



GRWG Requirements - format for GSICS VIS/NIR products and requirements for GSICS Plotting Tool

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Overview and Purpose

❖ Overview

- New GSICS product (GEO-LEO-VNIR) will enter Demo-Phase in 2016
 - EUMETSAT GEO-LEO-VNIR product: in GPPA
 - Products (netCDF) will contain [multiple calibration methods' results in one file](#)
 - NetCDF convention: almost fixed, but some issues (e.g. [use of enhanced data model](#)) should be discussed within [GDWG](#) members
 - Requirement documents for [GSICS Plotting Tool](#) would be prepared by GRWG

❖ Purpose of this talk

- To introduce new product and GRWG requirement
- To discuss / get consensus on the requirement (incl. enhanced data model)



Current Convention for the GEO-LEO-VISNIR (DCC) product

Basic idea: to follow existing GEO-LEO-IR convention

❖ File naming

- E.g., W_XX-EUMETSAT-Darmstadt,SATCAL+RAC+**GEOLEOVNIR**,MSG3+SEVIRI-**Aqua+MODIS**_C_EUMG_20130601000000_demo_01.nc

❖ netCDF Convention

- Global attributes
 - Nothing special issues to be discussed
- Variables
 - Basic variables (e.g. date, channel name)
 - Official calibration coefficients (This will also be discussed for GEO-LEO-IR)
 - **Specific variables to GSICS VISNIR products in order to support multiple calibration methods**



VIS/NIR netCDF Convention - Global Attributes (1)

```
:atbd_doc_doi = "N/A" ;  
:atbd_doc_url = "http://www.eumetsat.int/Home/Main/DataProducts/Calibration/Inter-calibration/" ;  
:conventions = "CF-1.6" ;  
:creator_email = "ops@eumetsat.int" ;  
:creator_name = "EUMETSAT";  
:creator_url = "http://www.eumetsat.int" ;  
:date_created = "2016-01-27T13:09:12Z" ;  
:date_modified = "2016-01-27T13:09:12Z" ;  
:geospatial_lat_max = 60.f ;  
:geospatial_lat_min = -60.f ;  
:geospatial_lat_units = "degrees_north" ;  
:geospatial_lon_max = 60.f ;  
:geospatial_lon_min = -60.f ;  
:geospatial_lon_units = "degrees_east" ;
```



VIS/NIR netCDF Convention - Global Attributes (2)

```
:history = "Blend 2016-01-27T13:09:12Z v1.0.0; ..." ;  
:id = "W_XX-EUMETSAT-Darmstadt,SATCAL+RAC+GEOLEOVNIR,MSG3+SEVIRI-  
AQUA+MODIS_C_EUMG_20160123000000_demo_01.nc" ;  
:institution = "EUMETSAT" ;  
:keywords = "GSICS, satellites, inter-calibration, reflective solar bands" ;  
:license = "Calibration information delivered as a GSICS operational product is  
generated in accordance with GSICS principles..." ;  
:local_data_subcategory = 3s ;  
:metadata_conventions = "Unidata Dataset Discovery v1.0" ;  
:monitored_instrument = "SEVIRI" ;  
:monitored_instrument_wmo_code = "57 207" ;  
:naming_authority = "int.eumetsat.gsics" ;  
:processing_level = "demonstration/v1.0.0" ;
```



VIS/NIR netCDF Convention - Global Attributes (3)

```
:reference_instrument = "MODIS" ;  
:reference_instrument_wmo_code = "784 389" ;  
:references = "ATBD, Unidata NetCDF, Climate Format Conventions" ;  
:standard_name_vocabulary = "CF Standard Name Table (Version 19, 22 March 2012)" ;  
:summary = "Coefficients of the GSICS Correction for the reflective solar bands of a  
            GEOstationary imager using a LEO imager reference instrument. The current  
            version includes deseasonalisation in the processing." ;  
:time_coverage_end = "2016-01-27T13:09:11Z" ;  
:time_coverage_start = "2016-01-27T13:09:11Z" ;  
:title = "MSG3+SEVIRI vs Aqua+MODIS GSICS Re-Analysis Correction" ;  
:window_period = "P-15D+15D" ;  
:wmo_data_category = 30s ;  
:wmo_international_data_subcategory = 5s ;  
:project = "Global Space-based Inter-Calibration System " ;  
:srf_url = "SRF (netCDF) URL"; // Optional Global Attribute, to be discussed in GDWG session  
GDWG_2015.6a5:The GEOLEOVNIR or LEOLEOVNIR shall include an optional global  
attribute referencing the location of the associated SRF netCDF file.
```



VIS/NIR netCDF Convention

- Variables (1)

Example of SEVIRI DCC product

```
float central_wavelength(chan) ;  
    :long_name = "nominal channel central wavelength" ;  
    :units = "m" ;  
  
char channel_name(chan, chan_strlen) ;  
    :long_name = "channel identifier" ;  
  
double date(date) ;  
    :bounds = "validity_period" ;  
    :units = "seconds since 1970-01-01T00:00:00Z" ;  
  
float mon_official_offset(date, chan) ;  
    :long_name = "official calibration offset" ;  
    :units = "W m-2 sr-1 um-1" ;  
  
float mon_official_slope(date, chan) ;  
    :long_name = "official calibration slope" ;  
    :units = "W m-2 sr-1 um-1" ;  
  
double validity_period(date, validity) ;  
    :long_name = "correction validity period" ;  
    :units = "seconds since 1970-01-01T00:00:00Z" ;
```

```
central_wavelength(1) = 0.000635 ;  
  
channel_name(1,5) = "VIS06" ;  
  
date(2) = 1453334400, 1453420800;  
  
mon_official_offset(2,1) =  
    26.41869, 26.41869 ;  
  
mon_official_slope(2,1) =  
    0.5180135, 0.5180135;  
  
validity_period(2,2) =  
    1452038400, 1454630400, ← date[1]  
    1452124800, 1454716800: ← date[2]
```



VIS/NIR netCDF Convention

- Variables (2)

Example of SEVIRI DCC product

```
char method_name(method, method_strlen) ;
    :long_name = "method identifier" ;

float weight_method(date, chan, method) ;
    :long_name = "weight of the methods used for
the blend in each channel" ;
    :units = "1" ;

float mon_offset(date, chan, method) ;
    :long_name = "calibration offset with respect to
reference instrument" ;
    :units = "W m-2 sr-1 um-1" ;

float mon_slope(date, chan, method) ;
    :long_name = "calibration slope with respect to
reference instrument" ;
    :units = "W m-2 sr-1 um-1" ;
```

```
method_name(2) = "DCC", "BLEND" ;
```

```
weight_method(2,1,2) =
    1, 1,
    1, 1 ;
```

```
mon_offset(2,2) =
    -' -'
    -' -' ;
```

```
mon_slope(2,1,2) =
    0.582811, 0.582811, ← date[1]
    0.5828199, 0.5828199; ← date[2]
```

↑ DCC ↑ BLEND



Discussion on the GRWG requirements

- ❖ New “algorithm types” for file naming
- ❖ New Global Attributes
- ❖ Use of NetCDF-4 enhanced data model
- ❖ Incorporation of new GSICS product(s) in the GSICS Bias Plotting Tool



Discussion

- New “algorithm types” for file naming

To add **GEOLEOVNIR** and **LEOLEOVNIR** for GRWG VIS/NIR group products

Example of MSG-3/SEVIRI vs. Aqua/MODIS VIS/NIR product:

W_XX-EUMETSAT-Darmstadt,SATCAL+RAC+**GEOLEOVNIR**,MSG3+SEVIRI-AQUA+MODIS_C_EUMG_20160123000000_demo_01

Proposed new convention on the Wiki

<u>Alphanum. Code</u>	<u>Name</u>	<u>Code Figure</u>
GEOLEOIR	GEO-LEO-IR algorithm data	1
LEOLEOIR	LEO-LEO-IR algorithm data	2
GEOLEOVNIR	GEO-LEO-VISNIR algorithm data	3
LEOLEOVNIR	LEO-LEO-VISNIR algorithm data	4

<https://gsics.nesdis.noaa.gov/wiki/Development/FilenameConvention>

Impacts on GDWG activities – just to update the THREDDs directory tree when the product is submitted to GPPA.



Discussion

- New Global Attributes for file naming

GDWG_2015.6a5:

The GEOLEOVNIR or LEOLEOVNIR shall include an optional global attribute referencing the location of the associated SRF netCDF file.

:srf_url = “URL of the SRF (netCDF) file”;

No impacts on GDWG activities – but what name do we recommend?



Discussion

- Use of NetCDF enhanced data model

GEO-LEO-VNIR Products (netCDF) will contain multiple calibration methods' results in ONE FILE

Current proposal by GRWG

```
char method_name(method, method_strlen) ;  
    :long_name = "method identifier" ;  
  
float weight_method(date, chan, method) ;  
    :long_name = "weight of the methods used for  
the blend in each channel" ;  
    :units = "1" ;
```

Advantage:

- No need to use enhanced data model

Disadvantage:

- Variables have multiple dimensions (≥ 3)
- All the methods have to use the same variables
 - ✓ Method-specific variables are not allowed

Grouping could be useful even though GDWG did not recommend in 2015

SEVIRI vs. Aqua/MODIS VISNIR product

Combined result (DCC+Moon+...)

Global attributes, Dimensions, Variables

Method1 (Deep Convective Cloud)

Global attributes, Dimensions, Variables

Method2 (Moon)

Global attributes, Dimensions, Variables

Method3 (Desert)

Global attributes, Dimensions, Variables



Solution-2

To add *calibration method names* to variable names

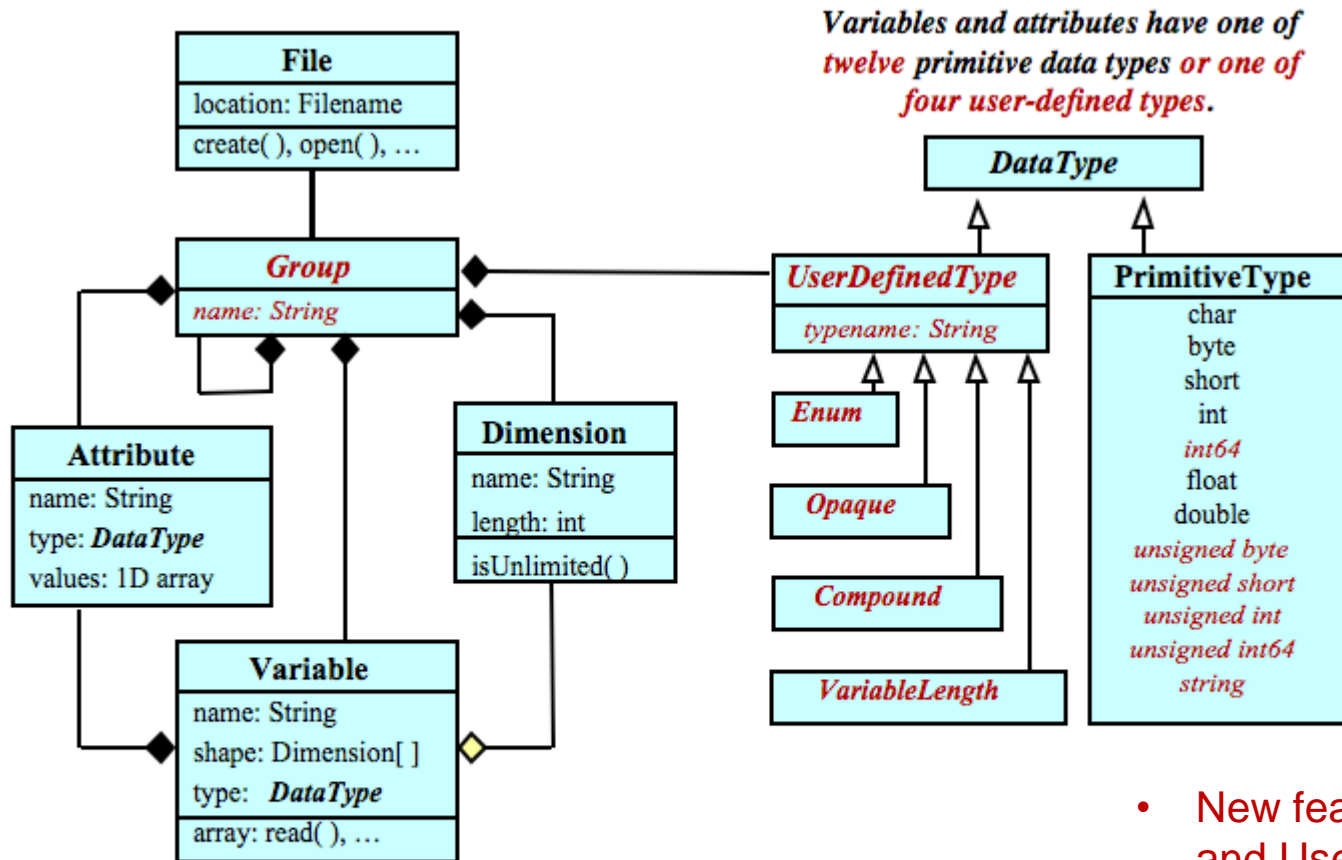
```
float blend_date(date, chan) ;  
float blend_mon_slope(date, chan) ;  
float blend_mon_offset (date, chan) ;
```

```
float dcc_date(date, chan) ;  
float dcc_mon_slope(date, chan) ;  
float dcc_mon_offset (date, chan) ;
```

```
float moon_date(date, chan) ;  
float moon_mon_slope(date, chan) ;  
float moon_mon_offset(date, chan) ;  
float moon_irr_giro (date, chan) ;
```

...

NetCDF-4 Data Model



- New features: Groups and User-Defined Types

A file has a top-level unnamed group. Each group may contain one or more named subgroups, user-defined types, variables, dimensions, and attributes. Variables also have attributes. Variables may share dimensions, indicating a common grid. One or more dimensions may be of unlimited length.

<http://www.unidata.ucar.edu/software/netcdf/workshops/2011/datamodels/Nc4-uml.html>



When to Use the Enhanced Data Model – from 2011 Unidata NetCDF Workshop

<http://www.unidata.ucar.edu/software/netcdf/workshops/2011/datamodels/Nc4-WhyUse.html>

- ❑ Enhanced data model: offers rich features for structuring data, but breaks backward compatibility
- ❑ Classic model: simple, well-understood, and had been around for a long time

Reasons to use the classic model:

- Data using the classic model **can be read by all existing netCDF software**
- Writing programs for classic model data is easier
- **Most or all existing netCDF conventions are targeted** at the classic model
- Many great features, like **compression, parallel I/O, large data sizes, etc., are available** within the classic model

Reasons to use the enhanced model:

- **Complex data structures can be represented very easily in the data**, leading to easier programming



Discussion

- Use of NetCDF enhanced data model

- ❖ Do we recommend the data model from technical point of view?
 - Can users/system adapt the enhanced model?
 - <https://www.unidata.ucar.edu/presentations/Rew/rew-egu.pdf>
- ❖ Impacts on GDWG activities – High(?)
 - Updates of GSICS Bias Plotting Tool
 - This will be required even if the enhanced data model is not used
 - How many resources do we have?
 - Needs to revisits on future GSICS tools (e.g. netCDF generation tool)?



Agenda item summary; assign action identifier, make EP recommendations and propose a lead for the action (to be updated in the discussion)

❖ Action Identifier:

- GDWG.2016.6g.1: XX to ...
- GDWG.2016.6g.2: XX to ...
- GDWG.2016.6g.3: XX to ...

❖ Substantial effort if required by the GDWG, GDWG chair should inform this activity to GSCIS Executive Panel, and ask for feedback regarding:

The GDWG estimates XX week of resources is needed to support this action.

❖ Identify the Working Group Member Taking the Lead on this Action:

- XXXX