

METAFOR Final STAB Report

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METAFOR Progress
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September 28, 2011

The CMIP5 climate model output database is now operational. The climate modeling groups are rapidly making their data public for use by the climate research community. The model data provides a basis for the IPCC 5th Assessment. There is a clear need for additional information about the models and simulations that produced these data. Fortunately, the EU funded METAFOR project provided a mechanism for inputting and disseminating this information, namely the Common Information Model (CIM), which is fed by information from an online questionnaire.

Some modeling groups have completed the METAFOR questionnaire and most have begun work on it. The METAFOR help desk has been very helpful in fixing any problems with the software and in assisting the modeling groups in their interactions with the questionnaire. It is obvious that the questionnaire and software connected to it has the potential to greatly improve and increase the amount of information available to users of model data sets. The CIM contains a wealth of metadata. It is crucial for the climate modeling community to have such a transparent set of climate information.

In short METAFOR is a large step forward for the climate community in documenting its models, numerical experiments, and data sets of model output. We strongly support its efforts. The work has been embedded in international modeling activities and has been endorsed by major coordinating bodies of climate research (such as the World Climate Research Program).

That said, METAFOR still has a long way to go. Standardizing model documentation is difficult because model parameterizations differ considerably from model to model and evolve in time. Finding a common framework to describe model parameterizations, as they evolve, will continue to be difficult. This is especially the case for the new components of CMIP5 models: the land and ocean bio-geochemical components.

Once the model information is input to the CIM via the questionnaire, the remaining considerable challenge is to display the information in a meaningful way to a wide range of users. The current user interface to the METAFOR questionnaire succeeds as a good first attempt to meet the needs of both the input and output sides of the problem.

From the start of the project, the community buy-in was seen as essential by METAFOR's Scientific and Technical Advisory Board. Community-wide engagement was partly accomplished by coordinating the project with groups outside of Europe and by obtaining endorsement from relevant coordinating bodies. As noted above, the METAFOR "help desk" has been responsive to user's

input and questions, and now with the end of funding, NCAS/BADC and DKRZ have committed significant effort for at least the next two years to maintain the CMIP5 questionnaire and associated processes as part as their CMIP5 data support activity. This includes user support, providing the data to portals, etc... This is the minimal effort needed but more is required for community governance and development of new tools and services, both key to community buy in. Ongoing additional support will be required to seek and respond to feed back from end-users. Follow-up programs should establish such a feedback mechanism. Also, an ongoing means needs to be found to perpetuate governance and maintenance of METAFOR products (i.e., the Common Information Model).

Finally, the METAFOR products have the potential to be applied in support of a broad variety of other climate community modeling activities, including, for example, regional modeling (CORDEX) and seasonal to decadal predictions (e.g. activities coordinated by WCRP's WGSIP committee). It seems that in Europe the ENES community is well positioned to extend METSFOR's application.

Comments from the STAB on METAFOR*

Karl E. Taylor

Representing **STAB**** members in attendance:
Reinhard Budich, Luigi Fusco, and Wilco Hazeleger

Oxford, UK

10 February 2009

*The METAFOR motto:

"If climate models be stick figures of reality,
why metadata description of them should follow quite trivially."

**The STAB motto: *"If you're not careful, we'll kill you"*

We applaud:

- Your good progress over the first year
 - Apparent recognition of the scientific imperative to produce a useful CIM and workable software within a challenging timeframe (your motto must continue to be: "vaporware is not an option!").
 - All year 1 deliverables were met
 - No apparent issues in coordination or collaboration.
- Your obvious recognition both of the enormous challenges faced in developing a truly useful CIM, and also of the potential scientific rewards of success.
- Your cognizance of and involvement in complementary/related work being done elsewhere (e.g., CF-conventions, IS-ENES, Curator, ESG)
- Your progress toward developing a roadmap from the somewhat theoretical conceptual framework envisioned by METAFOR to actual implementation.
- That the communication and frequency of interactions among members of the group (and among WP leaders) seems quite good. (and your recognition of a need for closer collaboration between WP 4, 5 - or 5,6?)

The big fear (but this applies to others in the climate modelling community as well):

- The timeline set by the IPCC will be impossible to meet.
- Obvious recommendation: determine what is clearly possible in the next year and deliver it (even if it falls short of your visions).
- Reward: the climate modeling community (and perhaps others too) will recognize your success.

Recommendation 1: More aggressive outreach to various "communities":

- To *WGCM* (and *CMIP* panel): seek their endorsement (which may already in fact be implied) that *METAFOR* will lead (and assume primary responsibility) for obtaining from the modelling groups metadata that describes their models and experiment conditions.
- To climate modellers: let them know you exist, perhaps starting with an email outlining what will be expected from them in terms of metadata for *CMIP5*. (Email might originate from or be co-signed by the *CMIP* panel)
- To communities less familiar with climate models (e.g., "effects", "impacts", "policy"): To a prudent degree, obtain input concerning *CIM* requirements to avoid problems "down the road" (but don't let this delay reaching the goals for *CMIP5*)
- To E-infrastructure: to steal any ideas that are useful

Recommendation 2: Aggressive outreach to various "outside" scientific communities (mainly in 3rd year):

- Pursue stronger links and advertise your goals and contributions with related efforts (and international scientific coordinating committees within WMO, WCRP, etc.)
- Seek more complete input on metadata needs of other communities
 - Try to satisfy them
 - Perhaps consider first the needs of the hydrological community
 - Metric of success: Can a hydrologist discover and use CMIP5 model output in meaningful ways without consulting climate modeling experts more than a few times?

Recommendation 3: Please continue to keep the STAB informed:

- Provide us with access to METAFOR's internal website (in case a miracle occurs and we have a spare minute or two for browsing).
- Send us the work plan notes (developed at this meeting) for year 2.
- Be ready to report briefly on any responses to our recommendations at your next annual meeting.

Final note: Carry on with all due speed!

“time’s a wasting”

Don’t be distracted by anything irrelevant
(even if it comes from the STAB)

Get on with the tasks and good luck!

Metafor Year 2 impressions

- Team work is exemplary: interactive, civilized, focused
- Appear to be making good progress ... holding to established timeline(s) (mostly)
- Good working-relationship and communication with closely-related efforts (Curator, ESG, IS-ENES?)

Metafor Year 2 concerns

- Lots yet to be done in time for CMIP5, but it looks like it's doable.
- I was surprised that only a subset of the information in the questionnaire can currently be accommodated by the CIM.
- In the QC step, Metafor (or someone else?) should check whether the metadata saved in the netCDF files is consistent with the simulation description recorded in the CIM.

Metafor Year 2 concerns (cont.)

- I didn't hear much about how the end users were going to easily make use of the metadata recorded by Metafor. How, for example, would a user find out:
 - What is the horizontal resolution and number of vertical layers found in each model?
 - For each of a list of models, what time period of what control run should be subtracted from a perturbed run to form anomalies?
 - What "forcings" were included in a particular experiment for each model?
- Appears that communication between Metafor and some of the folks who will eventually access the metadata is still limited, as is application of the CIM beyond Metafor.

Metafor Stab

General remarks

- Good job on getting an actual, really relevant 'product' out of Metafor!
- Good job on interacting with each other and working together (e.g. coding sprints).
→ Advantage of a relatively small project

Congratulations to the entire team!

Recommendations

- Organize legacy and governance beyond Metafor
 - Role IS-ENES needs to be clarified
 - Role and commitment of institutes (vs IS-ENES) after Metafor ends, such as BADC, DKRZ, needs to be clarified, including the governance structure
 - Make sure software is well documented before the end of the project (in addition to science papers in journals such as GMD)
 - Outreach to other communities, in particular CORDEX and other MIPS (CFMIP, PMIP, GLACE2)
 - Present Metafor as a benchmark

Recommendations

- Selling the product
 - Need for active communication (but not in a defensive way)
 - Letter to directors through WGCM (Metafor to suggest a text) focusing on need for transparency of climate research & climate debate
 - Letter to modeling leads through WGCM (Metafor to suggest a text) focusing on advantages for scientists
 - Export button/viewer in place to show the potential of the CIM
 - Expectation management. It is more than a few weeks work and one needs to engage specialists.
 - Example of MetOffice to be made public and if possible others (the rest will follow)

Comments

- It is a bit unclear who your audience is:
 - The modellers
 - The IPCC WG1 diagnostics scientists
 - The IPCC WG2/3 impact/integrated assessment community
 - suggestion, focus on WG1 first. Necessary condition for the rest
 - suggestion WG2 through IS-ENES, Era-net Circle etc.

Comments

- Versioning unclear (to us)
 - Suggestion: freeze the questionnaire very soon (at least the ‘outside’), only work on bug fixes and work under the hood thereafter
 - Indicate in questionnaire what mandatory’s are to validate (and what desirables are)
 - Present upfront information with a description of procedure, structure, getting started guide (not in video, but concise description)
 - Export sections to specialists that can be included later (e.g. can an ocean modeller get the ocean section only?)
 - Sharing Q&As