Report on activities in Climate and Forecast (CF) conventions regarding space data products

A WG-I liaison between CGMS and the governing bodies of the netCDF Climate and Forecast (CF) Conventions actively represents the interests of CGMS members within the CF community. This report details the key developments that have taken place in this regard over the past year:
- Support for the use of hierarchical groups in netCDF-4 data products
- Clarification of the use of geostationary projections
- Stronger collaboration between CF and WMO
- Enhancement of the capabilities of implementing changes to the CF Conventions in a timely fashion

In addition to presenting the details of these steps, this paper also proposes goals to be pursued in this area by CGMS-49 as agreed with the participants of the intersessional meetings on data formats and formatting standards.

Action/Recommendation proposed: Members are invited to endorse continued work liaising between the CF community and CGMS, as well as participation in ongoing collaborative talks between WMO and the CF community.

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1   INTRODUCTION

This paper describes activities that have taken place since CGMS-47 to represent the interests of CGMS members within the governing bodies of the CF Conventions.

2   KEY ACHIEVEMENTS

2.1   Group data structures in netCDF-4

One of the key proposals that have been submitted for adoption in the CF Conventions was related to the use of hierarchical groups in netCDF-4. This feature makes it possible to organise variables, attributes, and dimensions within a data product in a hierarchical fashion, thus allowing for richer interrelations between these items and a more natural representation of data as acquired by a satellite. The intersessional meetings had identified this feature as being high-priority for use in satellite data products, particularly Level 1 products.

In the interim, the proposal has been accepted and is now part of the CF Conventions v1.8, which was published on 30 January 2020. Therefore, it is now possible to use groups in any CF-compliant data products.

2.2   Support to streamlining CF governance process

One of the issues noted during intersessional meetings is the fact that changes to the CF Conventions can be very slow to implement, leading data producers to see themselves forced to disseminate data encoded in a way that is not compliant with the CF Conventions in order to achieve goals related to schedule.

As a result, discussions took place with the CF Community concerning improvements to the governance process, and ways to increase the frequency of releases of new versions of the Conventions. The result is an upgraded community governance model, as well as an acceleration of the Conventions' release model. Changes will remain subject to the same level of peer review, but features that are deemed appropriate for the Conventions can be incorporated into the document with higher speed. The Conventions will now be released every six months, if changes have passed through the peer review process in a given review period.

2.3   Other high-priority issues

Participants in the WGI intersessional meetings on data format and metadata standards provided valuable feedback on the prioritisation of items which need to be

adopted in the CF Conventions or which need to be developed in order to facilitate the use of the CF Conventions. These were prioritised as follows, and have been completed or are currently under completion:

1. Data products in satellite ("swath") viewing geometry: It is deemed important to be able to encode data in CF-netCDF in the native viewing geometry of a satellite or other viewing platform. At CGMS-47 a collection of such encoding types was presented for verification of its completeness and endorsed. A corresponding proposal is currently under consideration by the CF Community. Due to the proposal's complexity it is not expected that this will be accepted in the next release; the following release is a more realistic target.

2. Improved CF compliance checker software: Software that verifies that a data product complies with the CF Conventions is an essential tool for data producers seeking to use the Conventions. Due in large part to changes made at the request of CGMS members (i.e. the addition of groups to the CF Conventions) updates were necessary that would allow compliance checkers to work with data encoded using the new capabilities. This has been accomplished by the provision of a software package procured by EUMETSAT which translates data products that use groups into a legacy-style encoding that is semantically equivalent to the hierarchical encoding, thus making any data product using this new feature compatible with any existing compliance checker.

3. New data types: Several CGMS members have expressed the need to use new data types that are available in netCDF-4. Progress in this regard has been made, focused on the use of unsigned integer types. Other new data types are still the subject of planned proposals.

4. Clarifications to the CF geostationary projection description: Some members have noted that the description of the geostationary projection used by the CF Conventions is in need of clarification; some improvements have been made to clarify the units that may be used in geostationary data products.

3   FUTURE ACTIVITIES

In the time until CGMS-49, it is proposed to pursue the following items:

- Collaboration between WMO and CF. Previous to CGMS-48, a meeting took place between represents of the WMO and CF Communities. At this meeting a mailing list was established to facilitate collaborative discussions between WMO, the CF Governance Panel, and interested parties. Outputs of these discussions has fed into discussions at WMO and proposed Terms of Reference for an Expert Team that should between WMO and the CF Community. This activity should continue to receive support from CGMS, as ensuring the beneficial evolution of both bodies of standards will provide value to CGMS members.

- Standardisation of subsampled coordinates. Several approaches are used by CGMS members to reduce the volume of data products by providing a subset of the full set of coordinates needed to geolocate all observations within a data product. Work has been initiated to standardise these approaches within CF, and CGMS should participate in this process in order to ensure an outcome that is beneficial to both producers and users of such products.

- New data types. Further progress is needed on data types that are available as part of the netCDF-4 specification, such as strings and enumerated values.

4   ACTIONS AND/OR RECOMMENDATIONS FOR CONSIDERATION BY CGMS WORKING GROUP I

The participants are invited to endorse the continued efforts to extend the CF Conventions so that they allow full use of the features available in netCDF-4, as well as activities that improve the interface between WMO and the CF Community. This will ensure that not only the needs of research and climate users, but also those of operational NWP users and remote sensing data providers, are taken into consideration as the Conventions evolve.

5   CONCLUSIONS

Significant progress has been made in evolving the CF Conventions to cover the needs of satellite data producers. Efforts on the part of WMO to assist in the evolution and governance of the CF Conventions are likely to have positive effects on the standard by providing better representation to users from operational communities. Further involvement in the evolution of the CF Conventions will benefit CGMS members and their users.