HDF-EOS Aura File Format Guidelines

Cheryl Craig[1], David Cuddy[2],
Pepijn Veefkind[3], Peter Leonard [4],
Paul Wagner[2], Christina Vuu[5], Douglas Shepard[6]

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1 - National Center for Atmospheric Research
1850 Table Mesa Dr.
Boulder, CO 80303 USA

2 - Mail Stop 183-701, Jet Propulsion Laboratory
4800 Oak Grove Dr.
Pasadena, California 91109 USA

3 - KNMI
P.O. Box 201
NL-3730 AE De Bilt The Netherlands

4- ADNET Systems, Inc.
7515 Mission Dr., Suite A1C1
Lanham, MD 20706 USA

5- Raytheon Information Solutions.
299 N. Euclid Ave, Suite 500
Pasadena, CA 91773 USA

6- Mail Stop 168-414, Jet Propulsion Laboratory
4800 Oak Grove Dr..
Pasadena , CA 91109 USA

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1.0 Introduction

While HDF-EOS constrains HDF with its POINT, SWATH, ZONAL MEAN, and GRID implementations, it is still possible to create two files that contain the same information with completely different structures and which would require dramatically different readers. To ease use of each other's data sets, for purposes like validation and joint research, the Aura teams have agreed to make their files match as closely as reasonably possible. The purpose of this paper is to document these guidelines. This standardization only makes sense for Level 2, 3 and above. It is not intended to apply to Level 1 or other special product files. This document is being written from the standpoint of standardizing Level 2 and Level 3 products for Aura, but many of the same principles can be used in standardizing products for other instruments as well.

2.0 Areas of potential mismatch

- Major HDF-EOS version (HDF-EOS V2.x and HDF-EOS V5.x are not interchangeable)
- Organization of geolocation and data fields and attributes
- Dimension names
- Geolocation field names and dimension ordering
- Data field names and dimension ordering
- Units for geolocation and data fields
- Attribute names, values and units

All of the above items can cause difficulties in creating uniform data sets. Each of these items may require a user to write separate code if they differ from other data sets. For this reason we are creating a list of guidelines. It should be understood that each substantial deviation from the set of guidelines will require the user to create special code for each case. A substantial deviation is something like the absence or misnaming of a mandatory field, or failure of its size or shape to match what the guidelines prescribe. A non-substantial deviation would be something like including some extra fields or attributes in addition to what the guidelines prescribe. These are considered instrument-specific data, which are implicitly permitted by the guidelines, and should not require the user to write special code.

The intended effect is to constrain the producers of data no more than is necessary. This document is an attempt to limit data producers only enough to allow users to see sufficient uniformity. Data producers are free to shape their products in areas in which they are not constrained. For example, HDF-mediated compression is neither mandated nor forbidden. Because end users do not need to know whether or not the data has been compressed, as HDF handles any necessary uncompression automatically behind the scenes, the use of this feature has been left up to the individual data producers.

3.0 Guidelines List

- Aura Level 2, Level 2G and Level 3 files will be created using HDF-EOS V5.x
- Aura Level 2 files will use the HDF-EOS Swath format.
- Aura Level 2G files will use the HDF-EOS Grid format.
- Aura Level 3 files will use the HDF-EOS Swath, Grid, and/or Zonal Means formats.
- HDF-EOS Structure Names should adhere to the Valids list (in Section 5). It is important to note that in order for names to be uniform, they must match completely. Spacing as well as capitalization must be followed exactly.
- Profile data should be reported on a pressure grid and be ordered from the ground to space.
- Profile data Fields in Level 2 should be ordered so that the pressure coordinate is the fastest incrementing coordinate, and the number of times (profiles) is the slowest incrementing coordinate.
- Data Fields should be stored in the units specified.
- HDF fill value and missing data values should have the same value. The actual missing data value will be specified in the MissingValue data field attribute.

The decision on whether to have a file contain only one species or multiple species was left to the instrument teams. The organization for each instrument team's files is as follows:

- HIRDLS File Organization
  - Swath - One file contains all species in one swath grouping
- MLS File Organization
  - Swath - One species per swath, usually one swath per file
  - Grid
    - Daily - One mode per grid, one species per file; some species have multiple modes, therefore some files have multiple grids
    - Monthly - One mode per grid, one file contains all species, therefore it has multiple grids
  - Zonal Mean - One mode per zonal mean, one file contains multiple species; some species have multiple modes, therefore it has multiple zonal means.
- TES File Organization
  - Swath - One file for each species
  - Grid
    - Daily - One file per species, multiple grids per file
    - 8-day - One file per species, multiple grids per file
    - Monthly - One file per species, multiple grids per file
- OMI File Organization
  - Swath and Grid - One file for each species

TES daily product files may contain both limb and nadir data. In addition, several species (NO2 and atmospheric temperature) will contain day/night grid data.

The OMI suite of products includes Level 2G, where "G" means gridded. Each Level 2G file contains 24 UTC hours of data from a particular Level 2 product subsetted onto a 1/4 degree longitude-latitude grid. A third dimension holds up to fifteen time-ordered Level 2 observations in each Level 2G grid cell. The advantage of Level 2G over Level 2 is that there are 14.4 (= 24 hours divided by the Aura orbital period) times fewer files to deal with, and the size of each Level 2G file is smaller than that of the total combined size of the corresponding Level 2 files. The latter is true because diagnostic Level 2 fields that are not of use to the typical user are not included in the Level 2G products.

4.0 Organization of data fields and attributes

4.1 Swath geolocation and data fields and attributes

More than one species can be contained within a swath and more than one swath can exist within a file.

(Aura Data File Structure)

File Level Attributes:
- InstrumentName
- ProcessLevel
- GranuleMonth
- GranuleDay
- GranuleYear
- TAI93At0zOfGranule
- PGEVersion

Swath Name: *Instrument Specific*

Swath Level Attributes:
- Pressure
- VerticalCoordinate

Dimensions:
- nTimes
- nLevels
- nWavel
- nXtrack
- nLayers

Geolocation Fields:
- Time
- Latitude
- Longitude
- Pressure
- SolarZenithAngle
- LocalSolarTime
- etc.

(See the valids for the complete listing of possible Geolocation fields)

Geolocation Field Attributes:
- MissingValue
- Title
- Units
- UniqueFieldDefinition
- ScaleFactor (*only if applicable*)
- Offset (*only if applicable*)

Data Fields:
- Temperature
- O3
- etc.

(See the valids for the complete listing of possible Data fields)

Data Field Attributes:
- MissingValue
- Title
- Units
- UniqueFieldDefinition
- ScaleFactor (*only if applicable*)
- Offset (*only if applicable*)

Swath Name2: *Instrument Specific*

Additional swaths may occur in a file

4.2 Grid data fields and attributes

More than one species can be contained within a grid and more than one grid can exist within a file. While the Grid structure does not specify the difference between grid (geolocation fields) and data fields, we have separated them for the sake of documentation.

(Aura Data File Structure)

File Level Attributes:
- OrbitNumber
- OrbitPeriod
- InstrumentName
- ProcessLevel
- GranuleMonth
- GranuleDay
- GranuleYear
- GranuleDayOfYear
- TAI93At0zOfGranule
- PGEVersion
- StartUTC
- EndUTC
- Period ('Daily', 'Monthly', '8-day', 'Global Survey')

Grid Name: *Instrument Specific*

Grid Level Attributes:
- Projection
- GridOrigin
- GridSpacing
- GridSpacingUnit
- GridSpan
- GridSpanUnit

Dimensions:
- XDim
- YDim
- nLevels
- nCandidate

Grid Fields:
- Latitude
- Longitude
- Pressure

(See the valids for the complete listing of possible Grid fields)

Grid Field Attributes:
- MissingValue
- Title
- Units
- UniqueFieldDefinition
- ScaleFactor (*only if applicable*)
- Offset (*only if applicable*)

Data Fields:

(Value, Precision, …) for the following:
- Temperature
- N2O
- Etc.

(See the valids for the complete listing of possible Data fields)

Data Field Attributes:
- MissingValue
- Title
- Units
- UniqueFieldDefinition
- ScaleFactor (*only if applicable*)
- Offset (*only if applicable*)

Grid Name2: *Instrument Specific*

Additional Grids may occur in a file

4.3 Zonal Means data fields and attributes

More than one species can be contained within a Zonal Means and more than one Zonal Means can exist within a file. While the Zonal Mean structure does not specify the difference between zonal (geolocation) fields and data fields, we have separated them for the sake of documentation.

(Aura Data File Structure)

File Level Attributes:
- OrbitNumber
- OrbitPeriod
- InstrumentName
- ProcessLevel
- GranuleMonth
- GranuleDay
- GranuleYear
- GranuleDayOfYear
- TAI93At0zOfGranule
- PGEVersion
- StartUTC
- EndUTC
- Period (‘Daily’, ‘Monthly’, ‘8-day’ ‘Global Survey’)

Zonal Name: *Instrument Specific*

Zonal Level Attributes:
- Pressure
- VerticalCoordinate
- ZonalSpacing
- ZonalSpacingUnit

Dimensions:
- nLats
- nLevels

Zonal Fields:
- Latitude
- Pressure
- Etc.

(See the valids for the complete listing of possible Zonal fields)

Zonal Field Attributes:
- MissingValue
- Title
- Units
- UniqueFieldDefinition
- ScaleFactor (*only if applicable*)
- Offset (*only if applicable*)

Data Fields:
(Value, Stdandard_Deviation, Data_Count,…) for the following
- Temperature
- N2O
- Etc.

(See the valids for the complete listing of possible Data fields)

Data Field Attributes:
- MissingValue
- Title
- Units
- UniqueFieldDefinition
- ScaleFactor (*only if applicable*)
- Offset (*only if applicable*)

Zonal Name2: *Instrument Specific*

Additional zonals may occur in a file

5.0 Valids

This section lists the specific names which will be used within the file.

5.1 Swath

5.1.1 Name

Varies by Instrument

It has become apparent that each instrument has different needs for this name, and standardization is not feasible. A user can use HE5_SWinqswath to determine what the values are for each data set.

5.1.2 Dimensions:

These are the actual dimensions of the Geolocation and Data field quantities.

nTimes	Number of times (profiles) in data set (this may be unlimited)
nLevels	Number of pressure levels
nWavel	Number of wavelengths
nXtrack	Number of pixels in the across track direction (OMI specific)
nLayers	Usually number of Umkehr layers (OMI specific)
nFreqs	Number of frequencies (MLS specific)
nCloudTypes	Number of cloud types (HIRDLS specific)
nFreq	Number of frequencies (TES specific)
nUARSlevels	87 standard UARS levels (TES specific)

5.1.3 Swath Geolocation Fields:

This is data which describe the scientific measured quantities. They provide information to aid in describing the data's "location".

NOTE THE ORDER OF DIMENSIONS IS IN FORTRAN ORDER WITH THE FIRST DIMENSION BEING THE MOST RAPIDLY INCREMENTING. C USERS SHOULD REVERSE THE DIMENSION ORDER

				Instrument				
HDF-EOS Name	***Dimension***	***Data Type***	***Units***	***H***	***M***	***O***	***T***	***Notes***
Time	(nTimes)	HE5T_NATIVE_DOUBLE	s	X	X	X	X	time in TAI units
Latitude	(nTimes)	HE5T_NATIVE_FLOAT	deg	X	X		X	Geodetic Latitude
Latitude	(nXtrack,nTimes)	HE5T_NATIVE_FLOAT	deg			X		Geodetic Latitude
Longitude	(nTimes)	HE5T_NATIVE_FLOAT	deg	X	X		X	range: [-180 to 180]
Longitude	(nXtrack,nTimes)	HE5T_NATIVE_FLOAT	deg			X		range: [-180 to 180]
Pressure^{+}	(nLevels)	HE5T_NATIVE_FLOAT	hPa	X	X			Pressure will be a superset of the UARS pressure levels (ordered from ground to space)
Pressure^{+}	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	hPa				X	Pressure will be a superset of the UARS pressure levels (ordered from ground to space)
Altitude	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	m	X			X	
SecondsInDay	(nTimes)	HE5T_NATIVE_FLOAT	s	X		O		Seconds from midnight of day listed in global attributes
SolarZenithAngle	(nTimes)	HE5T_NATIVE_FLOAT	deg	X	X		X	
SolarZenithAngle	(nXtrack,nTimes)	HE5T_NATIVE_FLOAT	deg			X		
LocalSolarTime	(nTimes)	HE5T_NATIVE_FLOAT	h	X	X		X	(hours)
SpacecraftLatitude	(nTimes)	HE5T_NATIVE_FLOAT	deg	X		X	A	Geodetic latitude above WGS84 ellipsoid
SpacecraftLongitude	(nTimes)	HE5T_NATIVE_FLOAT	deg	X		X	A	Longitude above WGS84 ellipsoid , range: [-180 to 180]
SpacecraftAltitude	(nTimes)	HE5T_NATIVE_FLOAT	m	X		X	A	Height above WGS84 ellipsoid
OrbitAscendingFlag	(nTimes)	HE5T_NATIVE_INT8	NoUnits	X			A	1= true then orbit is ascending
SurfaceElevStandardDeviation	(nTimes)	HE5T_NATIVE_FLOAT	m				X	
OrbitGeodeticAngle	(nTimes)	HE5T_NATIVE_FLOAT	deg		X			
Frequency	(nTimes)	HE5T_NATIVE_FLOAT	GHz		X			In file only when appropriate

HDF-EOS Name	Dimension	Data Type	Units	Instrument H	M	O	T	Notes
LineOfSightAngle	(nTimes)	HE5T_NATIVE_FLOAT	deg(EastofNorth)		X			
SolarAzimuthAngle	(nXtrack,nTimes)	HE5T_NATIVE_FLOAT	deg(EastofNorth)			O		
SolarAzimuthAngle	(nTimes)	HE5T_NATIVE_FLOAT	deg(EastofNorth)				A	
ViewingZenithAngle	(nXtrack,nTimes)	HE5T_NATIVE_FLOAT	deg			X		
ViewingAzimuthAngle	(nXtrack,nTimes)	HE5T_NATIVE_FLOAT	deg(EastofNorth)			O		
RelativeAzimuthAngle	(nXtrack,nTimes)	HE5T_NATIVE_FLOAT	deg(EastofNorth)			O		(SolarAzimuthAngle + 180) - ViewingAzimuthAngle
TerrainHeight	(nXtrack,nTimes)	HE5T_NATIVE_UINT16	m			X		
GroundPixelQualityFlags	(nXtrack,nTimes)	HE5T_NATIVE_UINT16	NoUnits			X		
Tgt_SpacecraftAzimuth	(nTimes)	HE5T_NATIVE_FLOAT	deg(EastofNorth)				X	
Tgt_SpacecraftZenith	(nTimes)	HE5T_NATIVE_FLOAT	deg				X	
ScienceScanMode	(nTimes)	HE5T_NATIVE_INT16	NoUnits	X				HIRDLS Science Scan Mode identifier (short integer)
ScanUpFlag	(nTimes)	HE5T_NATIVE_INT8	NoUnits	X				HIRDLS Scan Up identifier 1=up (true)
ScanElevationAtNominalAltitude	(nTimes)	HE5T_NATIVE_FLOAT	deg	X				
ScanAzimuthAtNominalAltitude	(nTimes)	HE5T_NATIVE_FLOAT	deg	X				
TangentHeightAtNominalAltitude	(nTimes)	HE5T_NATIVE_FLOAT	m	X				
ViewDirectionAtNominalAltitude	(nTimes)	HE5T_NATIVE_FLOAT	deg(EastofNorth)	X				
ProfileID	(nTimes)	HE5T_NATIVE_INT	NoUnits	X				HIRDLS identification number for that day's profiles
BoresightNadirAngle	(nTimes)	HE5T_NATIVE_DOUBLE	deg				X	32 bits (accommodate N+N2 scans)
BoresightNadirAngleUnc	(nTimes)	HE5T_NATIVE_DOUBLE	deg				X	
BoresightAzimuth	(nTimes)	HE5T_NATIVE_DOUBLE	deg				X	
BoresightTangentHeight	(nTimes)	HE5T_NATIVE_FLOAT	m				X	(Limb only)
BoresightTangentHeightUnc	(nTimes)	HE5T_NATIVE_FLOAT	m				X	(Limb only)
Latitude_Footprint_1	(nTimes)	HE5T_NATIVE_DOUBLE	deg				X	
Latitude_Footprint_2	(nTimes)	HE5T_NATIVE_DOUBLE	deg				X	
Latitude_Footprint_3	(nTimes)	HE5T_NATIVE_DOUBLE	deg				X	
Latitude_Footprint_4	(nTimes)	HE5T_NATIVE_DOUBLE	deg				X	
Longitude_Footprint_1	(nTimes)	HE5T_NATIVE_DOUBLE	deg				X	
Longitude_Footprint_2	(nTimes)	HE5T_NATIVE_DOUBLE	deg				X	
Longitude_Footprint_3	(nTimes)	HE5T_NATIVE_DOUBLE	deg				X	
Longitude_Footprint_4	(nTimes)	HE5T_NATIVE_DOUBLE	deg				X	
Sequence	(nTimes)	HE5T_NATIVE_INT16	NoUnits				X	

HDF-EOS Name	*Dimension*	*Data Type*	*Units*	*Instrument* *H*	*M*	*O*	*T*	*Notes*
Scan	(nTimes)	HE5T_NATIVE_INT8	NoUnits				X	
SurfaceTypeFootprint	(nTimes)	HE5T_NATIVE_FLOAT	deg				X	

X – Field in standard file
A – Data items which will be carried in an ancillary file that is created only once per set of standard products
O - Optional Field

\+ *For HIRDLS* - nLevels is set to 145 (1000. * 10 ** (-i/24) i=0,144)
For TES Global Survey and Special Observation products - nLevels means 87 UARS levels + 1 for the surface. For the TES Summary product, nLevels means 15 UARS levels + 1 for the surface.

5.1.4 Swath Data Fields:

This is the actual scientific data. This list is not meant to be exhaustive and contain all fields in individual team's data files. Rather it lists the fields where overlap between instrument teams occurs as well as other primary data fields.

NOTE THE ORDER OF DIMENSIONS IS IN FORTRAN ORDER WITH THE FIRST DIMENSION BEING THE MOST RAPIDLY INCREMENTING. C USERS SHOULD REVERSE THE DIMENSION ORDER

HDF-EOS Name	*Dimension*	*Data Type*	*Units*	*H*	*M*	*O*	*T*	*Notes*
Temperature	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	K	X	X		X	
TemperaturePrecision	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	K	X	X		X	
TemperatureNormChiSq	(nTimes)	HE5T_NATIVE_FLOAT	NoUnits	X				
TemperatureQuality	(nTimes)	HE5T_NATIVE_INT8	NoUnits	X				
O3	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	vmr	X	X		X	
O3Precision	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	vmr	X	X		X	
O3NormChiSq	(nTimes)	HE5T_NATIVE_FLOAT	NoUnits	X				
O3Quality	(nTimes)	HE5T_NATIVE_INT8	NoUnits	X				
H2O	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	vmr	X	X		X	
H2OPrecision	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	vmr	X	X		X	
H2ONormChiSq	(nTimes)	HE5T_NATIVE_FLOAT	NoUnits	X				
H2OQuality	(nTimes)	HE5T_NATIVE_INT8	NoUnits	X				
ClONO2	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	vmr	X				
ClONO2Precision	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	vmr	X				
ClONO2NormChiSq	(nTimes)	HE5T_NATIVE_FLOAT	NoUnits	X				
ClONO2Quality	(nTimes)	HE5T_NATIVE_INT8	NoUnits	X				
N2O5	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	vmr	X				
N2O5Precision	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	vmr	X				
N2O5NormChiSq	(nTimes)	HE5T_NATIVE_FLOAT	NoUnits	X				
N2O5Quality	(nTimes)	HE5T_NATIVE_INT8	NoUnits	X				
N2O	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	vmr	X	X			
N2OPrecision	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	vmr	X	X			
N2ONormChiSq	(nTimes)	HE5T_NATIVE_FLOAT	NoUnits	X				
N2OQuality	(nTimes)	HE5T_NATIVE_INT8	NoUnits	X				
NO2	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	vmr	X			X	TES limb only
NO2Precision	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	vmr	X			X	TES limb only
NO2NormChiSq	(nTimes)	HE5T_NATIVE_FLOAT	NoUnits	X				

HDF-EOS Name	*Dimension*	*Data Type*	*Units*	*H*	*M*	*O*	*T*	*Notes*
NO2Quality	(nTimes)	HE5T_NATIVE_INT8	NoUnits	X				
CH4	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	vmr	X			X	
CH4Precision	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	vmr	X			X	
CH4NormChiSq	(nTimes)	HE5T_NATIVE_FLOAT	NoUnits	X				
CH4Quality	(nTimes)	HE5T_NATIVE_INT8	NoUnits	X				
HNO3	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	vmr	X	X		X	TES limb only
HNO3Precision	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	vmr	X	X		X	TES limb only
HNO3NormChiSq	(nTimes)	HE5T_NATIVE_FLOAT	NoUnits	X				
HNO3Quality	(nTimes)	HE5T_NATIVE_INT8	NoUnits	X				
CFC11	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	vmr	X				
CFC11Precision	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	vmr	X				
CFC11NormChiSq	(nTimes)	HE5T_NATIVE_FLOAT	NoUnits	X				
CFC11Quality	(nTimes)	HE5T_NATIVE_INT8	NoUnits	X				
CFC12	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	vmr	X				
CFC12Precision	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	vmr	X				
CFC12NormChiSq	(nTimes)	HE5T_NATIVE_FLOAT	NoUnits	X				
CFC12Quality	(nTimes)	HE5T_NATIVE_INT8	NoUnits	X				
OH	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	vmr		X			
OHPrecision	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	vmr		X			
HO2	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	vmr		X			
HO2Precision	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	vmr		X			
CO	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	vmr		X		X	
COPrecision	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	vmr		X		X	
HCN	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	vmr		X			
HCNPrecision	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	vmr		X			
RHI	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	%rhi		X			
RHIPrecision	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	%rhi		X			
HCl	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	vmr		X			
HClPrecision	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	vmr		X			
HOCl	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	vmr		X			
HOClPrecision	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	vmr		X			
ClO	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	vmr		X			
ClOPrecision	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	vmr		X			
BrO	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	vmr		X			
BrOPrecision	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	vmr		X			

HDF-EOS Name	*Dimension*	*Data Type*	*Units*	*H*	*M*	*O*	*T*	*Notes*
IWC	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	g/m3		X			
IWCPrecision	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	g/m3		X			
GPH	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	m		X			
GPHPrecision	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	m		X			
SO2	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	vmr		X			
SO2Precision	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	vmr		X			
CH3CN	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	vmr		X			
CH3CNPrecision	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	vmr		X			
Status	(nTimes)	HE5T_NATIVE_INT	NoUnits		X			
Quality	(nTimes)	HE5T_NATIVE_FLOAT	NoUnits		X			
7.1MicronCloudAerosolFlag	(nLevels,nTimes)	HE5T_NATIVE_INT8	see Note 1 below	X				Type of cloud identified
7.1MicronExtinction	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	1/km	X				
7.1MicronExtinctionPrecision	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	1/km	X				
7.1MicronExtinctionNormChiSq	(nTimes)	HE5T_NATIVE_FLOAT	NoUnits	X				
7.1MicronExtinctionQuality	(nTimes)	HE5T_NATIVE_INT8	NoUnits	X				
8.3MicronCloudAerosolFlag	(nLevels,nTimes)	HE5T_NATIVE_INT8	see Note 1 below	X				Type of cloud identified
8.3MicronExtinction	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	1/km	X				
8.3MicronExtinctionPrecision	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	1/km	X				
8.3MicronExtinctionNormChiSq	(nTimes)	HE5T_NATIVE_FLOAT	NoUnits	X				
8.3MicronExtinctionQuality	(nTimes)	HE5T_NATIVE_INT8	NoUnits	X				
10.8MicronCloudAerosolFlag	(nLevels,nTimes)	HE5T_NATIVE_INT8	see Note 1 below	X				Type of cloud identified
10.8MicronExtinction	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	1/km	X				
10.8MicronExtinctionPrecision	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	1/km	X				
10.8MicronExtinctionNormChiSq	(nTimes)	HE5T_NATIVE_FLOAT	NoUnits	X				
10.8MicronExtinctionQuality	(nTimes)	HE5T_NATIVE_INT8	NoUnits	X				
12.1MicronCloudAerosolFlag	(nLevels,nTimes)	HE5T_NATIVE_INT8	see Note 1 below	X				Type of cloud identified
12.1MicronExtinction	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	1/km	X				
12.1MicronExtinctionPrecision	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	1/km	X				
12.1MicronExtinctionNormChiSq	(nTimes)	HE5T_NATIVE_FLOAT	NoUnits	X				
12.1MicronExtinctionQuality	(nTimes)	HE5T_NATIVE_INT8	NoUnits	X				
17.4MicronCloudAerosolFlag	(nLevels,nTimes)	HE5T_NATIVE_INT8	see Note 1 below	X				Type of cloud identified
17.4MicronExtinction	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	1/km	X				
17.4MicronExtinctionPrecision	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	1/km	X				
17.4MicronExtinctionNormChiSq	(nTimes)	HE5T_NATIVE_FLOAT	NoUnits	X				
17.4MicronExtinctionQuality	(nTimes)	HE5T_NATIVE_INT8	NoUnits	X				

HDF-EOS Name	*Dimension*	*Data Type*	*Units*	*H*	*M*	*O*	*T*	*Notes*
CloudTopPressure	(nCloudTypes,nTimes)	HE5T_NATIVE_FLOAT	hPa	X				
CloudTopPressure	(nTimes)	HE5T_NATIVE_FLOAT	hPa				X	
CloudTopPressureError	(nTimes)	HE5T_NATIVE_FLOAT	hPa				X	
CloudEffectiveOpticalDepth	(nTimes)	HE5T_NATIVE_FLOAT	NoUnits				X	
CloudEffectiveOpticalDepthError	(nTimes)	HE5T_NATIVE_FLOAT	NoUnits				X	
ColumnAmountO3	(nXtrack,nTimes)	HE5T_NATIVE_FLOAT	DU			X		
TropoColumnAmountO3	(nXtrack,nTimes)	HE5T_NATIVE_FLOAT	DU			X		
ColumnAmountNO2	(nXtrack,nTimes)	HE5T_NATIVE_FLOAT	molec/cm2			X		
CloudFraction	(nXtrack,nTimes)	HE5T_NATIVE_FLOAT	NoUnits			X		
AerosolOpticalDepth	(nWavel,nLayers, nXtrack,nTimes)	HE5T_NATIVE_FLOAT	NoUnits			X		
FinalAerosolOpticalDepth	(nWavel,nXtrack,nTimes)	HE5T_NATIVE_FLOAT	NoUnits			X		
UVAerosolIndex	(nXtrack,nTimes)	HE5T_NATIVE_FLOAT	NoUnits			X		
VISAerosolIndex	(nXtrack,nTimes)	HE5T_NATIVE_FLOAT	NoUnits			X		
InstrumentConfigurationId	(nTimes)	HE5T_NATIVE_UINT8	NoUnits			X		OMI Instrument Configuration ID
MeasurementQualityFlags	(nTimes)	HE5T_NATIVE_UINT8	NoUnits			X		OMI Measurement Quality Flags
ErythemalDoseRate	(nXtrack,nTimes)	HE5T_NATIVE_FLOAT	Wm^2			X		Erythemally weighted dose rate at local Solar noon
ErythemalDailyDose	(nXtrack,nTimes)	HE5T_NATIVE_FLOAT	Jm^2			X		Erythemally weighted daily dose
CSErythemalDoseRate	(nXtrack,nTimes)	HE5T_NATIVE_FLOAT	Wm^2			X		Clear sky erythemally weighted dose rate at local Solar noon
CSErythemalDailyDose	(nXtrack,nTimes)	HE5T_NATIVE_FLOAT	Jm^2			X		Clear sky erythemally weighted daily dose
Reflectivity331	(nXtrack,nTimes)	HE5T_NATIVE_FLOAT	%			X		Reflectivity at 331 nm
[species]VerticalResolution	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	km				X	range: [0-1000] km
SpeciesRetrievalConverged	(nTimes)	HE5T_NATIVE_INT8	NoUnits				X	Species retrieval converged, 1=T=success
SpeciesRetrievalQuality	(nTimes)	HE5T_NATIVE_INT8	NoUnits				X	
NumIterPerformed	(nTimes)	HE5T_NATIVE_INT8	NoUnits				X	Number of model iterations performed for retrieval of the particular

HDF-EOS Name	***Dimension***	***Data Type***	***Units***	***H***	***M***	***O***	***T***	***Notes***
								species, range: [0-8] (small int.)
MaxNumIterations	(nTimes)	HE5T_NATIVE_INT8	NoUnits				X	
CloudCover	(nTimes)	HE5T_NATIVE_INT8	NoUnits				A	Identified through retrieval or L1B, 0=clear, 1=thin, 2=opaque
DeviationVsRetrievalCovariance	(nTimes)	HE5T_NATIVE_FLOAT	NoUnits				X	
RadianceResidualMean	(nTimes)	HE5T_NATIVE_FLOAT	NoUnits				X	
RadianceResidualRMS	(nTimes)	HE5T_NATIVE_FLOAT	NoUnits				X	
RadianceResidualMax	(nTimes)	HE5T_NATIVE_FLOAT	NoUnits				X	
ConstraintVector	(nLevels,nTimes)	HE5T_NATIVE_FLOAT	VMR or K				X	
AveragingKernel	(nLevels,nLevels,nTimes)	HE5T_NATIVE_FLOAT	NoUnits				X	
TotalErrorCovariance	(nLevels,nLevels,nTimes)	HE5T_NATIVE_FLOAT	vmr2 or K2				X	
MeasurementErrorCovariance	(nLevels,nLevels,nTimes)	HE5T_NATIVE_FLOAT	vmr2 or K2				X	
SystematicErrorCovariance	(nLevels,nLevels,nTimes)	HE5T_NATIVE_FLOAT	vmr2 or K2				X	
ScanAveragedCount	(nTimes)	HE5T_NATIVE_INT8	NoUnits				X	
DegreesOfFreedomForSignal	(nTimes)	HE5T_NATIVE_FLOAT	NoUnits				X	
InformationContent	(nTimes)	HE5T_NATIVE_FLOAT	NoUnits				X	
PixelsUsedFlag	(nTimes)	HE5T_NATIVE_INT64	NoUnits				A	
LandSurfaceEmissErrors	(nFreq,nTimes)	HE5T_NATIVE_FLOAT	NoUnits				A	TES Nadir only
RetrievedPointingAngle	(nTimes)	HE5T_NATIVE_FLOAT	deg				A	TES Limb only
RetrievedPointingAngleError	(nTimes)	HE5T_NATIVE_FLOAT	deg				A	TES Limb only
T_H2OCovariance	(nLevels,nLevels,nTimes)	HE5T_NATIVE_FLOAT	K*vmr				A	
T_H2OAveragingKernel	(nLevels,nLevels,nTimes)	HE5T_NATIVE_FLOAT	NoUnits				A	
H2O_TAveragingKernel	(nLevels,nLevels,nTimes)	HE5T_NATIVE_FLOAT	NoUnits				A	
Filter_Position_1A	(nTimes)	HE5T_NATIVE_INT8	NoUnits				X	
Filter_Position_1B	(nTimes)	HE5T_NATIVE_INT8	NoUnits				X	
Filter_Position_2A	(nTimes)	HE5T_NATIVE_INT8	NoUnits				X	
Filter_Position_2B	(nTimes)	HE5T_NATIVE_INT8	NoUnits				X	

X – Field in standard file
A – Data items which will be carried in an ancillary file that is created only once per set of standard products

Note 1: 0=no contamination, 1=unknown cloud, 2=cirrus layer, 3=PSC, 4=saturated cloud, 99=anomaly detected

5.2 Grid Name

5.2.1 Name

Varies by Instrument

It has become apparent that each instrument has different needs for this name, and standardization is not feasible. A user can use he5_gdinqgrid (HE5_GDinqgrid for C users) to determine what the values are for each data set.

5.2.2 Structure, Projection and Dimensions:

Aura instruments use the U.S. Geological Survey General Cartographic Transformation Package (GCTP) Geographic projection to store their gridded data. The GCTP_GEO projection code is 0. In the Grid files, YDim is latitude and XDim is longitude.

TES and MLS gridded output will be on spacings of 2 degrees in latitude and 4 degrees in longitude. The grid will span +/- 82 degrees in latitude and longitude will be specified as east longitude and go from 0 to 360 degrees. The center is the origin of the grids.

The OMI gridded output will be on ¼ degree latitude and longitude spacings. The grid will span +/- 90 degrees in latitude and +/- 180 degrees in longitude.

These are the actual dimensions of the Grid field quantities:

XDim	Dimension created automatically with the Grid interface. Corresponds to longitude for Geographic projection
YDim	Dimension created automatically with the Grid interface. Corresponds to latitude for Geographic projection
nLevels	Number of pressure levels
nCandidate	Number of candidate Level 2 observations for each Level 2G grid cell
nLayers	Usually number of Umkehr layers (OMI specific)
nWavel	Number of wavelengths (OMI specific)

5.2.3 Grid Fields:

This is data which describe the scientific measured quantities. They provide information to aid in describing the data's "location". While the Grid structure does not specify the difference between geolocation fields and data fields, we have separated them for the sake of documentation.

NOTE THE ORDER OF DIMENSIONS IS IN FORTRAN ORDER WITH THE FIRST DIMENSION BEING THE MOST RAPIDLY INCREMENTING. C USERS SHOULD REVERSE THE DIMENSION ORDER

HDF-EOS Name	*Dimension*	*Data Type*	*Units*	*Instrument*				*Notes*
				H	*M*	*O*	*T*	
Latitude	(YDim)	HE5T_NATIVE_FLOAT	deg	T	X	X	X	Range: [-82 to 82] OMI range: [-90 to 90]
Latitude	(XDim,YDim,nCandidate)	HE5T_NATIVE_FLOAT	deg			G		
Longitude	(XDim)	HE5T_NATIVE_FLOAT	deg	T	X	X	X	range: [-180 to 180]
Longitude	(XDim,YDim,nCandidate)	HE5T_NATIVE_FLOAT	deg			G		range:[-180.0 to 180.0]
Pressure	(nLevels)	HE5T_NATIVE_FLOAT	hPa	T	X		X	Pressure will be a superset of the UARS pressure levels (ordered from ground to space)
GroundPixelQualityFlags	(XDim,YDim,nCandidate)	HE5T_NATIVE_UINT16	NoUnits			G		
PathLength	(XDim,YDim,nCandidate)	HE5T_NATIVE_FLOAT	NoUnits			G		secant(SolarZenithAngle) + secant(ViewingZenithAngle)
RelativeAzimuthAngle	(XDim,YDim,nCandidate)	HE5T_NATIVE_FLOAT	deg(EastofNorth)			G		SolarAzimuthAngle + 180 - ViewingZenithAngle
SecondsInDay	(XDim,YDim,nCandidate)	HE5T_NATIVE_FLOAT	s			G		Time in Seconds since UTC midnight
SolarAzimuthAngle	(XDim,YDim,nCandidate)	HE5T_NATIVE_FLOAT	deg(EastofNorth)			G		
SolarZenithAngle	(XDim,YDim,nCandidate)	HE5T_NATIVE_FLOAT	deg			G		
SpacecraftAltitude	(XDim,YDim,nCandidate)	HE5T_NATIVE_FLOAT	m			G		Spacecraft Altitude above WGS84 Ellipsoid
SpacecraftLatitude	(XDim,YDim,nCandidate)	HE5T_NATIVE_FLOAT	deg			G		Spacecraft Geodetic Latitude above WGS84 Ellipsoid
SpacecraftLongitude	(XDim,YDim,nCandidate)	HE5T_NATIVE_FLOAT	deg			G		Spacecraft Geodetic Longitude above WGS84 Ellipsoid
TerrainHeight	(XDim,YDim,nCandidate)	HE5T_NATIVE_UINT16	m			G		
ViewingAzimuthAngle	(XDim,YDim,nCandidate)	HE5T_NATIVE_FLOAT	deg(EastofNorth)			G		
ViewingZenithAngle	(XDim,YDim,nCandidate)	HE5T_NATIVE_FLOAT	deg			G		
Time	(XDim,YDim,nCandidate)	HE5T_NATIVE_DOUBLE	s			G		Time in TAI93 Units

X – Field in standard file
G - In OMI L2 Grid Files
T - TBD - At the current time, HIRDLS is not producing Gridded data, but may at a future date

5.2.4 Grid Data Fields:

This is the actual scientific data. This list is not meant to be exhaustive and contain all fields in individual team's data files. Rather it lists the fields where overlap between instrument teams occurs as well as other primary data fields.

NOTE THE ORDER OF DIMENSIONS IS IN FORTRAN ORDER WITH THE FIRST DIMENSION BEING THE MOST RAPIDLY INCREMENTING. C USERS SHOULD REVERSE THE DIMENSION ORDER

HDF-EOS Name	*Dimension*	*Data Type*	*Units*	*H*	*M*	*O*	*T*	*Notes*
Temperature	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	K	T	X		X	TES – possibility separate nadir obs by day/night, limb is not planned to be separated
TemperaturePrecision	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	K	T	X			
O3	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	vmr	T	X		X	
O3Precision	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	vmr	T	X			
O3Ascending	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	vmr		X			
O3AscendingPrecision	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	vmr		X			
ColumnAmountO3	(XDim,YDim)	HE5T_NATIVE_FLOAT	DU			X		
H2O	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	vmr	T	X		X	
H2OPrecision	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	vmr	T	X			
HDO	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	vmr				X	
N2O	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	vmr	T	X			
N2OPrecision	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	vmr	T	X			
HNO3	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	vmr	T	X		X	TES – limb only
HNO3Precision	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	vmr	T	X			
ClONO2	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	vmr	T				
ClONO2Precision	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	vmr	T				
N2O5	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	vmr	T				
N2O5Precision	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	vmr	T				
NO2	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	vmr	T			X	TES – limb only
NO2Precision	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	vmr	T				
CH4	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	vmr	T			X	
CH4`Precision	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	vmr	T				
HNO3	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	vmr	T				
HNO3Precision	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	vmr	T				

HDF-EOS Name	*Dimension*	*Data Type*	*Units*	*H*	*M*	*O*	*T*	*Notes*
CFC11	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	vmr	T				
CFC11Precision	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	vmr	T				
CFC12	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	vmr	T				
CFC12Precision	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	vmr	T				
OH	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	vmr		X			
OHPrecision	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	vmr		X			
OHAscending	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	vmr		X			
OHAscendingPrecision	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	vmr		X			
OHDescending	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	vmr		X			
OHDescendingPrecision	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	vmr		X			
CO	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	vmr		X		X	
COPrecision	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	vmr		X			
HCN	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	vmr		X			
HCNPrecision	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	vmr		X			
RHI	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	%rhi		X			
RHIPrecision	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	%rhi		X			
GPH	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	m		X			
GPHPrecision	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	m		X			
HCl	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	vmr		X			
HClPrecision	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	vmr		X			
ClO	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	vmr		X			
ClOPrecision	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	vmr		X			
ClOAscending	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	vmr		X			
ClOAscendingPrecision	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	vmr		X			
ClODescending	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	vmr		X			
ClODescendingPrecision	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	vmr		X			
IWC	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	g/m3		X			
IWCPrecision	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	g/m3		X			
UVAerosolIndex	(XDim,YDim)	HE5T_NATIVE_FLOAT	NoUnits			X		
Reflectivity331	(XDim,YDim)	HE5T_NATIVE_FLOAT	%			X		Effective Surface Reflectivity at 331 nm
AirMassFactor	(XDim,YDim,nCandidate)	HE5T_NATIVE_FLOAT	NoUnits			G		
CloudFraction	(XDim,YDim,nCandidate)	HE5T_NATIVE_FLOAT	NoUnits			G		
CloudPressure	(XDim,YDim,nCandidate)	HE5T_NATIVE_FLOAT	hPa			G		
ColumnAmountBrO	(XDim,YDim,nCandidate)	HE5T_NATIVE_FLOAT	molec/cm2			G		

HDF-EOS Name	***Dimension***	***Data Type***	***Units***	***H***	***M***	***O***	***T***	***Notes***
ColumnAmountHCHO	(XDim,YDim,nCandidate)	HE5T_NATIVE_FLOAT	molec/cm2			G		
ColumnAmountOClO	(XDim,YDim,nCandidate)	HE5T_NATIVE_FLOAT	molec/cm2			G		
ColumnAmountNO2	(XDim,YDim,nCandidate)	HE5T_NATIVE_FLOAT	molec/cm2			G		
ColumnAmountO3	(XDim,YDim,nCandidate)	HE5T_NATIVE_FLOAT	DU			G		
ColumnAmountSO2	(XDim,YDim,nCandidate)	HE5T_NATIVE_FLOAT	DU			G		
SO2Index	(XDim,YDim,nCandidate)	HE5T_NATIVE_FLOAT	NoUnits			G		
InstrumentConfigurationId	(XDim,YDim,nCandidate)	HE5T_NATIVE_UINT8	NoUnits			G		OMI Instrument Configuration ID
MeasurementQualityFlags	(XDim,YDim,nCandidate)	HE5T_NATIVE_UINT8	NoUnits			G		OMI Measurement Quality Flags
TerrainPressure	(XDim,YDim,nCandidate)	HE5T_NATIVE_FLOAT	hPa			G		
UVAerosolIndex	(XDim,YDim,nCandidate)	HE5T_NATIVE_FLOAT	NoUnits			G		

X – Field in standard file
G - In OMI L2G Grid Files
T - TBD - At the current time, HIRDLS is not producing Gridded data, but may at a future date

Just for information only - additional fields carried in the TES gridded product (but may be unique to TES and not part of the standard)

HDF-EOS Name	***Dimension***	***Data Type***	***Units***	***H***	***M***	***O***	***T***	***Notes***
TotalColumnDensity	(XDim,YDim)	HE5T_NATIVE_FLOAT	Molecules/cm3				X	TES – provided with each species w/ exception of Temperature
SurfaceTemperature_Day	(XDim, YDim)	HE5T_NATIVE_FLOAT	K				X	TES – used in Temperature daily product only
SurfaceTemperature_Night	(XDim,YDim)	HE5T_NATIVE_FLOAT	K				X	TES – used in Temperature daily product only
<species>DataCount	(XDim,YDim,nLevels)	HE5T_NATIVE_INT	N/A				X	TES – used in 8 day, monthly products
<species>StdDeviation	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	N/A				X	TES – used in 8 day, monthly products
<species>Maximum	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	N/A				X	TES – used in 8 day, monthly products

HDF-EOS Name	*Dimension*	*Data Type*	*Units*	*H*	*M*	*O*	*T*	*Notes*
<species> Minimum	(XDim,YDim,nLevels)	HE5T_NATIVE_FLOAT	N/A				X	TES – used in 8 day, monthly products
TotColDensDataCount	(XDim,YDim)	HE5T_NATIVE_FLOAT	N/A				X	TES – used in 8 day, monthly products
TotColDensStdDeviation	(XDim,YDim)	HE5T_NATIVE_FLOAT	N/A				X	TES – used in 8 day, monthly products
TotColDensMaximum	(XDim,YDim)	HE5T_NATIVE_FLOAT	N/A				X	TES – used in 8 day, monthly products
TotColDensMinimum	(XDim,YDim)	HE5T_NATIVE_FLOAT	N/A				X	TES – used in 8 day, monthly products

5.3 Zonal Means

5.3.1 Name

Varies by Instrument – TES will not be producing a Zonal Mean product

It has become apparent that each instrument has different needs for this name, and standardization is not feasible. A user can use he5_zainqza (HE5_ZAinqza for C users) to determine what the values are for each data set.

5.3.2 Structure and Dimensions:

MLS products shall have 2 degrees latitude band spacings. The OMI products shall have ¼ degree latitude spacings.

These are the actual dimensions of the Zonal Means field and Data field quantities:

nLats	Number of latitudes
nLevels	Number of pressure levels

5.3.3 Zonal Means Fields*:*

This is data which describe the scientific measured quantities. They provide information to aid in describing the data's "location". While the Zonal Mean structure does not specify the difference between geolocation fields and data fields, we have separated them for the sake of documentation.

NOTE THE ORDER OF DIMENSIONS IS IN FORTRAN ORDER WITH THE FIRST DIMENSION BEING THE MOST RAPIDLY INCREMENTING. C USERS SHOULD REVERSE THE DIMENSION ORDER

HDF-EOS Name	*Dimension*	*Data Type*	*Units*	*Instrument* *H*	*M*	*O*	*T*	*Notes*
Latitude	(nLats)	HE5T_NATIVE_FLOAT	deg	T	X			
Pressure	(nLevels)	HE5T_NATIVE_FLOAT	hPa	T	X			Pressure will be a superset of the UARS pressure levels (ordered from ground to space)
SolarZenithAngle	(nLats)	HE5T_NATIVE_FLOAT	deg	T	X			
LocalSolarTime	(nLats)	HE5T_NATIVE_FLOAT	h	T	X			(hours)

X – Field in standard file
A – Data items which will be carried in an ancillary file that is created only once per set of standard products
T - TBD - At the current time, HIRDLS is not producing Gridded data, but may at a future date

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5.3.4 Zonal Means Data Fields:

This is the actual scientific data. This list is not meant to be exhaustive and contain all fields in individual team's data files. Rather it lists the fields where overlap between instrument teams occurs as well as other primary data fields.

At least three data fields would be supplied for each product: Value, Standard Deviation and Data Count.

NOTE THE ORDER OF DIMENSIONS IS IN FORTRAN ORDER WITH THE FIRST DIMENSION BEING THE MOST RAPIDLY INCREMENTING. C USERS SHOULD REVERSE THE DIMENSION ORDER

HDF-EOS Name	*Dimension*	*Data Type*	*Units*	*H*	*M*	*O*	*T*	*Notes*
TemperatureAscending	(nLevels,nLats)	HE5T_NATIVE_FLOAT	K	T	X			
TemperatureDescending	(nLevels,nLats)	HE5T_NATIVE_FLOAT	K	T	X			
O3Ascending	(nLevels,nLats)	HE5T_NATIVE_FLOAT	vmr	T	X			
O3Descending	(nLevels,nLats)	HE5T_NATIVE_FLOAT	vmr	T	X			
H2OAscending	(nLevels,nLats)	HE5T_NATIVE_FLOAT	vmr	T	X			
H2ODescending	(nLevels,nLats)	HE5T_NATIVE_FLOAT	vmr	T	X			
N2OAscending	(nLevels,nLats)	HE5T_NATIVE_FLOAT	vmr	T	X			
N2ODescending	(nLevels,nLats)	HE5T_NATIVE_FLOAT	vmr	T	X			
HNO3Ascending	(nLevels,nLats)	HE5T_NATIVE_FLOAT	vmr	T	X			
HNO3Descending	(nLevels,nLats)	HE5T_NATIVE_FLOAT	vmr	T	X			
ClONO2Ascending	(nLevels,nLats)	HE5T_NATIVE_FLOAT	vmr	T				
ClONO2Descending	(nLevels,nLats)	HE5T_NATIVE_FLOAT	vmr	T				
N2O5Ascending	(nLevels,nLats)	HE5T_NATIVE_FLOAT	vmr	T				
N2O5Descending	(nLevels,nLats)	HE5T_NATIVE_FLOAT	vmr	T				
NO2Ascending	(nLevels,nLats)	HE5T_NATIVE_FLOAT	vmr	T				
NO2Descending	(nLevels,nLats)	HE5T_NATIVE_FLOAT	vmr	T				
CH4Ascending	(nLevels,nLats)	HE5T_NATIVE_FLOAT	vmr	T				
CH4Descending	(nLevels,nLats)	HE5T_NATIVE_FLOAT	vmr	T				
CFC11Ascending	(nLevels,nLats)	HE5T_NATIVE_FLOAT	vmr	T				
CFC11Descending	(nLevels,nLats)	HE5T_NATIVE_FLOAT	vmr	T				
CFC12Ascending	(nLevels,nLats)	HE5T_NATIVE_FLOAT	vmr	T				
CFC12Descending	(nLevels,nLats)	HE5T_NATIVE_FLOAT	vmr	T				
OHAscending	(nLevels,nLats)	HE5T_NATIVE_FLOAT	vmr		X			
OHDescending	(nLevels,nLats)	HE5T_NATIVE_FLOAT	vmr		X			

HDF-EOS Name	*Dimension*	*Data Type*	*Units*	*H*	*M*	*O*	*T*	*Notes*
COAscending	(nLevels,nLats)	HE5T_NATIVE_FLOAT	vmr		X			
CODescending	(nLevels,nLats)	HE5T_NATIVE_FLOAT	vmr		X			
GPHAscending	(nLevels,nLats)	HE5T_NATIVE_FLOAT	m		X			
GPHDescending	(nLevels,nLats)	HE5T_NATIVE_FLOAT	m		X			
HCNAscending	(nLevels,nLats)	HE5T_NATIVE_FLOAT	vmr		X			
HCNDescending	(nLevels,nLats)	HE5T_NATIVE_FLOAT	vmr		X			
RHIAscending	(nLevels,nLats)	HE5T_NATIVE_FLOAT	%rhi		X			
RHIDescending	(nLevels,nLats)	HE5T_NATIVE_FLOAT	%rhi		X			
HClAscending	(nLevels,nLats)	HE5T_NATIVE_FLOAT	vmr		X			
HClDescending	(nLevels,nLats)	HE5T_NATIVE_FLOAT	vmr		X			
ClOAscending	(nLevels,nLats)	HE5T_NATIVE_FLOAT	vmr		X			
ClODescending	(nLevels,nLats)	HE5T_NATIVE_FLOAT	vmr		X			
IWCAscending	(nLevels,nLats)	HE5T_NATIVE_FLOAT	g/m3		X			
IWCDescending	(nLevels,nLats)	HE5T_NATIVE_FLOAT	g/m3		X			
<species>AscendingDataCount	(nLevels,nLats)	HE5T_NATIVE_INT	N/A		X			
<species>DescendingDataCount	(nLevels,nLats)	HE5T_NATIVE_INT	N/A		X			
<species>AscendingStdDeviation	(nLevels,nLats)	HE5T_NATIVE_FLOAT	N/A		X			
<species>DescendingStdDeviation	(nLevels,nLats)	HE5T_NATIVE_FLOAT	N/A		X			

X – Field in standard file

A – Data items which will be carried in an ancillary file that is created only once per set of standard products

T - TBD - At the current time, HIRDLS is not producing Gridded data, but may at a future date

6.0 Definition of Mandatory Attributes in File

The following attributes are ones that are mandatory to appear in the file. They are meant to provide additional information or to ease use of the data. For instance, while the date is provided in the ECS attached metadata, the GranuleMonth/Day/Year are provided as a simpler interface to this information. Instrument teams may have additional attributes that they have specified.

6.1 File Level Attributes (HDF-EOS Global File Attributes)

This is information that helps to describe this particular data set. It can be useful in labeling plots, calculating dates, etc.. These will be set via calls to he5_ehwrglatt (HE5_EHwriteglbattr for C users).

Note that HE5T_NATIVE_CHAR and HE5T_NATIVE_SCHAR can be used interchangeably. End users should not see a difference in accessing attributes of either of these types.

Attribute Name	***Data Type***	***Attribute Description***
InstrumentName	HE5T_NATIVE_CHAR	“HIRDLS”, “MLS”, “TES” or “OMI”
ProcessLevel	HE5T_NATIVE_CHAR	Processing Level --- “L2”, “L3” etc.
GranuleMonth	HE5T_NATIVE_INT	Month of start of granule --- 1-12
GranuleDay	HE5T_NATIVE_INT	Day of start of granule ---- 1-31
GranuleYear	HE5T_NATIVE_INT	Year of start of granule ---- i.e. 2003
TAI93At0zOfGranule	HE5T_NATIVE_DOUBLE	TAI time of 0z of granule
PGEVersion	HE5T_NATIVE_CHAR	Processing version

Level 3 products shall include the above attribute names and the additional following attribute names:

Attribute Name	***Data Type***	***Attribute Description***
OrbitNumber	HE5T_NATIVE_INT	For ‘Daily’ and ‘Global Survey’ product: an array containing 16 orbit numbers per day For ‘Monthly’ product: an array containing first and last orbit numbers of that month
OrbitPeriod	HE5T_NATIVE_DOUBLE	For daily product: an array containing 16 orbit periods For monthly product: an array containing first and last orbit numbers of that month
Period	HE5T_NATIVE_CHAR	Type of product ---- “Daily”, “ Monthly”, “8-day”, “Global Survey”

6.2 HDF-EOS Group Attributes for Each Data Type

6.2.1 Swath Level Attributes

This is information which helps describe the swath to which it is attached. These will be set via calls to he5_swwrattr (HE5_SWwriteattr for C users).

Attribute Name	***Attribute Type***	***Attribute Description***
Pressure*	HE5T_NATIVE_FLOAT	pressure levels
VerticalCoordinate	HE5T_NATIVE_CHAR	“Pressure”, “Altitude”, “Potential Temperature”, “Total Column”, "Slant Column"

* This attribute is an exact duplicate of the Pressure Geolocation Field. Writing the pressure data in two locations was agreed upon as a compromise between instrument teams. This attribute is only mandatory if VerticalCoordinate is "Pressure".

6.2.2 Grid Level Attributes

This is information which helps describe the grid to which it is attached. These will be set via calls to he5_gdwrattr (HE5_GDwriteattr for C users).

Attribute Name	***Attribute Type***	***Attribute Description***
Projection	HE5T_NATIVE_CHAR	“Geographic”, “Simple Cylindrical”
GridOrigin*	HE5T_NATIVE_CHAR	“Center”
GridSpacing	HE5T_NATIVE_CHAR	“(4,2)”,"(0.25,0.25)"
GridSpacingUnit	HE5T_NATIVE_CHAR	“deg”
GridSpan	HE5T_NATIVE_CHAR	“(0,360,-82,+82)”,"(-180,180,-90,90)"
GridSpanUnit	HE5T_NATIVE_CHAR	“deg”

* GridOrigin refers to the location where the grid cell's coordinates are located.

6.2.3 Zonal Means Level Attributes

This is information which helps describe the zonal means to which it is attached. These will be set via calls to he5_zawrattr (HE5_ZAwriteattr for C users).

Attribute Name	***Attribute Type***	***Attribute Description***
Pressure*	HE5T_NATIVE_FLOAT	pressure levels
VerticalCoordinate	HE5T_NATIVE_CHAR	“Pressure”, “Altitude”, “Potential Temperature”, “Total Column”, "Slant Column"
ZonalSpacing	HE5T_NATIVE_CHAR	“2”
ZonalSpacingUnit	HE5T_NATIVE_CHAR	“Degree”

* This attribute is an exact duplicate of the Pressure Zonal Means Field. Writing the pressure data in two locations was agreed upon as a compromise between instrument teams. This attribute is only mandatory if VerticalCoordinate is "Pressure".

6.3 Geolocation and Data Field Attributes (HDF-EOS Local Attributes)

This is information that helps to describe the individual data fields. Data Field Attributes are a feature which can be useful in annotating plots as well as describing the data product to input routines. If ScaleFactor and Offset are not applicable they may be omitted. These attributes will be set via calls to he5_swwrlattr (HE5_SWwritelocattr for C users) if using swath format, he5_gdwrlattr (HE5_GDwritelocattr for C users) if using grid format, and he5_zawrlattr (HE5_ZAwritelocattr for C users) if using Zonal Means format. ().

Attribute Name	***Attribute type***	***Attribute Description***
MissingValue	Same type as Data Field	Contains the value for missing data
Title	HE5T_NATIVE_CHAR	For labeling a plot or axis
Units	HE5T_NATIVE_CHAR	Labeling units (for labeling color bars, converting between units, etc). After applying scale and offset, if applicable. The units are specified in Tables 5.3 and 5.4.

UniqueFieldDefinition[1]	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)
ScaleFactor	HE5T_NATIVE_DOUBLE	Factor for scaling data (mandatory only if applicable)
Offset	HE5T_NATIVE_DOUBLE	Value to add to the data (mandatory only if applicable)

In addition to the attributes listed above, the *FillValue* attribute is recommended. It is created via the optional call to he5_SWsetfill (HE5_SWfillvalue for C users) if using swath format,, he5_GDsetfill (HE5_GDfillvalue for C users) if using grid format, he5_ZAsetfill (HE5_ZAfillvalue for C users) if using zonal means format. Its value can be recovered by a call to he5_SWgetfill (HE5_SWgetfillvalue for C users) if using swath format, he5_GDgetfill (HE5_GDfillvalue for C users) if using grid format, he5_ZAgetfill (HE5_ZAfillvalue for C users) if using zonal means format. If it is used, its attribute type and value must be the same as the MissingValue attribute. Its literal name is set automatically and is not under the control of the instrument teams. In the form implemented by the HDFEOS library at the time of this writing that literal name is *_FillValue*.

[1]UniqueFieldDefinition is used to indicate to end-users if data from different instruments can be considered to have the same definition. If X-Specific is set, then instrument X has a unique definition of this field. If X-Y-Shared is set, then Instruments X and Y are using the same definition for this field. "Aura-Shared" indicates the same definition is used for all Aura instruments. Note that definitions can be shared even if dimensionalities are different.

7.0 ESDT LongNames and ECS Metadata

ESDT LongNames are the most visible identifiers of science data collections in the DAAC archives, and so it is very useful if the LongNames carry a lot of identifying information. Aura LongNames will include the following information where applicable. The Sensor/Platform field will be first and instrument teams will determine the ordering of the other fields.

Sensor/Platform	(HIRDLS/Aura | MLS/Aura |OMI/Aura |TES/Aura)
File identification	(free text that identifies the file, indicating the Geophysical Parameter or type of data, may include vertical resolution: Total Column | Profile | TOA)
Operating Mode	(Zoomed | Science Mode|SpecialObservation)
Temporal Resolution	(5-Min | 1-Orbit | Daily | 8-Day | Monthly)
Processing Level	(L1B | L2 | L2G| L3 | L3e| L4 | Level 0 | Level 1 | Level2)
Spatial Coverage	(Swath | Global)
Spatial Resolution	(13x24km | 52x48km | 500km | 0.25deg | 1deg | 2x4deg)
Grid Scheme	(TBD when L3 and L4 products defined)

Examples of Aura ESDT LongNames (ShortNames are included for clarity):

ShortName	LongName
HIRDLS1	HIRDLS/Aura L1 Radiance Scans Science Mode Daily Global
HIRDLS2	HIRDLS/Aura L2 Vertical Profiles Science Mode Daily Global
HIRDLS3	HIRDLS/Aura L3 Lat Long Press Gridded Parameters Science Mode Daily Global
MLS0SCI1	MLS/Aura Level 0 Science Data APID=1744
ML1RADD	MLS/Aura Level 1 Radiances from DAACS Channels
ML2CLO	MLS/Aura Level 2 Chlorine Monoxide (ClO) Mixing Ratio
ML3DCLO	MLS/Aura L3 Daily Map of Chlorine Monoxide (ClO) Mixing Ratio Global 2x4 deg
ML3MMAPS	MLS/Aura L3 Monthly Maps for Standard Products Global 2x4 deg
OMBRO	OMI/Aura BrO Total Column 1-Orbit L2 Swath 52x48km
OML1BCAL	OMI/Aura Calibration Coefficients 1-Orbit L1B Swath
OMCLDO2	OMI/Aura Cloud Top Pressure (O2-O2 Absorption) 1-Orbit L2 Swath 13x24km
OML1BRUG	OMI/Aura Geolocated Earth Radiance UV 1-Orbit L1B Swath 13x24km
OML1BRUZ	OMI/Aura Geolocated Earth Radiance UV Zoomed 1-Orbit L1B Swath 13x12km
OML1BOPF	OMI/Aura Operational Parameters L1B
OMPROO3	OMI/Aura Ozone Profile 1-Orbit L2 Swath 13x24km
OMDOAO3	OMI/Aura Ozone Total Column DOAS 1-Orbit L2 Swath 13x24km
OMTROO3	OMI/Aura Ozone Tropospheric 1-Orbit L2 Swath 500x500km
OMSO2	OMI/Aura SO2 Total Column 1-Orbit L2 Swath 52x48km
OML1BIRR	OMI/Aura Solar Irradiance Daily L1B Swath 13x24km
OMTO3G	OMI/Aura Ozone (O3) Total Column Daily L2 Global 0.25deg Lat/Lon Grid
OMTO3d	OMI/Aura Ozone (O3) Total Column Daily L3 Global 1x1.25deg Lat/Lon Grid
OMTO3e	OMI/Aura Ozone (O3) Total Column Daily L3e Global 0.25deg Lat/Lon Grid
TL1BL	TES/Aura L1B Spectra Limb
TL1BN	TES/Aura L1B Spectra Nadir
TL2CH4L	TES/Aura L2 CH4 Limb
TL2CH4NS	TES/Aura L2 CH4 Nadir Special Observation
TL2O3N	TES/Aura L2 O3 Nadir
TL2ANC	TES/Aura L2 Ancillary Product
TL2SUM	TES/Aura L2 Summary Product

> ESDT LongNames cannot exceed 80 characters because of the ECS database hard limit. If more than 80 characters are needed for a LongName, then other metadata attributes can be used as an "extension" of the LongName, both at the Collection as well as at the Inventory and Archived metadata levels.

It is recommended that the ESDT LongName be saved in both the Collection and Archived metadata. The latter causes the LongName to appear in each product file. Setting Data_Location = MCF in both the Collection and Archived parts of the descriptor file is instrumental in making the two LongNames match.

8.0 Aura File Names

At the DSWG meeting in conjunction with the Aura Science Meeting of April 2002 in the Netherlands, a subgroup of the DSWG met to hammer out a proposal for a common file naming schema for all Aura instruments. Present were Scott Lewicki, Cheryl Craig, James Johnson, Al Fleig, and David Cuddy.

8.1 General Rules

File names traditionally have two parts – basis and suffix. The basis part of the file name is that which precedes the *period* before the suffix and will be discussed in more detail below. The suffix follows a *period* and identifies the type of file, and some software will assume certain behavior for a given suffix name. Examples: "txt" indicates a text file with only printable ASCII characters, "exe" indicates an executable, "doc" indicates a Microsoft Word document, and "jpg" indicates a particular kind of displayable image.

File names are equivalent to LocalGranuleID in the ECS, but not quite. Ideally, the LocalGranuleID should be equal to the basis of the file name, but that is not what has been implemented. As an example, the Toolkit will add ".met" to the name that has been used for the data file name. For example, if the file name was "Granule1234.dat", then the Toolkit will name the associated metadata file with the name "Granule1234.dat.met". What should have been implemented was to name the metadata file "Granule1234.met", but changing this is beyond the scope of this document. For all other Aura cases, we hope that there will only be one period and one suffix.

The file names should do several things. They should:

1) uniquely identify products
2) make it easy to write scripts/programs to parse the names.
3) use a scheme that will list things in the order that follows data organization or identification.
4) make it people friendly – shorter names may satisfy the first three, but longer names will make the names more readable by people, especially for those less familiar with NASA, EOS, and Aura.

File names must be compatible with Unix, Linux, and Windows file names. Aura will use only alpha-numeric characters plus *underscore*, *dash*, and *period*. *Underscores* will be used to delimit sections and the *period* only to delimit the suffix. *Dashes* can be used to delimit sub-fields within a section. Note that Unix and Linux are case sensitive, however Windows is not. Therefore case should not be used to create unique file names because when files are transferred to a Windows platform any uniqueness due to case will disappear. For consistency and continued readability, once a file is given its name, it should maintain its original case (character by character) for as long as it exists. That is, when a file is moved to the Windows environment, the case should not be changed. More importantly, the ECS/DAAC ingest and export processes should not change the case of any character when the file name is used as part of the LocalGranuleID.

For those characters that stand alone amongst numbers, it is recommended that those letters be kept in lower case except for the letter "L" that looks very much like the number "1".

File names must not be longer than the most restrictive limits set by the operating systems (Linux, Unix, and Windows) and by ECS. According to this, a string composed of the path, file name, and suffix ".met" must not exceed 256 characters in length.

8.2 Specific Rules

Aura 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, Version, and Data ID. The order of the four sections has some flexibility, but all four instrument teams have agreed that the first two (Instrument ID and Data Type) should always be the first two. Version and DataID can be interchangeable and are easily identifiable by the beginning character. Version field will always begin with the character "v" and DataID can begin with any other alpha-numeric character.

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

Instrument ID:
Instrument ID should contain the name or acronym of the instrument followed by a *dash* and the name of the platform. The instrument name precedes the platform name to make the instrument name more noticeable in the string – this is a people friendly feature. The platform name, although not necessary, helps in identifying this particular mission against past and future missions. Example: MLS was also on UARS and the hope is that there is a next generation MLS on a future platform. Without the "-Aura", some might confuse TES for a more famous cousin that traveled to Mars.

<Instrument>-<Platform>

Examples

HIRDLS-Aura
MLS-Aura
OMI-Aura
TES-Aura

Data Type:
Data Type will identify level of processing, species, look angle (nadir or limb), and other subgroups. To allow flexibility for the various instrument parameters, we propose that the names can be composed of the primary data type followed by optional sub-types that can be repeated as needed and separated by a *dash*.

`<Primary>[&-<subtype>]` & indicates this field can be repeated.

Examples:
For HIRDLS Level 2, there is only one type, so they will choose to use "L2"
For MLS Level 2, there are two Level 2 Primary types (L2AUX and L2GP) and multiple subtypes that specify the various species.
For OMI, there are multiple Level 2 subtypes that specify the various species.
For TES Level 2 products, there are three levels of information for Data Type – Level, species, and look. An example is L2-O3-Limb.

HIRDLS Names for Data Type	
Primary	**Subtype**
L1	
L2	
L3	

MLS Names for Data Type	
Primary	**Subtype**
L1BRADD	
L1BRADG	
L1BRADT	
L1BOA	
L2GP	BrO
L2GP	CH3CN
L2GP	ClO
L2GP	CO
L2GP	GPH
L2GP	H2O

L2GP	HCl
L2GP	HCN
L2GP	HNO3
L2GP	HO2
L2GP	HOCl
L2GP	N2O
L2GP	O3
L2GP	OH
L2GP	RHI
L2GP	SO2
L2GP	Temperature
L2GP	DGG
L2GP	IWC
L2AUX	DGM
L3DM	ClO
L3DM	CO
L3DM	GPH
L3DM	H2O
L3DM	HCl
L3DM	HCN
L3DM	HNO3
L3DM	N2O
L3DM	O3
L3DM	OH
L3DM	RHI
L3DM	Temperature
L3DM	IWC
L3DZ	Diagnostics
L3DZ	Standard
L3MM	Diagnostic
L3MM	Standard
L3MZ	Diagnostic
L3MZ	Standard

OMI Names for Data Type	
Primary	**Subtype**
L1	OML1BCAL
L1	OML1BOPF
L1	OML1BRUG
L1	OML1BRVG
L1	OML1BRUZ
L1	OML1BRVZ
L1	OML1BIRR
L2	OMDOAO3
L2	OMTO3
L2	OMPROO3
L2	OMTROO3
L2	OMAERO
L2	OMCLDRR
L2	OMCLDO2
L2	OMNO2
L2	OMBRO
L2	OMOCLO

L2	OMHCHO
L2	OMSO2
L2	OMTO3Z
L2	OMDOAO3Z
L2	OMPROO3Z
L2	OMTROO3Z
L2	OMAEROZ
L2	OMCLDRRZ
L2	OMCLCO2Z
L2	OMNO2Z
L2	OMBROZ
L2	OMOCLOZ
L2	OMHCHOZ
L2	OMSO2Z
L2G	OMTO3G
L3	OMTO3d
L3	OMTO3e

TES Names for Data Type		
Primary	**Subtype**	**Look**
L1B		Nadir
L1B		Limb
L2	H2O	Nadir
L2	H2O	Limb
L2	O3	Nadir
L2	O3	Limb
L2	CH4	Nadir
L2	CH4	Limb
L2	CO	Nadir
L2	CO	Limb
L2	NO2	Limb
L2	NO	Limb
L2	HNO3	Limb
L2	ATM-TEMP	Nadir
L2	ATM-TEMP	Limb
L2	ANCILLARY	
L2	SO	
L2	SUMMARY	

Version:
The Version section allows the ability to identify the operational environment of the data. The parameters that are often used to identify this include software version, production identification (cycle number or production date-time), and/or a change in input configurations. Cycle is an identifier that helps to uniquely distinguish a granule. The uniqueness may be due to input data change or anything that causes the data to be re-processed using the same software version. In the case of OMI, the value for cycle uses the production date-time. In the case of MLS, the value for Cycle is the letter C followed by a two digit number. For TES and HIRDLS it is a two digit number.

If the change is due to data format such that change is required of viewer and other software, flagging this information in the file name could be accomplished in several ways. One is to increment the major portion of the identifier. Another is to use an optional field as indicated below. The format field might be more clearly identifiable if it were prefixed with the character “f”. If the change in format is radical as changing from HDF4 to HDF5, this information is encoded in the suffix and would be redundant in the file name.

v<major>[&-<minor>][-<cycle>][-<format>]

HIRDLS plans to use software version with the following rule:
v<major>-<minor>-<InputDataChange>-c<cycle> with two digits for each.
Eg. v01-02-01-c01

MLS plans to use software version with the following rule:
v<major>-<minor>-c<cycle> with two digits for each.
Eg. v01-02-c01

OMI plans to use ECS collection version plus production date-time.
v<major>-<ProductionDateTime>
Eg. v007-2002m0503t015937

TES plans to use two digits specifying the format version followed by two digits specifying the content version.
F<major>-<minor>
Eg. F01_02

Data ID:
Data ID is the section that uniquely identifies the data based on attributes of the data such as date, time, location, orbit, frame, run identifier, sequence count, or some other changing parameter that distinguishes it from its neighboring data granules. For several of the instruments on Aura, the granularity of the files is daily, so using date is adequate. If date and/or time is used, please see the section below about rules for specifying date and time. If the Data ID requires a range of date and time, two date and time specifiers separated by a dash can indicate a time range. In some cases two or more specifiers may be required to uniquely identify the data. For TES and OMI, there are other parameters that are used in addition to or in place of date/time. They are run identifier and orbit. We propose that they are distinguished from time by using the following rule:

r<RunID> - where RunID is a sequence of alpha numeric characters, for TES this is 10 characters in length and zero padded
o<orbit> - where orbit is a 5 digit number that counts from begin of mission
tile<tile> - where tile is an alphanumeric ID of a static geographic area. Tiles that cover Earth will be defined when L3 products are defined.
zone<zone> - where zone is an alphanumeric ID of a static geographic area. Zones are bigger than tiles.

Rules about Date and Time:
<yyyy> - year, four digits, no leading Y
d<ddd> - day of year, three digits
m<mm[dd]> - month, two digits and optional 2 digits for day of month
t<hhmmssfffff> - time with 2 digits for hour, 2 for minutes, 2 for seconds and trailing digits for fractional seconds. Any trailing digits that are missing are assumed to be set to zero. Obviously, leading digits cannot be missing.

Eg. t01 – specifies 01:00:00.00000
t0001 – specifies 00:01:00.00000
t01020399999 – specifies 01:02:03.99999
2002d123 – specifies day 123 of year 2002
2002m01 – specifies January of 2002
2002m0101 – specifies January 1, 2002
2002d123t0102 – specifies year 2002, day of year 123, time 01:02:00.00000
2002d123-2002d127 – specifies a range of days including day 123 through 127

Suffix:
The following are the basic suffixes for Aura.

h5 – HDF5
he5 – HDF-EOS5
met – metadata
h4 – HDF4
he4 – HDF-EOS2
txt – ASCII text file
dat – generic data file, recommend that this not be used for standard products

Examples:

TES-Aura_L2-O3-Nadir_rnnnnnnnnnn_Fff_cc.he5
TES-Aura_L2-O3-SO-Nadir_rnnnnnnnnnn_Fff_cc.he5
TES-Aura_L2-ANCILLARY_rnnnnnnnnnn_Fff_cc.he5
TES-Aura_L2-SUMMARY_rnnnnnnnnnn_Fff_cc.he5
HIRDLS-Aura_L2_v01-02-01_2002d253.he5

Examples of MLS file names:

MLS-Aura_L1BRADD_v01-03-c01_2002d123.h5
MLS-Aura_L2GP-O3_v01-00-c01_2004d253.he5
MLS-Aura_L3DM-Temperature_v01-02-c01_2002d123.he5
MLS-Aura_L3MM-Standard_v01-02-c01_2002m02.he5

Examples of OMI file names:

OMI-Aura_L1-OML1BRVG_2004m0523t0732-o01696_v002-2004m0526t123012.he4
OMI-Aura_L2-OMTO3_2004m0523t0732-o01696_v002-2004m0526t123259.he5
OMI-Aura_L2-OMTO3_2004m0523t0732-o01696_v002-2004m0526t123259.he5.met
OMI-Aura_L2-OMPROO3_2004m0523t0732-o01696_v002-2004m0526t124354.he5
OMI-Aura_L2-OMDOAO3_2004m0523t0732-o01696_v002-2004m0526t124139.he5
OMI-Aura_L2-OMPROO3_2004m0523t0732-o01696_v002-2004m0526t023411.he5
OMI-Aura_L2-OMPROO3_2004m0523t0732-o01696_v003-2004m0526t232034.he5.met
OMI-Aura_L2-OMTROO3_2004m0523t0732-o01696_v002-2004m0526t124700.he5
OMI-Aura_L2-OMTROO3Z_2004m0523t0732-o01696_v002-2004m0526t124724.he5
OMI-Aura_L2-OMPROO3Z_2004m0523t0732-o01696_v002-2004m0526t125901.he5
OMI-Aura_L2G-OMTO3G_2006m0831_v002-2006m0901t181039.he5
OMI-Aura_L3-OMTO3d_2006m0831_v002-2006m0902t151849.he5
OMI-Aura_L3-OMTO3dtoz_2006m0831_v002-2006m0902t151849.txt
OMI-Aura_L3-OMTO3e_2006m0831_v002-2006m0902t152105.he5
OMI-Aura_L3-OMTO3etoz_2006m0831_v002-2006m0902t152105.txt

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