

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 a data provider and a tools developer. We have directly implemented some, but not all of the CF metadata convention. Specifically, we have not yet addressed standard names.

Initially, we did not use pre-existing software, but lately we are using Lats4D.
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.

(a) The specification provides most of the detail needed. However, given the vast amount of NASA Earth Science data in HDF4 and HDF5, I think it needs a more explicit treatment of what CF “looks like” in those two formats. This is particularly necessary in light of the facts:

(i) that MERRA HDF4 output purports to be CF-1 compliant (is it really? Inquiring minds want to know...) and

(ii) that SMAP is currently planning to use HDF5, perhaps with CF conventions. I think the document also needs to address the mapping to HDF-EOS2 and HDF-EOS5, which are more problematic due to the current lack of support for dimension scales in those two APIs. (Though we should note that work is underway to remedy that.)

(b) Our reading of the specification indicates that it is lacking in a couple of areas for satellite-borne data. While Level 2 swaths are adequately modeled as grids in CF, we have had difficulty with non-standard Z-dimensions, such as wavelength, a situation that is particularly acute for Level 1 radiance data.
3. *(Accuracy)* Do any parts of the specification contain inaccuracies, or internal inconsistencies? If so, please provide details.

No.

4. *(Clarity)* Is any part of the specification ambiguous, or poorly explained? If so, please provide details.
No.
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?
Yes, regarding the set of concepts and attributes. We cannot comment on the standard names, not having implemented them.
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?)
In general, this specification is useful for our needs, supplying excellent context for the conventions and the philosophy behind them. It is particularly useful for most Level 3 gridded and Level 2 swath data. Not so much for Level 2 profile, limb scanning data or Level 1 radiance.
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?)
It does conflict with HDF-EOS2 and HDF-EOS5, which do not support dimension scales. Also, see above notes on Level 2 profile, calibrated radiance, etc.
8. *(Flexibility)* In what software environment(s) have you used the CF metadata conventions (e.g., Solaris, Linux, Windows, Mac OS X)?
We have produced CF data on Linux, but used it within CF-savvy tools on Linux, Windows, Mac OS X.
9. *(Standard Names)* In your opinion, does the standard name table provide an adequately comprehensive set of names for the metadata representation?
We have not exploited Standard Names much yet.

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?
Yes, we currently produce CF-compliant (mostly) data in a production setting. We use Panoply, IDV, ncl and GrADS with the conventions. The metadata model works relatively well (except caveats noted in previous sections).
11. Why do you choose to use the CF metadata conventions for your applications?
We wanted to enable use of our data by analysis and visualization tools such as Panoply, IDV and GrADS.

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.
GrADS is unable to read swath data in CF-1 8-.
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?*)
Access could use improvement w.r.t. other 3rd dimensions when there is no vertical dimension (i.e., wavelength). We do not provide catalog services based on CF.
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.*)
No significant operational challenges.
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 enable the creation of generalized visualization and analysis tools.
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.*)
We offer a netcdf/CF-1 conversion for 77 data sets
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?
Expected community is modelers and applications users using tools like IDV.
18. (*User comments*) Any additional comments, observations or criticisms of CF metadata conventions and the RFC can be provided here.