | nTimes, nXtrack | deg | Viewing azimuth angle at at WGS84 ellipsoid for center co-ordinate of the ground pixel, defined Eastof-North. Scaled by a factor 100. |
| TerrainHeight | HE5T_NATIVE_INT16 | nTimes, nXtrack | m | Terrain height at for center co-ordinate of the ground pixel |
| GroundPixelQualityFlags | HE5T_NATIVE_UINT16 | nTimes, nXtrack | NoUnits | See Table 7. |

[s]) UniqueFieldDefinition = “Aura-Shared”
[hot]) UniqueFieldDefinition = “HIRLDS-OMI-TES-Shared”
[ot]) UniqueFieldDefinition = “OMI-TES-Shared”

**Table 7.** Definition of the GroundPixelQualityFlags

| Bit | Description |
|---|---|
| 0-3 | Land/Water flags [RD6]<br>0=Shallow Ocean<br>1=Land<br>2=Shallow Inland Water<br>3=Ocean coastline / Lake shoreline<br>4=Ephemeral (intermittent) water<br>5=Deep Inland Water<br>6=Continental Shelf Ocean<br>7=Deep Ocean<br>8-14=Not used<br>15=Error flag for Land/Water |
| 4 | Sun Glint Possibility flag |
| 5 | Solar Eclipse possibility flag |
| 6 | Geolocation Error flag |
| 7 | Reserved for future use |
| 8-14 | Snow/Ice flags [based on NISE, RD5] |

| | |
|---|---|
| | 0=Snow-free land<br>1-100=Sea ice concentration (%)<br>101=Permanent ice (Greenland, Antarctica)<br>102=Not used<br>103=Dry snow<br>104=Ocean [NISE-255]<br>105-123=Reserved<br>124=Mixed pixels at coastline [NISE-252]<br>125=Suspect ice value [NISE-253]<br>126=Corners (undefined) [NISE-254]<br>127=Error |
| 15 | NISE nearest neighbor filling flag<br>0=Not set<br>1=Set |

### 3.4.2 Data Fields

The data fields are stored in the Data Fields group of the Swath structure. Table 8 Gives a description of the Data Fields. Table 9 and Table 10 give the detailed bit-level description of the MeasurementQualityFlags and ProcessingQualityFlags. As for the geolocation fields, the notes in the first column of Table 8 indicate that the UniqueFieldDefinition differs from the default value, which is "OMI-Specific". Data fields which name is in *Italic* are optional fields. These fields may not be presented in the data fields.

**Table 8.** The Data Fields.

| Name | Type | Dimensions | Unit | Description |
|---|---|---|---|---|
| O3 | HE5T_NATIVE_FLOAT | nTimes, nXtrack, nLayers | DU | Ozone concentration. |
| O3Precision | HE5T_NATIVE_INT16 | nTimes, nXtrack, nLayers | % | Ozone concentration precision. |
| ColomnAmountO3 | HE5T_NATIVE_FLOAT | nTimes, nXtrack | DU | Total column amount ozone. |
| O3APriori | HE5T_NATIVE_INT16 | nTimes, nXtrack, nLayers | DU | *A priori* ozone concentrations<br>Scaled factor 100 |
| O3APrioriError | HE5T_NATIVE_INT16 | nTimes, nXtrack, nLayers | % | Error in the *a priori* ozone concentration.<br>Scale factor 100 |
| *AveragingKernel* | HE5T_NATIVE_INT16 | nTimes, nXtrack, nLayers, nLayers | NoUnits | Scale factor $1x10^4$ |
| CovarianceMatrix | HE5T_NATIVE_INT16 | nTimes, nXtrack, nMatrix | NoUnits | Scale factor 100 |
| *APrioriCovarianceMatrix* | HE5T_NATIVE_INT16 | nTimes, nXtrack, nMatrix | NoUnits | Scale factor 100 |
| StateVectorSpecies | HE5T_NATIVE_UINT8 | nTimes, nStateVectorParam | NoUnits | Number of elements per species: O3, NO2, SO2, Aerosol optical thickness, Surface albedo, Cloud fraction |

| | | | | |
|---|---|---|---|---|
| ResidualsOfFit | HE5T_NATIVE_FLOAT | nTimes, nXtrack, nResiduals | NoUnits | Residual of the fit at selected wavelengths. |
| RootMeanSquareErrorOfFit | HE5T_NATIVE_FLOAT | nTimes, nXtrack | NoUnits | Root mean square error of the radiance fit |
| CostFunctionOfFit | HE5T_NATIVE_FLOAT | nTimes, nXtrack | NoUnits | |
| NumberOfIterations | HE5T_NATIVE_INT8 | nTimes, nXtrack | NoUnits | |
| DegreesOfFreedomForSignal | HE5T_NATIVE_INT16 | nTimes, nXtrack | NoUnits | Degrees of freedom for Signal scaled by 1000 |
| *NO2ColumnAmount* | HE5T_NATIVE_FLOAT | nTimes, nXtrack | molec./cm$^2$ | $NO_2$ column amount. Depending on the StateVectorSpecies field, the value contains fit results or *a priori* climatology values. |
| *SO2ColumnAmount* | HE5T_NATIVE_FLOAT | nTimes, nXtrack | molec./cm$^2$ | $SO_2$ column amount. Depending on the StateVectorSpecies field, the value contains fit results or *a priori* climatology values. |
| *AerosolOpticalThickness* | HE5T_NATIVE_FLOAT | nTimes, nXtrack | NoUnits | Aerosol optical thickness at the reference wavelength nominally set to 400 nm. Depending on the StateVectorSpecies field, the value contains fit results or *a priori* climatology values. |
| EffectiveCloudFractionUV1 | HE5T_NATIVE_INT16 | nTimes, nXtrack | NoUnits | Effective cloud fraction from UV-1 channel. Scaled by a factor 1000. |
| EffectiveCloudFractionUV2 | HE5T_NATIVE_INT16 | nTimes, nXtrack | NoUnits | Effective cloud fraction from UV-2 channel. Scaled by a factor 1000. |
| CloudPressure | HE5T_NATIVE_INT16 | nTimes, nXtrack | hPa | Effective cloud pressure |
| TerrainReflectivityUV1 | HE5T_NATIVE_INT16 | nTimes, nXtrack | NoUnits | Surface reflectivity for UV-1 at 308.5 nm, scaled by a factor 1000. |
| TerrainReflectivityUV2 | HE5T_NATIVE_INT16 | nTimes, nXtrack | NoUnits | Surface reflectivity for UV-2 at 330 nm, scaled by a factor 1000. |
| MeasurementQualityFlags | HE5T_NATIVE_UINT8 | nTimes | NoUnits | See Table 9 |
| ProcessingQualityFlags | HE5T_NATIVE_UINT16 | nTimes, nXtrack | NoUnits | See Table 10 |
| SmallPixelRadiance | HE5T_NATIVE_FLOAT | nTimesSmallPixel, nXtrack | photons/(s.nm.cm2.sr) | Radiance of small pixel data column |
| SmallPixelRadianceVariance | HE5T_NATIVE_FLOAT | nTimesSmallPixel, nXtrack | (photons/(s.nm.cm2.sr))$^2$ | Variance of the small pixel radiances of a composite ground pixel |
| SmallPixelRadiancePointer | HE5T_NATIVE_INT16 | nTimes, nSmallPixelPointer | NoUnits | Offset and count of nTimesSmallPixel wrt nTimes |
| InstrumentConfigurationId | HE5T_NATIVE_UINT8 | nTimes | NoUnits | Unique ID for instrument settings for current measurement, see [RD5]. |

**Table 9.** Definition of the MeasurementQualityFlags

| Bit | Name | Description |
|---|---|---|
| 0 | Measurement Missing Flag | Set if all Ground Pixels give Earth Radiance Missing Flag. |

| | | |
|---|---|---|
| | 0 Not set<br>1 Set | |
| 1 | Measurement Error Flag<br>0 Not set<br>1 Set | Set if any of the L1B MeasurementQualityFlags bit 0, 1 or 3 are set for the Radiance or for the used Solar product. |
| 2 | Measurement Warning Flag<br>0 Not set<br>1 Set | Set if any of the L1B MeasurementQualityFlags bit 2, 4, 5, 8, 9 are set for the Radiance or for the used Solar product. |
| 3 | Rebinned Measurement Flag<br>0 Not set<br>1 Set | Set if L1B radiance MeasurmentQualityFlags bit 7 is set to 1. |
| 4 | SAA Flag<br>0 Not set<br>1 Set | Set if L1B MeasurmentQualityFlags bit 10 is set to 1, for the Radiance or for the used Solar product |
| 5 | Spacecraft Maneuver Flag<br>0 Not set<br>1 Set | Set if L1B MeasurmentQualityFlags bit 11 is set to 1, for the Radiance or for the used Solar product |
| 6 | Instrument Settings Error Flag<br>0 Not set<br>1 Set | The Earth and Solar InstrumentConfigurationIDs are not compatible. |
| 7 | Cloud Data Not Synchronized Flag<br>0 Not set<br>1 Set | Set if radiance and cloud data are not synchronized |

**Table 10.** Definition of the ProcessingQualityFlags.

| **Bit** | **Name** | **Description** |
|---|---|---|
| 0 | Solar Irradiance Warning Flag<br>0 Not set<br>1 Set | For any of the irradiance pixels contained in the fit window:<br>- L1B PixelQualityFlags bit 3-10 is set<br>- wavelenghtPrecision > maxWavelengthPrecision<br>- wavelengthPrecision <= 0<br>- wavelengthPrecision contains fill value<br>- irradiancePrecision > maxIrradiancePrecision<br>- irradiancePrecision <= 0<br>- irradiancePrecision contains fill value |
| 1 | Earth Radiance Missing Flag<br>0 Not set<br>1 Set | For this ground pixel the number of spectral pixels flagged with the L1B PixelQualityFlags bit 0 is larger than threshold set in the OPF, or, the number of spectral pixels is too small to perform the fitting. |
| 2 | Earth Radiance Error Flag<br>0 No error<br>1 Error | For this ground pixel the number of spectral pixels flagged with the L1B PixelQualityFlags bit 0-2 is larger than a threshold set in the OPF. |
| 3 | Earth Radiance Warning Flag<br>0 Not set<br>1 Set | For any of the radiance pixels contained in the fit window:<br>- L1B PixelQualityFlags bit 3-10 is set<br>- wavelenghtPrecision > maxWavelengthPrecision<br>- wavelengthPrecision <= 0<br>- wavelengthPrecision contains fill value<br>- radiancePrecision > maxRadiancePrecision<br>- radiancePrecision <= 0<br>- radiancePrecision contains fill value<br>- Any of the radiance or geolocation fields used is out-of-bounds |
| 4 | Cloud Data Error Flag<br>0 Not set<br>1 Set | Cloud fraction set to zero flag, because the cloud data is missing or invalid. *Note that if the cloud product is not synchronized the cloud data is invalid.* |

| | | |
|---|---|---|
| 5 | Cloud Data Warning Flag<br>0 Not set<br>1 Set | A warning flag is set for the cloud data |
| 6 | Initialization Error<br>0 Not set<br>1 Set | An error occurred during the processing of the pixel, no output was generated. The following errors raise this flag:<br>- Mismatch between irradiance and radiance wavelengths.<br>- The distance between UV1 and UV2 ground pixels exceeds a threshold set in the OPF.<br>- Derived a-priori information does not validate, no processing is possible |
| 7 | Initialization Warning<br>0 Not set<br>1 Set | Incorrect or missing values appeared during processing, but processing was still possible. The following warnings raise this flag:<br>- Derived a-priori information couldn't always be used, default or estimated values are used. |
| 8 | Radiative Transfer Error<br>0 Not set<br>1 Set | Errors occurred during the radiative transfer computations, no processing possible. |
| 9 | Radiative Transfer Warning<br>0 Not set<br>1 Set | Warnings occurred during the radiative transfer computations, but processing was still possible. |
| 10 | Optimal Estimation Error<br>0 Not set<br>1 Set | Errors occurred during the optimal estimation, no processing possible. |
| 11 | Optimal Estimation Warning<br>0 Not set<br>1 Set | Warnings occurred during the optimal estimation, but processing was still possible. |
| 12 | Optimal Estimation Convergence Flag<br>0 Not set<br>1 Set | Set if the optimal estimation did not converge. |
| 13 | Spare | n/a |
| 14 | Profile Warning Flag<br>0 Not set<br>1 Set | Flag that indicates if any warnings occurred during the computation of the ozone profile. |
| 15 | Profile Error Flag<br>0 Not set<br>1 Set | Flag that indicates if any errors occurred during the computation of the ozone profile. |

### 3.5 Metadata

In this document the term “metadata” is reserved for metadata on file (granule) level. Examples of metadata on granule level are the date and time that the data was measured, the percentage of the data that is missing for the granule, the geographic coverage, etc..
The metadata is implemented in two ways:

1. as HDF-EOS file level attributes
2. as ECS metadata.

The metadata fields that are implemented as HDF-EOS file level attributes are only available in the data file, whereas part of the ECS metadata fields are stored both in the data and in the metadata file. The advantage of storing a metadata field as HDF-EOS file attributes are that they are easily available for the users. Another advantage of using HDF-EOS file attributes is that there are no iterations needed with ECS to change or add such a metadata field. The ECS metadata on the other hand have the advantage that they are ingested by the ECS system (via the metadata file), and can be used for searching the DAAC archive. There are three types of ECS metadata:

1. Collection

2. Inventory
3. Archived.

The collection type metadata describe the collection of all the product files. Thus, collection metadata fields described in this document are the same for all the granules for the OMI Level 2 Ozone Profile Product. The collection level metadata consist of fields like the instrument name ("OMI"), the platform name ("EOS-Aura"), etc.. The Inventory metadata describe a single granule. It contains standard ECS fields, as well as the so-called product specific attributes. Like the product specific attributes, the archive metadata can also be defined per product. The difference between archive and inventory metadata is that archive metadata cannot be used for searching the DAACs. Furthermore, the Archive level attributes are not part of the metadata file, whereas the Collection and Inventory metadata are contained in the metadata file. The Collection, Inventory and Archive ECS metadata are listed in Tables, 11, 12 and 13, respectively.

The HDF-EOS file attributes are stored in the "FILE_ATTRIBUTES" group, see Figure 1. The parameters that are stored as Global Attributes are listed in Table 14. Some of these parameters are also part of the ECS metadata, like for instance the the GranuleDay, GranuleMonth, GranuleYear attributes. The reason of this duplication is that the Global Attributes provide a simpler interface to this information.

**Table 11.** Collection metadata.

| **Name** | **Value** |
|---|---|
| DLLName | libDsESDTOmOMIPoly.001Sh.so |
| SpatialSearchType | Orbit |
| ShortName | "OMO3PR" for global, "OMO3PRZ" for zoom products |
| LongName | "OMI/Aura Ozone (O3) Profile 1-Orbit L2 Swath 13x48km" for global products,<br>"OMI/Aura Ozone (O3) Profile 1-Orbit L2 Swath 13x24km" for zoom products |
| CollectionDescription | Ozone Profile measured with OMI. |
| VersionID | 1 |
| RevisionDate | 2004-01-12 |
| SuggestedUsage | Sience Research |
| ProcessingCenter | OMI SIPS |
| ArchiveCenter | GSFC |
| VersionDescription | Pre-launch test using simulated and on-ground-acquired data |
| CitationforExternalPublication | OMI data contained herein were obtained through joined research between the Netherlands (NIVR/KNMI), Finland (FMI), and the U.S. (NASA) in the Earth Observing System (EOS) Aura Mission |
| CollectionState | In Work |
| MaintenanceandUpdateFrequency | Continually |
| TimeType | UTC |
| DateType | Gregorian |
| TemporalRangeType | Continuous Range |
| PrecisionofSeconds | 1 |
| EndsatPresentFlag | Y |
| RangeBeginningDate | 2004-06-01 |
| RangeBeginningTime | 00:00:00.000000 |
| RangeEndingDate | 2004-06-01 |
| RangeEndingTime | 00:00:00.000000 |
| ContactOrganizationContainer.Role | Archive |
| ContactOrganizationContainer.HoursofService | 08:00 to 18:00:00 EDT (-0500 GMT)" |
| ContactOrganizationContainer.ContactInstructions | Contact for format/distribution issues |

| | |
|---|---|
| ContactOrganizationContainer.ContactOrganizationName | Goddard DAAC User Services |
| ContactOrganizationAddressContainer.StreetAddress | NASA/GSFC Code 902 |
| ContactOrganizationAddressContainer.City | GREENBELT |
| ContactOrganizationAddressContainer.StateProvince | MD |
| ContactOrganizationAddressContainer.PostalCode | 20771 |
| ContactOrganizationAddressContainer.Country | USA |
| OrganizationTelephoneContainer.TelephoneNumber | 301-614-5473 |
| OrganizationTelephoneContainer.TelephoneNumberType | Voice |
| OrganizationTelephoneContainer.TelephoneNumber | 301-614-5304 |
| OrganizationTelephoneContainer.TelephoneNumberType | Facsimile |
| OrganizationEmail.ElectronicMailAddress | daac_usg@gsfcsrvr4.gsfcmo.ecs.nasa.gov |
| ECSDisciplineKeyword | Earth Science |
| ECSTopicKeyword | Atmosphere |
| ECSTermKeyword | Atmospheric Chemistry/Oxygen Compounds |
| ECSVariableKeyword | Ozone |
| ProcessingLevelDescription | Geophysical Quantities at sensor resolution or geolocated |
| ProcessingLevelID | 2 |
| PlatformShortName | Aura |
| PlatformLongName | EOS Aura Mission Satellite |
| PlatformType | Spacecraft |
| PlatformCharacteristicName | OrbitInclination |
| PlatformCharacteristicDescription | Angle between the orbit plane and the Earth's equatorial plane |
| PlatformCharacteristicDataType | float |
| PlatformCharacteristicUnit | Degrees |
| PlatformCharacteristicValue | 98.2 |
| InstrumentShortName | OMI |
| InstrumentLongName | Ozone Monitoring Instrument |
| InstrumentTechnique | Nadir-Viewing Cross-Track Imaging Spectroradiometry |
| NumberofSensors | 2 |
| SensorShortName | CCD Ultra Violet |
| SensorLongName | Charge Coupled Device Ultra Violet |
| SensorTechnique | Frame Transfer CCD Imaging Spectroradiometry |
| SensorCharacteristicName | CCD_UV_bandwidth |
| SensorCharacteristicDescription | The sensor's Ultra Violet wavelength range. |
| SensorCharacteristicDataType | varchar |
| SensorCharacteristicUnit | nm |
| SensorCharacteristicValue | 270-380 |
| SensorShortName | CCD Visible |
| SensorLongName | Charge Coupled Device Visible |
| SensorTechnique | Frame Transfer CCD Imaging Spectroradiometry |
| SensorCharacteristicName | CCD_VIS_bandwidth |
| SensorCharacteristicDescription | The sensor's Visible wavelength range. |

| | |
|---|---|
| SensorCharacteristicDataType | varchar |
| SensorCharacteristicUnit | nm |
| SensorCharacteristicValue | 350-500 |
| PrimaryCSDT | Complex Swath |
| Implementation | HDF-EOS |
| GranuleTimeDuration | 6600 |

**Table 12.** Inventory metadata. Entries in blue are Product Specific Attributes.

| Name | Mandatory | Location | nr. of values | Type | Value |
|---|---|---|---|---|---|
| SizeMBECSDataGranule | FALSE | DSS | 1 | Double | |
| ReprocessingPlanned | TRUE | DP | 1 | String | "Yes" |
| ReprocessingActual | TRUE | PCF | 1 | String | |
| DayNightFlag | TRUE | MCF | 1 | String | "Day" |
| LocalGranuleID | TRUE | PGE | 1 | String | Filename, as specified in section 2.2 |
| LocalVersionID | TRUE | PCF | 1 | String | |
| ProductionDateTime | TRUE | TK | 1 | DateTime | |
| ParameterName | TRUE | PGE | 1 | String | "Ozone" |
| AutomaticQualityFlag | TRUE | PGE | 1 | String | *) |
| AutomaticQualityFlagExplanation | TRUE | PGE | 1 | String | **) |
| OperationalQualityFlag | TRUE | MCF | 1 | String | "Passed" |
| OperationalQualityFlagExplanation | TRUE | MCF | 1 | String | ***) |
| ScienceQualityFlag | TRUE | MCF | 1 | String | "Not Investigated" |
| ScienceQualityFlagExplanation | TRUE | MCF | 1 | String | ****) |
| QAPercentMissingData | TRUE | PGE | 1 | Integer | Percentage of data for which ProcessingQuality-Flags bit 13 is set. |
| QAPercentOutOfBoundsData | TRUE | PGE | 1 | Integer | Percentage of pixels for which the ozone VCD is outside the boundaries set in the OPF |
| OrbitNumber | TRUE | PGE | 1 | Integer | |
| EquatorCrossingDate[1] | TRUE | PGE | 1 | Date | |
| EquatorCrossingTime[1] | TRUE | PGE | 1 | Time | |
| EquatorCrossingLongitude[1] | TRUE | PGE | 1 | Double | |
| ShortName | TRUE | MCF | 1 | String | "OMO3PR" for global<br>"OMO3PRZ" for zoom |
| VersionID | TRUE | MCF | 1 | Integer | "0" |
| InputPointer | TRUE | PGE | 20 | String | |
| RangeBeginningDate[2] | TRUE | PGE | 1 | Date | |
| RangeBeginningTime[2] | TRUE | PGE | 1 | Time | |
| RangeEndingDate[2] | TRUE | PGE | 1 | Date | |
| RangeEndingTime[2] | TRUE | PGE | 1 | Time | |
| PGEVersion | TRUE | PCF | 1 | String | |
| AssociatedPlatformShortName | TRUE | MCF | 1 | String | "Aura" |
| AssociatedInstrumentShortName | TRUE | MCF | 1 | Aura | "OMI" |
| AssociatedSensorShortname | TRUE | MCF | 1 | String | "CCD Ultra Violet" |
| OperationMode | TRUE | PCF | 1 | String | "Global" or "Zoom" |
| NrMeasurements[1] | TRUE | PGE | 1 | Integer | Range(0,5000) |
| NrZoom[1] | TRUE | PGE | 1 | Integer | Range(0,5000) |
| NrSpatialZoom[1] | TRUE | PGE | 1 | Integer | Range(0,5000) |
| NrSpectralZoom[1] | TRUE | PGE | 1 | Integer | Range(0,5000) |
| ExpeditedData[1] | TRUE | PGE | 1 | String | "True" or "False" |
| SouthAtlanticAnomalyCrossing[1] | TRUE | PGE | 1 | String | "True" or "False" |
| SpacecraftManeuverFlag[1] | TRUE | PGE | 1 | String | "True" or "False" |
| SolarEclipse[1] | TRUE | PGE | 1 | String | "True" or "False" |
| InstrumentConfigurationIDs[1] | TRUE | PGE | 256 | Integer | Range(0,255) |
| MasterClockPeriods[1] | TRUE | PGE | 256 | Float | Range(0,255) |

| | | | | | |
|---|---|---|---|---|---|
| ExposureTimes[1] | TRUE | PGE | 256 | Float | Range(0,255) |
| PathNr[1] | TRUE | PGE | 500 | Integer | Range(1,466) |
| StartBlockNr[1] | TRUE | PGE | 500 | Integer | Range(1,500) |
| EndBlockNr[1] | TRUE | PGE | 500 | Integer | Range(1,500) |

[1]) The value can be copied from the L1B Radiance metadata fields.

[2]) The value can be copied from the L1B Radiance metadata fields or set via the time tags in the PCF.

*) "Failed" if :
RadianceScienceQualityFlag is "Failed".
IrradianceScienceQualityFlag is "Failed".
The maximum of the following parameters is larger than or equal to the AutomaticQAFailed parameter in the OPF:
QAPctProfileError

"Suspect" if:
RadianceScienceQualityFlag is "Suspect".
IrradianceScienceQualityFlag is "Suspect".
The maximum of the following parameters is smaller than the AutomaticQAFailed but larger or than or equal to the AutomaticQASuspect parameter in the OPF:
QAPctProfileError

"Passed" for all other conditions.

**) "The value is based on a combination of the RadianceScienceQualityFlag, IrradianceScienceQualityFlag, and the ProfileErrorFlag. Thresholds used: xx% for Failed and yy% for Suspect."

***) "This granule passed operational tests that were administered by the OMI SIPS. QA metadata was extracted and the file was successfully read using standard HDF-EOS utilities."

****) "An updated science quality flag and explanation is put in the product .met file when a granule has been evaluated. The flag value in this file, Not Investigated, is an automatic default that is put in every granule during production."

**Table 13.** Archive metadata.

| Name | Location | Mandatory | # values | Type | Description |
|---|---|---|---|---|---|
| LongName | MCF | TRUE | 1 | String | "OMI/Aura Ozone (O3) Profile 1-Orbit L2 Swath 13x48km" for global products, "OMI/Aura Ozone (O3) Profile 1-Orbit L2 Swath 13x24km" for zoom products |
| ESDTDescriptorRevision | MCF | TRUE | 1 | String | TBD |

**Table 14.** Global Attributes of the OMI Level 2 Ozone Profile data files.

| Name | Data Type | nr | Description |
|---|---|---|---|
| InstrumentName | HE5T_NATIVE_CHAR | 1 | "OMI" |
| ProcessLevel | HE5T_NATIVE_CHAR | 1 | "2" |
| GranuleMonth | HE5T_NATIVE_INT | 1 | Month of start of granule (1-12) |
| GranuleDay | HE5T_NATIVE_INT | 1 | Day of start of granule (1-31) |
| GranuleYear | HE5T_NATIVE_INT | 1 | Year of start of granule (i.e. 2003) |
| TAI93At0zOfGranule | HE5T_NATIVE_DOUBLE | 1 | TAI time at 00:00 UTC at date of start of granule |
| PGEVersion | HE5T_NATIVE_CHAR | 1 | Version of the PGE |
| ProcessingSystem | HE5T_NATIVE_CHAR | 1 | "OFFLINE", "NRT" or "VFD" |
| SolarProductMissing<br>0 Not set<br>1 Set | HE5T_NATIVE_INT | 1 | Set if the Solar product could not be opened, read, is in unexpected format or the data is missing. The Backup product is used in this case. |
| SolarProductOutOfDate<br>0 Not set<br>1 Set | HE5T_NATIVE_INT | 1 | Set if the difference of the dates of the measurements of the Earth radiance and Solar irradiance is larger than maxSolarAge |
| SolarIrradianceWarning<br>0 Not set<br>1 Set | HE5T_NATIVE_INT | 1 | Set if QAPctIrradianceWarning is larger than 0 |
| BackupSolarProductUsed<br>0 Not set<br>1 Set | HE5T_NATIVE_INT | 1 | Set if the backup Solar product is used instead of the normal Solar product. |
| ParametersInconsistent<br>0 Not set<br>1 Set | HE5T_NATIVE_INT | 1 | Set if there is an inconsistency between the OPF parameters and the parameters of the LUTs. |
| RadianceParametersMissing<br>0 Not set<br>1 Set | HE5T_NATIVE_INT | 1 | Set if any of the general parameters from the L1B radiance product are missing. |
| RadianceScienceQualityFlag | HE5T_NATIVE_CHAR | 1 | Set to the value set for the radiance product ScienceQualityFlag metadata attribute |
| IrradianceScienceQualityFlag | HE5T_NATIVE_CHAR | 1 | Set to the value set for the Solar product ScienceQualityFlag metadata attribute |
| CloudProductMissing<br>0 Not set<br>1 Set | HE5T_NATIVE_INT | 1 | Set if the Cloud product could not be opened, read, or is in unexpected format. |
| QAPctSunGlint | HE5T_NATIVE_INT | 1 | Percent of ground pixels for which L2 GroundPixelQualityFlags bit 4 is set |
| QAPctEclipse | HE5T_NATIVE_INT | 1 | Percent of ground pixels for which L2 GroundPixelQualityFlags bit 5 is set |
| QAPctIrradianceWarning | HE5T_NATIVE_INT | 1 | Percent of ground pixels for which L2 ProcessingQualityFlags bit 0 is set |
| QAPctRadianceMissing | HE5T_NATIVE_INT | 1 | Percent of ground pixels for which L2 ProcessingQualityFlags bit 1 is set |
| QAPctRadianceError | HE5T_NATIVE_INT | 1 | Percent of ground pixels for which L2 ProcessingQualityFlags bit 2 is set |
| QAPctRadianceWarning | HE5T_NATIVE_INT | 1 | Percent of ground pixels for which L2 ProcessingQualityFlags bit 3 is set |
| QAPctCloudDataError | HE5T_NATIVE_INT | 1 | Percent of ground pixels for which L2 ProcessingQualityFlags bit 4 is set |
| QAPctCloudDataWarning | HE5T_NATIVE_INT | 1 | Percent of ground pixels for which L2 |

| | | | |
|---|---|---|---|
| | | | ProcessingQualityFlags bit 5 is set |
| QAPctInitializationError | HE5T_NATIVE_INT | 1 | Percent of ground pixels for which L2 ProcessingQualityFlags bit 6 is set |
| QAPctInitializationWarning | HE5T_NATIVE_INT | | Percent of ground pixels for which L2 ProcessingQualityFlags bit 7 is set |
| QAPctRadiativeTransferError | HE5T_NATIVE_INT | | Percent of ground pixels for which L2 ProcessingQualityFlags bit 8 is set |
| QAPctRadiativeTransferWarning | HE5T_NATIVE_INT | | Percent of ground pixels for which L2 ProcessingQualityFlags bit 9 is set |
| QAPctOptimalEstimationError | HE5T_NATIVE_INT | | Percent of ground pixels for which L2 ProcessingQualityFlags bit 10 is set |
| QAPctOptimalEstimationWarning | HE5T_NATIVE_INT | | Percent of ground pixels for which L2 ProcessingQualityFlags bit 11 is set |
| QAPctOptimalEstimationConvergence | HE5T_NATIVE_INT | | Percent of ground pixels for which L2 ProcessingQualityFlags bit 12 is set |
| QAPctProfileError | HE5T_NATIVE_INT | | Percent of ground pixels for which L2 ProcessingQualityFlags bit 14 is set |
| QAPctProfileWarning | HE5T_NATIVE_INT | | Percent of ground pixels for which L2 ProcessingQualityFlags bit 15 is set |
| QAPctMeasMissing | HE5T_NATIVE_INT | 1 | Percent of measurements for which L2 MeasurementQualityFlags bit 0 is set |
| QAPctMeasError | HE5T_NATIVE_INT | 1 | Percent of measurements for which L2 MeasurementQualityFlags bit 1 is set |
| QAPctMeasWarning | HE5T_NATIVE_INT | 1 | Percent of measurements for which L2 MeasurementQualityFlags bit 2 is set |
| QAPctRebinned | HE5T_NATIVE_INT | 1 | Percent of measurements for which L2 MeasurementQualityFlags bit 3 is set |
| QAPctSAA | HE5T_NATIVE_INT | 1 | Percent of measurements for which L2 MeasurementQualityFlags bit 4 is set |
| QAPctSpacecraftManeuver | HE5T_NATIVE_INT | 1 | Percent of measurements for which L2 MeasurementQualityFlags bit 5 is set |
| QAPctInstrumentSettingsError | HE5T_NATIVE_INT | 1 | Percent of measurements for which L2 MeasurementQualityFlags bit 6 is set |
| QAPctCloudDataNotSynchronized | HE5T_NATIVE_INT | 1 | Percent of measurements for which L2 MeasurementQualityFlags bit 7 is set |
| OPF_OPFVERSION | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_LEVEL1READBUFFERSIZE | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_LEVEL2WRITEBUFFERSIZE | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_AUTOMATICQUALITYFAILED | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_AUTOMATICQUALITYSUSPECT | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_SPECTRALWINDOW | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_POLARIZATIONCORRECTIONFLAG | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_PRESSURELEVELSRETRIEVAL | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_GROUNDPIXELSTRIDE | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_GROUNDPIXELOFFSET | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_GROUNDPIXELCOUNT | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_NUMCHEBYSHEVCOE | HE5T_NATIVE_CHAR | 1 | OPF Setting |

| | | | |
|---|---|---|---|
| FF | | | |
| OPF_SPECTRALWIDTHSLITFUNCTIONOPF | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_ALTITUDEOZONELAYER | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_ALBEDOSNOW | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_ALBEDOWATER | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_ALBEDOLANDTHRESHOLD | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_ALBEDOWATERTHRESHOLD | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_ALBEDOSEAICENH | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_ALBEDOSEAICESH | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_NWAVELENRESIDUALSL2PROD | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_WAVELENGRIDRESIDUALSL2PROD | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_STRIDEWAVELENINTERMEDPROD | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_MAXEXPCOEFFINTERMEDPROD | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_MAXNUMITERATIONSOPTESTIMATION | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_USELMITERATION | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_USEREFLECTANCECOSTFUNCTION | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_REFLCOSTFUNCTIONTHRESHOLD | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_USESTATEVECTORCOSTFUNCTION | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_STATEVECTORCOSTFUNCTIONTHRESHOLD | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_INITIALLMLAGRANGEPARAM | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_LMLANGRANGEPARAMSCALEFACTOR | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_DOAEROSOLFIT | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_CLOUDFRACTIONSURFACEFIT | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_CLOUDFRACTIONAEROSOLFIT | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_FITTOTALOZONECOLUMN | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_FITNO2PROFILE | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_FITSO2PROFILE | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_INITERRORSURFACEALBEDO | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_INITERRORAEROSOLOPTICALTHICKNESS | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_NUMSTREAMLIDORT | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_USEDELTAM | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_USEPSEUDOSPHERICALSOLUTION | HE5T_NATIVE_CHAR | 1 | OPF Setting |

| | | | |
|---|---|---|---|
| OPF_USESINGLESCATTERING | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_REPLACECABANNESRAMANBYRAYLEIGH | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_SIMILARITYTRANSAEROSOL | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_NDISTORTIONPARAM | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_USEDISTORTIONPARAM | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_DISTORTIONPARAM | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_NUMWAVELENRTM | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_NUMINTERPOLVALUESSIM | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_SPECTRALGRIDRTMAMF | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_SPECTRALGRIDRTM_50 | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_ROWOFFSET | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_WAVELENBOUNDARYUV1_UV2 | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_MAXSOLARIRRADIANCEAGEINDAY | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_MAXSPECTRALPIXELSMISSING_ | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_MAXSPECTRALPIXELSERROR_ | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_MAXSPECTRALPIXELSWARNING_ | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_MAXWAVELENGTHPRECISION | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_MAXRADIANCEPRECISION | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_MAXIRRADWAVELENGTHPRECISION | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_MAXIRRADPRECISION | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_MAXDISTANCEUV1TOUV2 | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_LIMITSEARTHRAD | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_LIMITSSOLARIRRAD | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_LIMITSLATITUDE | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_LIMITSLONGITUDE | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_LIMITSSZA | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_LIMITSSAZ | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_LIMITSVZA | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_LIMITSVAZ | HE5T_NATIVE_CHAR | 1 | OPF Setting |
| OPF_LIMITSSURFACEHEIGHT | HE5T_NATIVE_CHAR | 1 | OPF Setting |

### 3.6 Data File Size

The size of the data files depends on the number of measurements and whether it is generated from a Global or Zoom-in Level 1B product. Table 15 shows estimates for the data file for an orbit of Global data and part of the orbit of Global or Zoom-in data.

**Table 15.** Estimated data file sizes.

| L1B Product | Duration [min] | Dimensions | | File Size [Mbytes] | Size per Groundpixel [bytes] |
|---|---|---|---|---|---|
| | | nTimes | nXtrack | | |
| Global | 53 (orbit) | 1600 | TBD | TBD | TBD |
| Global | 10 | 300 | TBD | TBD | TBD |
| Zoom-in | 10 | 300 | TBD | TBD | TBD |

# 4 The Metadata File

## 4.1 Description

The metadata file contains the metadata of the granule. It is produced by call to the SDP Toolkit.

## 4.2 Format

The metadata file is in ASCII.

## 4.3 Structure

The metadata uses ODL.

Metadata Fields
The metadata fields for the ECS metadata are listed in tables 12, 13 and 14.