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Reporting data to NDACC and other validation centers using GEOMS compliant HDF

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Applicable to Groups …

- *Submitting or intending to submit data to NDACC, or*
- *Involved in the NORS Project (Klemens Hocke)*

  Network of Remote Sensing Ground-based Observations for the GMES Atmospheric Service

  http://nors.aeronomie.be/ , or
- *Want to distribute data in a common format*

GEOMS FORMAT

Generic Earth Observation Metadata Standard (GEOMS) facts:

– *http://avdc.gsfc.nasa.gov/GEOMS*

– *Shared standard of NDACC, AVDC, EVDC (ex-cal/val), GECA, ...*

– *Published in March 2011*

– *Formats supported: HDF4, HDF5, netCDF (NDACC accepts HDF4 only)*

BENEFITS OF GEOMS

- ***Enhance usability***
- ***Contents of data files described unambiguously***
- ***Metadata is available in each file***
- ***For many instruments (incl. MWR, Lidar, FTIR, UVVis-DOAS), there is a reporting template, meaning all groups report the same variables, using the same data units***
  - ***For MWR decided on in 2004 at MWR community meeting at QOS***
- ***Templates developed by the working groups, within prescribed definitions***

MICROWAVE REPORTING – METADATA 1

Global Attributes (up to 35 Attributes Reported)

PI_NAME; PI_AFFILIATION; PI_ADDRESS; PI_EMAIL
DO_NAME; DO_AFFILIATION; DO_ADDRESS; DO_EMAIL *{ORIGINATOR ATTRIBUTES}*
DS_NAME; DS_AFFILIATION; DS_ADDRESS; DS_EMAIL
DATA_DESCRIPTION=<Enter free format value>
DATA_DISCIPLINE=ATMOSPHERIC.PHYSICS;REMOTE.SENSING;GROUNDBASED
DATA_GROUP=EXPERIMENTAL;PROFILE.STATIONARY
DATA_LOCATION=[Enter Data Location Value]
DATA_SOURCE=MWR.[GAS]_[Enter Affiliation and Instrument ID e.g. UMASS001]
DATA_VARIABLES=
DATA_START_DATE=
DATA_STOP_DATE= *{DATASET ATTRIBUTES]*
DATA_FILE_VERSION=[Enter Unique Database File Version e.g. 001]
DATA_MODIFICATIONS=<Optional - enter free format value>
DATA_CAVEATS=<Optional - enter free format value>
DATA_RULES_OF_USE=<Optional - enter free format value>
DATA_ACKNOWLEDGEMENT=<Optional - enter free format value>
DATA_QUALITY=<Enter free format value>
DATA_TEMPLATE=GEOMS-TE-MWR-001
DATA_PROCESSOR=<Optional - enter information on the data processor and the data processor version>
FILE_NAME=
FILE_GENERATION_DATE=
FILE_ACCESS=[Enter one or more File Access Values e.g. NDACC;AVDC]
FILE_PROJECT_ID=<Optional - enter custom project identification code> *{FILE ATTRIBUTES}*
FILE_ASSOCIATION=<Optional - enter free format value>
FILE_META_VERSION=
FILE_DOI=

MICROWAVE REPORTING – METADATA 2

Reported Datasets (22 Attributes Reported - 24 for Ozone)

Variable Name	*Dependency*	*Units*	*Data Type*
LATITUDE.INSTRUMENT	*CONSTANT*	*deg*	*REAL*
LONGITUDE.INSTRUMENT	*CONSTANT*	*deg*	*REAL*
ALTITUDE.INSTRUMENT	*CONSTANT*	*m*	*INTEGER*
DATETIME	*DATETIME*	*MJD2K*	*DOUBLE*
ANGLE.VIEW_AZIMUTH	*[CONSTANT|DATETIME]*	*deg*	*REAL*
ANGLE.VIEW_ZENITH_MEAN	*DATETIME*	*deg*	*REAL*
ANGLE.SOLAR_ZENITH_MEAN	*DATETIME*	*deg*	*REAL*
OPACITY.ATMOSPHERIC_EMISSION	*DATETIME*	*Np*	*REAL*
DATETIME.START	*DATETIME*	*MJD2K*	*DOUBLE*
DATETIME.STOP	*DATETIME*	*MJD2K*	*DOUBLE*
INTEGRATION.TIME	*DATETIME*	*h*	*DOUBLE*
ALTITUDE	*ALTITUDE*	*m*	*INTEGER (Ref. GMH)*
PRESSURE_INDEPENDENT	*[ALTITUDE|DATETIME;ALTITUDE]*	*hPa*	*REAL*
TEMPERATURE_INDEPENDENT	*[ALTITUDE|DATETIME;ALTITUDE]*	*K*	*REAL*
[GAS].MIXING.RATIO_EMISSION	*[ALTITUDE|DATETIME;ALTITUDE]*	*ppv*	*REAL*
[GAS].MIXING.RATIO_EMISSION_UNCERTAINTY.RANDOM	*[ALTITUDE|DATETIME;ALTITUDE]*	*%*	*REAL*
[GAS].MIXING.RATIO_EMISSION_UNCERTAINTY.SYSTEMATIC	*[ALTITUDE|DATETIME;ALTITUDE]*	*%*	*REAL*
[GAS].MIXING.RATIO_EMISSION_UNCERTAINTY.TOTAL	*[ALTITUDE|DATETIME;ALTITUDE]*	*%*	*REAL*
[GAS].MIXING.RATIO_EMISSION_RESOLUTION.ALTITUDE	*[ALTITUDE|DATETIME;ALTITUDE]*	*m*	*INTEGER*
[GAS].MIXING.RATIO_EMISSION_APRIORI	*[ALTITUDE|DATETIME;ALTITUDE]*	*ppv*	*REAL*
[GAS].MIXING.RATIO_EMISSION_APRIORI.CONTRIBUTION	*[ALTITUDE|DATETIME;ALTITUDE]*	*%*	*REAL*
[GAS].MIXING.RATIO_EMISSION_AVK	*[ALTITUDE;ALTITUDE|DATETIME;ALTITUDE;ALTITUDE]*	*1*	*REAL*
O3.COLUMN_EMISSION	*DATETIME*	*DU*	*REAL*
O3.NUMBER.DENSITY_EMISSION	*[ALTITUDE|DATETIME;ALTITUDE]*	*molec m-3*	*REAL*

MICROWAVE REPORTING – METADATA 3

Reported Attributes for each dataset

VAR_NAME = LATITUDE.INSTRUMENT
VAR_DESCRIPTION = Latitude of the observation site (deg)
VAR_NOTES =
VAR_DEPEND = CONSTANT
VAR_SIZE = 1
VAR_DATA_TYPE = REAL
VAR_UNITS = deg
VAR_SI_CONVERSION = 0.0;1.74533E-2;rad
VAR_VALID_MIN = -90.0
VAR_VALID_MAX = 90.0
VAR_FILL_VALUE = -90000.0

HOW DO I MAKE AN HDF FILE?

- ***Refer to geoms-1.0.pdf at http://avdc.gsfc.nasa.gov/GEOMS***
- ***Refer to MWR template description at http://avdc.gsfc.nasa.gov/index.php?site=1209943366***
- ***AVDC supported tools – idlcr8hdf.pro/.sav and TAV file, available at http://avdc.gsfc.nasa.gov/index.php?site=1954079895***
- ***Generic Metadata template available from Ian Boyd – will place on the MWR reporting section of the AVDC web-site***
- ***Contact me (iboyd@astro.umass.edu) for help with initial set-up!***

- ***Options if you don't have IDL …***
  - ***Download and install the full version of IDL without a license***
  - ***Can run using IDL Virtual Machine (inputs via GUI)***
  - ***Can run as part of a shell script, batch file, or call from another program by running IDL in DEMO mode (active for 7 minutes only)***

DEMONSTRATION

- *Using IDL VM – Graphical User Interface*
- *Inputs:*
  ASCII Metadata file,
  ASCII Data file,
  File containing list of possible attribute values (for QC),
  Directory for output
- *Note: If using idlcr8hdf to make HDF file(s) then the Metadata file can be set-up so that it does not need to be changed from measurement to measurement. This is achieved by leaving out values that change, as idlcr8hdf can fill in the gaps*
- *You can create multiple HDF files with a single call to idlcr8hdf*

THANKS TO …

- ***Klemens Hocke and Mathias Palm for being ‘guinea pigs’, and providing useful feedback***