

Evidence of Implementations for the CF Metadata Conventions

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Abstract

The conventions for climate and forecast (CF) metadata are designed to promote the processing and sharing of files. The CF conventions are increasingly gaining acceptance and have been adopted by a number of projects and groups as a primary standard. The conventions define metadata that provide a definitive description of what the data in each variable represents, and the spatial and temporal properties of the data. This enables users of data from different sources to decide which quantities are comparable, and facilitates building applications with powerful extraction, re-gridding, and display capabilities. Evidence of operational implementations of these conventions is presented in this document.

CF Conventions Readers

CF Conventions readers (software that "understands" the metadata in CF-compliant data files) include:

1. The coordinate systems layer of Unidata's Common Data Model (CDM) Java software (<http://www.unidata.ucar.edu/software/netcdf-java/CDM/>), can read CF-compliant netCDF data and over a dozen other data formats that encode coordinate systems metadata. The coordinate systems layer of CDM presents a programming interface to access the data and coordinates as if they were CF-compliant netCDF data.
2. The Geospatial Data Abstraction Library (GDAL) has a netCDF driver (http://www.gdal.org/frmt_netcdf.html) that can read and interpret CF-compliant data to properly establish the intended coordinate system for the data.
3. A CF-compliance checker is available from the National Centre for Atmospheric Science - Computational Modelling Support (<http://puma.nerc.ac.uk/cgi-bin/cf-checker.pl>) that tests and confirms whether data is CF-compliant with any specified version of the CF Conventions.
4. Unidata's Common Data Model Coordinate System Validator service (<http://motherlode.ucar.edu:8080/cdmvalidator/validate.html>) identifies georeferencing Coordinate Systems in a CDM file (e.g. NetCDF), using CF, COARDS or other Conventions that it knows about. This accurately indicates what will be viewable in applications that use the CDM netCDF-Java library. It currently only works on gridded data.
5. ESRI's ArcINFO interprets CF metadata for coordinate system information, and can also write CF-compliant metadata for coordinates.
6. Other tools that make use of Unidata's CDM software inherit the ability to use CF metadata, for example:
 - o ERDDAP (Environmental Research Division Data Access Program), from National Marine Fisheries Service's Southwest Fisheries Science Center
 - o EDC (Environmental Data Connector) plug-in for ArcGIS
 - o ncWMS (Web Map Service for NetCDF data) and demo site (University of Reading (UK) E-Science Center/Jon Blower)
 - o Globally Leveraged Integrated Data Explorer for Research (aka GLIDER) (Univ. of Alabama at Huntsville)
 - o Integrated Data Viewer (Unidata)
 - o Java NEXRAD Tools (NOAA/NCDC)

- Live Access Server from NOAA/OAR/PMEL (Pacific Marine Environmental Laboratory)
- MATLAB toolkits
 - njTBX (Rich Signell/USGS, Sachin Bhate/Mississippi State University)
 - nctoolbox (Brian Schlining/MBARI)
- My World GIS (Northwestern University)
- ncBrowse (EPIC/NOAA) (this uses an earlier version of the library)
- Panoply netCDF viewer (NASA/Goddard Institute for Space Studies/Robert B. Schmunk)
- VERDI (Community Modeling and Analysis System (CMAS) Center at the University of North Carolina at Chapel Hill / Argonne National Laboratory)

CF Conventions Writers

CF Conventions writers (software that helps represent metadata in a CF-compliant way) include:

1. Unidata's Libcf, the NetCDF CF Library, <http://www.unidata.ucar.edu/software/libcf/>, still under development, is intended to support the creation of data files conforming to the CF conventions, using the netCDF API.
2. LLNL/PCMDI's Climate Model Output Rewriter (CMOR, pronounced "Seymour") http://cmip-pcmdi.llnl.gov/cmip5/output_req.html?submenuheader=2#cmor, written in C with FORTRAN 90/python API functions, can be used to produce CF-compliant netCDF files that fulfill the requirements of many of the climate community's standard model experiments.
3. The GDAL netCDF driver can be used by the gdal_translate utility (http://www.gdal.org/gdal_translate.html) to convert data from many other file formats into CF-compliant netCDF files.