



NetCDF and HDF5 Output Modules

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Output Modules

- Output modules in JMA collocation code
 - NetCDF output module
 - HDF5 output module
 - Written in Fortran 90
- There were some programming problems
 - “Namespace collision” between NetCDF and HDF4
 - HDF5 officially does not support Fortran

Namespace Collision

- HDF library is necessary for AIRS HDF data access
 - For NetCDF output, both HDF4 and NetCDF libraries should be included at a link process
- “Namespace collision” between NetCDF and HDF4
 - Both libraries contain functions with the same name
 - Simultaneous use of HDF4 lib and NetCDF lib is impossible
- To resolve the problem
 - HDF4 version 4.2r2 or later
 - “--disable-netcdf” option at a configure process to create HDF4 library

HDF5 from Fortran

- HDF5 officially does not support Fortran
 - HDF5 supports C and C++ only
- To resolve the problem
 - Version 1.6.6 or later
 - “--enable-fortran” option at a configure process to create HDF5 library with Fortran 90 interface

Current Output Elements

Name	Unit
Latitude	degree
Longitude	degree
Leo Scantime	TAI(International Atomic Time)
Geo Scantime	TAI(International Atomic Time)
Solar Azimuth Angle	degree
Solar Zenith Angle	degree
Leo Zenith Angle	degree
Leo Azimuth Angle	degree
Geo Zenith Angle	degree
Geo Azimuth Angle	degree
Geo Mean Radiance (Unim Check)	[mW m ² / cm ⁻¹ / sr]
Geo Radiance STD (Unim Check)	[mW m ² / cm ⁻¹ / sr]
Geo Mean Radiance (Leo FOV)	[mW m ² / cm ⁻¹ / sr]
Geo Radiance STD (Leo FOV)	[mW m ² / cm ⁻¹ / sr]
Simulated Radinace (Conv_WU)	[mW m ² / cm ⁻¹ / sr]
Simulated Radinace (Conv_Gunshor)	[mW m ² / cm ⁻¹ / sr]
Simulated Radinace (Cons_NoComp)	[mW m ² / cm ⁻¹ / sr]
Simulated Radinace (Cons_Comp)	[mW m ² / cm ⁻¹ / sr]
Satellite Name	Character
Sensor Name	Character

Any Elements Available (GSICS Standard Output)

Example

Name	Unit
Version	Numeric
Nominal Leo File Name	Character
Nominal Geo File Name	Character
Nominal GSICS File Name	Character
Satellite Identifier	Numeric
Sensor Identifier	Numeric
Processing Center	Character

The image features a light blue background with a fine grid pattern. At the top and bottom, there are decorative horizontal bands with wavy, stylized lines in shades of blue and white. Centered in the middle of the page is the word "Fin" written in a bold, italicized, purple font.

Fin

NetCDF4

- Try and evaluate NetCDF4
 - NetCDF4 supports C, C++, Fortran.
 - Perfect compatibility with NetCDF.
 - Is there any programming problem as to NetCDF4?

Appendix: Decode NetCDF and HDF5 Data

ncdump

- Print Header

- `ncdump -h filename.nc`

- Output Specified Data

- `ncdump -v Latitude filename.nc`

h5dump

- Output Header Information

- `h5dump -H filename.h5`

- Output Specified Data

- `h5dump --noindex -o output.txt -d Simulated_Radiances filename.h5`

“ncdump” Output

```
netcdf collocationdata0001 {
```

```
dimensions:
```

```
    GeoNameLen = 256 ;  
    LeoNameLen = 256 ;  
    NumOfData = 137 ;  
    NumOfLeoFiles = 1 ;  
    Simulated_Radinaces = 4 ;  
    NumOfGeoChan = 4 ;
```

```
variables:
```

```
    char GeoFileName(GeoNameLen) ;  
        GeoFileName:annotation = "Geo Data File Name" ;  
    char LeoFileName(NumOfLeoFiles, LeoNameLen) ;  
        LeoFileName:annotation = "Leo Data File Name" ;  
    double LeoScanTimeTAI(NumOfData) ;  
        LeoScanTimeTAI:units = "TAI(International Atomic Time)" ;  
    double GeoScanTimeTAI(NumOfData) ;  
        GeoScanTimeTAI:units = "TAI(International Atomic Time)" ;  
    float Lat(NumOfData) ;
```

“h5dump” Output

```
HDF5 "collocationdata0001.h5" {
GROUP "/" {
  DATASET "AveGEORad_LEOFOVRANGE" {
    DATATYPE H5T_IEEE_F32LE
    DATASPACE SIMPLE { ( 137, 4 ) / ( 137, 4 ) }
    ATTRIBUTE "units" {
      DATATYPE H5T_STRING {
        STRSIZE 80;
        STRPAD H5T_STR_SPACEPAD;
        CSET H5T_CSET_ASCII;
        CTYPE H5T_C_S1;
      }
      DATASPACE SIMPLE { ( 1 ) / ( 1 ) }
    }
  }
  DATASET "AveGeoRad_CheckRange" {
    DATATYPE H5T_IEEE_F32LE
    DATASPACE SIMPLE { ( 137, 4 ) / ( 137, 4 ) }
    ATTRIBUTE "units" {
      DATATYPE H5T_STRING {
        STRSIZE 80;
        STRPAD H5T_STR_SPACEPAD;
        CSET H5T_CSET_ASCII;
        CTYPE H5T_C_S1;
      }
      DATASPACE SIMPLE { ( 1 ) / ( 1 ) }
    }
  }
}
```