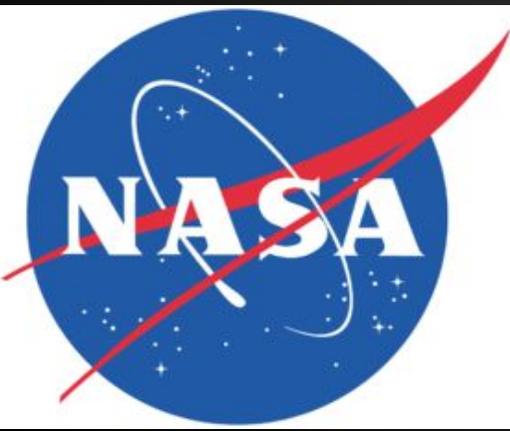


CF2-Group: Hierarchical Data and Metadata Extensions to Climate/Forecast Conventions

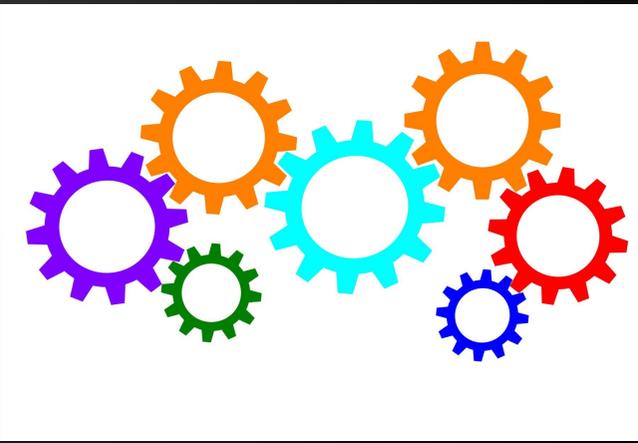
Charlie Zender

Departments of Earth System Science and of
Computer Science
University of California, Irvine



netCDF-CF Meeting
Boulder, CO
September 6-8, 2017

[Seminar on Web](#)



2013 Group Proposal to CF

1. September 15, 2013 thread "Towards recognizing and exploiting hierarchical groups" begins here:
<http://mailman.cgd.ucar.edu/pipermail/cf-metadata/2013/056827.html>
2. June, 2017 CF2-Group Draft shared in Google Docs:
<https://docs.google.com/document/d/1KK6IZ2ZmpaUTVgrw-GIFd6almppjvGz6D7nxVTO3Btl/edit>

Response



CF2-Group: Design Principles

1. Backwards compatible with CF1 ("CF-compliant" within each group)
2. Amenable to conversion to/from netCDF3 ("flattening", "dismembering", "inflating")
3. Exploit hierarchical principles of inheritance, scope

CF2-Group: Best Practices

1. Avoid netCDF4-specific atomic, compound, and user-defined types when compliance with CF1 is paramount, otherwise procedures to convert CF2-Group files to CF1 flat files will lose information or fail completely.

CF2-Group: Best Practices

2. Attributes normally attached to variables should not be stored as Group Attributes (e.g., `valid_min`, `units`, `_FillValue`) even when the attribute values are identical across the group. This is not interoperable.

CF2-Group: Best Practices

3. Group names should have no machine-readable relevance. Automatically generated group names (e.g., ensembles) are fine so long as their information content (e.g., realization number, station number) is separately stored as a Group Attribute.

CF2-Group: Best Practices

4. Moving a self-contained group or branch of groups to another location, should not impact the interpretation of data. Named objects (dimensions, coordinates, variables) resolve to the nearest in-scope object of that name. **Absolute or relative pathnames (containing "/") should be completely absent in metadata.**

*****Current Satellite Swath Proposal recommends always using full paths to locate "ancillary" information, e.g.,
coordinates="/geolocation/grid/lat /geolocation/grid/lon"**

Current "Typical" NASA L2 Dataset

/

Geo

Meta

Sci

Other

g1g1

g1g2

g2g2

g3g1

g3g2

g1g1g1

g2g2g1

g2g2g2

g3g1g1

g3g1g2

Nearest Coord. in Dimension's Scope

/

g1

g2

g3

g4

g1g1

g1g2

g2g2

g3g1

g3g2

g1g1g1

g2g2g1

g2g2g2

g3g1g1

g3g1g2

CF2-Group: Best Practices Options for locating out-of-group (meta)data

1. Absolute or relative pathnames (containing "/") should be completely absent in metadata.
2. Absolute pathnames always
3. Relative pathnames always
4. Absolute or relative always
5. "All of the above"
6. Others

Use Cases of Groups

1. Collections ("suitcases") of data
2. Ensembles (one group per realization/station)
3. Discrete Sampling Geometries (groups instead of instance or "station" dimension)
4. Remote sensing

Mapping CF2-Group to CF1 Flat Files

1. Flattening

- a. No namespace conflicts? Easy (Hyrax, NCO)
- b. Conflicts require algorithmic renaming
 - i. Hyrax replaces path separator '/' with underscores when flattening
 - ii. NCO can only "dismember" conflicts

2. Inflation

- a. Partial solutions only ("chicken and egg")
- b. NCO ncecat with Group Path Editing
- c. CF2 keys could facilitate conversion?

Supplementary Slides