

Climate and Forecast (CF) Metadata Conventions: a Community Driven Metadata Standard

J A Pamment: Rutherford Appleton Laboratory, UK

Contact: alison.pamment@stfc.ac.uk

CF was originally developed by Brian Eaton (NCAR), Jonathan Gregory (Hadley Centre, UK Met Office), Bob Drach (PCMDI,LLNL), Karl Taylor (PCMDI,LLNL) and Steve Hankin (PMEL,NOAA).

Purpose and Scope of CF

❖ CF was developed originally as a metadata convention for numerical weather prediction (NWP) and climate model output.

❖ The central aim was to facilitate the exchange of data between modelling groups worldwide for such undertakings as AMIP (Atmosphere Model Intercomparison Project) and IPCC (Intergovernmental Panel on Climate Change) assessment reports.

❖ CF is steadily being extended to provide metadata suitable for describing observational data, e.g., ground based meteorological observations; satellite altimeter data.

❖ The CF metadata conventions are generally used in conjunction with the netCDF file format, but many of the metadata concepts could equally well be applied to other file formats.

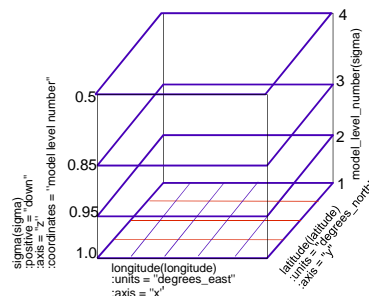
Standard Names

Each physical, chemical or biological quantity is given a CF standard name and assigned appropriate units. The purpose of the standard name is to determine whether parameters from different data sources can be treated as directly comparable.

| Standard Name | Canonical Units | AMIP | GRIB |
|----------------------------|-----------------|-------|------|
| air_potential_temperature | K | theta | 13 |
| air_pressure | Pa | plev | 1 |
| air_pressure_at_cloud_base | Pa | | |

Coordinate Variables

CF metadata describe multi-dimensional data by attaching a coordinate variable to each dimension. Auxiliary coordinate variables can be used to give alternative coordinates along each dimension, e.g. model level number and pressure level can both be given as vertical coordinates.



A separate coordinate variable is used to describe the time dimension. This can be used for 4D data or, for example, to represent a time series at individual locations. CF metadata can describe a number of alternative calendar systems and can describe climatological data such as 'the mean of all January temperatures over a ten year period'.

| | Hamburg | Livermore | Princeton | Reading |
|-------------|---------|-----------|-----------|---------|
| Lon (point) | 10 | -122 | -75 | -1 |
| Lat (point) | 54 | 38 | 40 | 51 |
| time ↓ | 11:00 | | | |
| | 12:00 | | | |
| | 13:00 | | | |
| | 14:00 | | | |
| | 15:00 | | | |
| 16:00 | | | | |

CF Development

❖ It is a central philosophy of CF development that the conventions should evolve in response to the current needs of the scientific community. Attempts to develop a metadata standard that will cater for all possible future requirements are deliberately avoided.

❖ Proposals to modify the CF conventions come from the CF community, usually scientists whose need is to write data in a standard format.

❖ All proposals for modifications to CF are discussed (electronically) in a public forum with the aim of arriving at community consensus. All interested parties are encouraged to contribute to the discussions.

❖ Proposals for modifications to the main CF conventions are submitted via a trac system which is accessible through the CF website: <http://www.cfconventions.org>.

❖ Proposals for new standard names are submitted via the CF mailing list. Information on the list is available at <http://mailman.cgd.ucar.edu/mailman/listinfo/cf-metadata..>

❖ General CF related questions can also be directed to the mailing list and usually receive a response within a few days.

Adoption of CF

CF/netCDF has been adopted as the required data standard for many atmospheric and climate science projects, for example, NERC DataGrid; CCMVal (Chemistry-Climate Model Validation Activity); PMIP (Paleoclimate Modelling Intercomparison Project). Many groups, including the British Atmospheric Data Centre, actively promote the use of CF.

Funding for the development of the CF metadata conventions is provided by PCMDI (Program for Climate Model Data Intercomparison), Lawrence Livermore National Laboratory, USA and by NERC (Natural Environment Research Council) through NCAS (National Centre for Atmospheric Science), UK.