

Review of Climate and Forecast Metadata Conventions Implementation and Operational Suitability

NASA's Earth Science Data Systems Standards Process Group (SPG) is considering the Climate and Forecast (CF) Metadata Conventions, for adoption as a community standard. You are invited to review this Requests For Comment (RFC) in the context of your **implementation experience** with this specification and its **suitability for operational use**. You only need to answer questions that are applicable to you. Please send completed review to:

spg-rfc-021@lists.nasa.gov.

Implementation Experience questions:

1. *(Your background)* Describe in a sentence or two your overall implementation experience related to the proposed specification. (e.g., *specification implementer, tools developer, data provider, scientific analyst, science user, etc.*) Have you directly implemented the CF metadata conventions? Did you use pre-existing software, and if so, what did you use?

We are using NetCDF CF convention in our Data Center. The major roles of this project are: 1) assimilate driver data into the format suitable as input for carbon cycle models; 2) process model output data and observation data into the format suitable for model-model and model-observation comparison.

We are using NetCDF Operator (NCO) tool and NetCDF CF Checker to create NetCDF files and validate them against CF conventions.

2. *(Completeness)* Does the specification (the online documents referenced) provide all the detail you need to implement it in software? (e.g., *to read or write a data file; to implement or modify a profile or extension; or develop a tool such as a metadata translator*) If not, describe what is missing in the specification.

Yes, the specification provides enough details we need.

3. *(Accuracy)* Do any parts of the specification contain inaccuracies, or internal inconsistencies? If so, please provide details.
4. *(Clarity)* Is any part of the specification ambiguous, or poorly explained? If so, please provide details.
5. *(Balance)* Does the standard describe the right set of concepts and attributes and enable the appropriate operations for its intended users? In particular, have the guiding principles outlined in section 5.2 been followed in the development of standard names?
6. *(Usefulness)* How well does this specification meet your information sharing needs? (e.g., *Does it properly represent and describe your datasets? What are the pros and cons of these metadata convention attributes?*)

This specification meets our needs.

The pros include:

- Variable names can be standardized using the predefined CF Standard Names vocabulary
- NetCDF CF convention is suitable to represent multi-dimension arrays
- Spatial and temporal dimensions can be defined in a standard way
- cell_method attribute is very useful to characterize how the cell values are derived.

7. *(Implementation)* What implementation challenges does the proposed standard present? (e.g., does it conflict with other metadata requirements for your data? Is it compatible with the data formats you use?)
8. *(Flexibility)* In what software environment(s) have you used the CF metadata conventions (e.g., Solaris, Linux, Windows, Mac OS X)?
Linux and Windows
9. *(Standard Names)* In your opinion, does the standard name table provide an adequately comprehensive set of names for the metadata representation?
The standard name table is comprehensive, but it needs to be better organized. A hierarchical structure will be appropriate. The relationships among standard names can be further specified. If the names are not well organized, with more and more names defined in the table, it will be harder and harder for users to choose the appropriate names.

Operational Suitability questions:

10. Do you currently use or plan to use CF conventions in a production setting? What types of applications do you use with CF Conventions? Does the metadata model work well with the data types and data manipulations in your application?
We are using CF conventions in a production setting. We are using command line tools with CF conventions. Yes, it works well.
11. Why do you choose to use the CF metadata conventions for your applications?
Our project is focused on carbon cycle modeling community. CF conventions are very popular in this user community.
12. Have you or your users encountered any difficulty when using some of the data access or visualization tools (e.g., IDL, GrADS, etc.) on files with CF metadata? If you have, please provide a brief description of your experience.
No, visualization of CF conventions compatible NetCDF files is convenient for users.
13. Does the CF metadata conventions meet your requirements for discovering, accessing, providing interoperability of data and metadata? (e.g., *Can it handle the data types in your applications? Do you provide catalog services that utilize CF conventions?*)

No, we don't provide catalog services that utilize CF conventions.

14. What operational challenges or limitations do the CF metadata conventions present? (*e.g., Does it take a long time to learn how to use it? Does it require advanced processing power, large amounts of memory, complex configuration, etc.*)
There aren't convenient tools for creating CF conventions compatible NetCDF files. We had to write our own scripts to convert NetCDF files into CF conventions compatible format.
15. What benefits do CF conventions present? Do the benefits of CF conventions outweigh the challenges? (*e.g., Do the conventions offer the flexibility you want to package the data types in your applications? Do they facilitate interdisciplinary studies?*)
CF conventions present standardization and interoperability. There are more than 20 modeling groups participated in our project. A single set of driver data in CF conventions compatible NetCDF format can feed into different models. For the comparison between model output data and observation data, CF conventions work as a bridge between modeling community and remote sensing community. The observation data (MODIS LAI, EVI, FPAR, GPP, etc) were converted into CF conventions compatible NetCDF format so the comparison can be eased.
16. How much data do/ will you provide using these CF metadata specifications? (*number of distinct data products or data sets, total data volume, number of files.*)
There are about 100 model output data products and about 10 observation data products involved. The total data volume is about 50GB.
17. How many users and user-groups do you have or expect to have for data using CF metadata conventions, and what is your expected user community?
We expect about 30 user-groups (including modeling groups and analysis groups).
18. (*User comments*) Any additional comments, observations or criticisms of CF metadata conventions and the RFC can be provided here.