

WCRP REPORT

World Climate Research Programme



ICSU
International Council for Science

PROJECT REPORT

Report of the third session of the WCRP
Modeling Advisory Council (WMAC)

Heidelberg, Germany
2 July 2014

October 2014

WCRP Report No. 16/2014



WCRP Modeling Advisory Council 3rd Session

**Kongresshaus „Stadthalle Heidelberg“, Heidelberg, Germany
2 July 2014**

Present: Christian Jakob (Co-Chair), John Mitchell (Co-Chair), Joan Alexander, Maria Assuncao Dias (remotely), Sandrine Bony, Otis Brown, Antonio Busalacchi, Gokhan Danabasoglu, Michel Dequé, Francisco Doblas-Reyes, Greg Flato, Bill Gutowski (remotely), Masahide Kimoto, Jon Petch, Cath Senior, Graeme Stephens, Jean-Noël Thépaut

Excused: Greg Bodeker, Andy Brown, Peter Cox, Helge Drange, Filippo Giorgi, Toshio Koike, Joe Santanello, Adam Scaife

WCRP JPS: Michel Rixen

1. Introduction

a. Introduction and review of past actions

Christian Jakob and John Mitchell, Co-Chairs of the WCRP Modelling Advisory Council, welcomed all participants and thanked them for their presence. A rapid tour de table allowed everyone to introduce himself. This year's agenda allowed WMAC members to hear all core projects, working group and Grand Challenges reports to the JSC, allowing more comprehensive and informed discussions.

It was recalled that WMAC2 ended with 2 main actions on the modeling prize and summer school respectively. The other important actions were on obs4MIPs and the Earth System Grid Federation (ESGF), which developed during the course of the year.

b. Welcome and Marching Orders from JSC

Antonio Busalacchi welcomed everyone on behalf of the Joint Scientific Committee. He provided for the Council the following marching orders resulting from presentations and discussions during the 2 first days of the JSC35:

- ESGF's role and governance to support WCRP
- modeling coordination with AIMES and Future Earth
- synthesis papers on climate prediction
- WMAC position and representation at the Climate Symposium in Darmstadt and the WCRP-IPCC workshop in Bern

These topics were reviewed under point "2b-c" and "6a AOB" below.

c. Adoption of agenda

The agenda was adopted without any further comments.

2. Actions/Recommendations from JSC presentations

a. Identification of new issues for WMAC from JSC discussions and presentations

The following issues were identified from the JSC discussions and presentations:

- The need for a more identifiable model-based evaluation and distillation strategy used to derive regional climate information
- A need for a clearer identification of model development activities in the Grand Challenges and core projects
- The better coordination of issues around dynamical processes, loosely referred to as climate dynamics
- A possible need to more coherently address systematic errors as a pan-WCRP issue
- A need for clarification of the interaction between DECK and MIPs in the proposed CMIP6 structure
- The evolution of obs4MIPs and its role in model evaluation
- The relationship between CMIP, DECK, MIPs and ESGF, and role of the WGCM infrastructure panel (WIP)

An additional topic on how to communicate/convey effectively uncertainty to end-users was highlighted as a common issue across many WCRP activities.

b-c. New issues raised by WMAC members and actions

Regional climate information

A rigorous and transparent model evaluation protocol and strategy is needed to support the derivation of regional climate information from various global (GCM) and regional models (RCM). This work should ideally be coordinated by the WGRC which in WMAC's view is currently too much application/end-user oriented and should refocus some of its efforts on modeling issues for example on extremes. Current GCMs reach the typical resolution of CORDEX runs, though not over very long runs yet nor under a wide suite of different scenarios and forcing conditions. This highlights the continued need for regional modeling as a central activity, reinforcing the need for bringing more rigor into its execution.

A steady relationship exists in that typical climate model resolutions lag that of global operational weather models by about 20 years. Concerns were expressed at WMAC2 on the way the CORDEX experimental protocol is currently presented. Regional modeling efforts should simulate the 20th century using past climate simulations and reanalysis to really estimate the likely information in downscaled regional climate simulations. Errors in regional models derive partially from the driving GCM. Implications of larger scale dynamics and teleconnections are often overlooked. Hence it is paramount to demonstrate the intrinsic downscaling added value of regional models (RCM). These ideas started more than 15 years ago under WGNE. It was suggested CORDEX could also downscale predictions, i.e. on shorter

time scales than typical projections. Concerns were also expressed on available resources for downscaling, as this competes to some extent with global modeling efforts with a risk of duplication. It was pointed out that this is a WCRP cross-cutting issue and opportunities exist to coordinate these efforts with the other WCRP working groups and core projects such as GEWEX.

Major challenges remain with regional models in terms of conservation of properties which should be addressed in detail. It was recalled that these emerging issues will be considered in the design of CORDEX Phase II. Members also cautioned on the distinction between regional models and modeling of the regional climate. Regional climate is the face of the programme to the outside world and should be a cross-programme activity involving all groups coordinated by WGRC and the Grand Challenge (GC). A rigorous and transparent model evaluation and distillation effort should be central to WGRC and cross-programme activities. WMAC strongly suggests putting greater focus in the WGRC modeling activities on the science challenges and establishing the scientific rigor of the predictions.

Grand Challenges

The Council is comfortable with the way GCs are developing, recognizing that some are clearly mapped onto core projects and others are not, but that all of them will need model development at some stage. It was suggested that each GC should hence address this issue on both scientific and technical sides as part of their overall planning and reporting. Key priorities and potential show stoppers for model development should be identified and clearly communicated by all GCs and core projects. It was noted that the WDAC faces similar issues regarding data and observations, which are not considered in explicitly and systematically enough in the planning of all WCRP activities. A number of proposals to better focus activities around and promote model development were made:

- Organize a large conference on model development around the 2017-2018 timeframe, separate from the systematic error workshop;
- Include a special presentation on model development when WCRP talks to funding bodies;
- Invite model development science presentations at SSGs, JSCs, etc;
- Encourage special model development sessions at all GC and project workshops and conferences wherever possible.

An example for organizing model development was provided by CliC, who have established an ice-sheet model development forum, a simple online meeting place to exchange ideas and results. Similar fora could be established in other science areas. Group memberships could also be “model-development biased” if needed or complemented with relevant model development expertise. A suggestion was made to enforce at least some reporting on model development (in a broad sense) in the annual GC and project reports by asking them to include:

- At least 1 slide on model development activities;
- At least 1 slide on priorities or current impediments resulting from model shortcomings.

Similar recommendations might be made for observations.

Climate dynamics

Members commented that this broad topic is common to many WCRP entities and captured in various ways in core projects, WGs and GCs with a risk of overlaps and gaps. At the regional scale this topic doesn't seem to be addressed very explicitly though with very few experts in this field. It was recalled that WMAC has been established to identify such issues. The complexity and multi-disciplinary nature of such topic should be recognized.

It is currently difficult to know who to contact for specific issues on the subject. Establishing a new body to that effect was not considered appropriate. It was rather suggested SPARC could play that interfacing and communication role, as this project involves experts in that field more directly.

Systematic errors

Studies on systematic errors are organized under the WGNE umbrella but it becomes more and more evident that this issue cuts across many WCRP activities and might require a wider coordination to resolve recurrent issues in models across time and spatial scales. The WGCM is seeking MIP proposals to address systematic errors. The WGSIP recognizes systematic errors as a major impediment to prediction success. Several of the GC goals are intimately linked to reducing systematic errors. It was suggested to perhaps make this an issue for discussion across the community for 2014/2015 and hear recommendations for better coordination at the 2015 JSC/WMAC meetings.

Obs4MIPs and model evaluation

WMAC was very pleased that the obs4MIPs initiated a dialogue with the modeling community but also expressed the need for more high spatio-temporal-resolution data to support process studies and model development. The obs4MIPs timeline is currently constrained by resource limitations. The new GEWEX Process Evaluation Study (GEWEX-PROES) initiative will attempt to include one of the high-temporal resolution GEWEX data sets into the ESGF as a test case to identify technical difficulties along the path. Global Precipitation Climatology Project (GPCP) daily data was suggested as a good initial candidate. The Cloud Feedback Model Intercomparison Project (CFMIP) data sets were also highlighted in this context. Members cautioned about meeting science requirements when publishing observational data sets on the ESGF.

CMIP, DECK, MIPS, ESGF

The WMAC supports the proposal of CMIP to separate CMIP6 into core DECK experiments and affiliated MIPs. However, there was some confusion

how CMIP would ensure that groups running the scenarios (now treated as a MIP outside the core DECK) also submit the DECK experiments with the same model version. WMAC asked WGCM to ensure that this is resolved.

The importance of continued efforts for better model versioning and traceability of simulations in ESGF was highlighted. One member recalled that the work involved in publishing WCRP observations, reanalyses and simulations on ESGF has a lot of benefits but is not a trivial task. It was further noted that currently simulations can be published on ESGF without going through CMIP, which carries the danger of losing track of model versions.

The Council also remarked that the overall ESGF governance remains somewhat unclear even though the establishment of the WGCM Infrastructure Panel (WIP) is seen as a very positive move. However, the broader question remains how WCRP can use the ESGF most effectively across the programme and a future extension of the WIP beyond CMIP and WGCM ought to be further discussed between WMAC and WDAC.

Regarding formats, there remains also a concern between weather standards using Grib, which are frequently used in seasonal prediction efforts, and climate standards using Netcdf, and how WCRP can most effectively contribute to GFCS. It was recalled that the ESGF is more than Netcdf, as it includes quality checks, documentation, etc.

WMAC urged WCRP to advocate strongly for ESGF, otherwise there is a risk this will not develop adequately, especially within core projects. Members felt that ESGF developments are currently resource limited and this message should be conveyed to the JSC. It was also recommended to have an ESGF presentation/demonstration at the next JSC session.

3. CMIP and ESGF issues

a. Discussion of current proposals for CMIP and the use of the ESGF in WCRP

See point 2b-c. above.

4. Summer schools for model development

a-b. A prospectus for a 2015 Summer School on Atmospheric Physics and discussion

A prospectus has been developed and distributed before the session. The First edition will be held 15-26 June 2015 at MPI on “Atmospheric Moist Processes”.

It was recognized that monitoring the success of each event would be important, not only in terms of attendance but also impact on stimulating new

careers and scientific progress in the field of model development. It was suggested to try and track participants for a few years after their attendance of the school to see what impact it had on their career choices.

c. Discussion of future summer schools

It seems that numerous centers would be interested hosting summer schools on model development. WCRP will in principle support this series of event. Some connection with other regular schools such as those organized by NASA or NCAR could be interesting in the future.

The format and focus of each of these events is quite flexible and details can be left to the organizers but it would be useful to inform them on what is expected. Members recommended co-chairs to develop a 1-pager with details on expectation and charge of such task. This could be part of a more general web page on WCRP summer schools with links to particular meetings at host institutions. It was also noted that the branding of such event would need to be somewhat consistent, e.g. "WCRP model development summer school on...".

d-e. Current status of model development prize proposals, discussions and next actions

Members agreed on the "WCRP/WWRP International Modeling Prize" dedicated to Early Career Researchers within 10 years of PhD. There was a general consensus that the award should consist of a certificate and WCRP financial support to attend a science meeting of the choice of the recipient. There were some discussions regarding the composition of the prize committee. It was commented that all model development disciplines should be represented on the committee, but a smaller group consisting of the WMAC and WGNE co-chairs was preferred, as this should in principle cover a wide range of topics and would ensure an efficient review process. Consultation with members would always be possible. The final format of this WCRP/WWRP International Modeling Prize would also need to be accepted by WWRP before announcement in all relevant groups and networks via the web, emails and newsletters.

6. WMAC Business

a. AOB

AIMES

Pierre Friedlingstein has been nominated as a new member on WGCM and will hence represent a direct liaison with the IGBP effort on Analysis, Integration and Modelling of the Earth System (AIMES). Moreover, AIMES is also represented on WMAC by Peter Cox, who was unable to attend WMAC3. It is proposed to further discuss this issue at WGCM18, along with what some have referred to as the "7th Grand Challenge on biospheric forcings (carbon cycle, etc)".

Synthesis papers

The JSC tasked WMAC to consider fostering synthesis papers to communicate progress and limitations in the field of climate prediction. It was noted that papers in BAMS and elsewhere on the topic have been published quite recently. Members wondered about the scope (e.g. time scales, dynamic vs statistical modeling), audience, and scientific value of such paper, as this represents a significant amount of work. The Council also remarked that such authoritative paper would have helped the IPCC AR5. If the purpose is public outreach, the assistance of a journalist would be needed.

Upcoming meetings

The WCRP-IPCC workshop, planned in Bern, 8-11 September will be attended by several WMAC members (Christian Jakob, Sandrine Bony, Greg Flato, Francisco Doblas-Reyes, Masahide Kimoto, Otis Brown). It was commented that 3 workshop topics were not directly part of WCRP expertise and it will hence be important to communicate what WCRP can do to address IPCC uncertainties. The workshop can be a place to advocate for model development and atmosphere dynamics in particular.

The Climate Symposium was designed to address observational requirements for WCRP science. The WDAC Co-chair noted the concern about the spatio-temporal resolution of data sets which should match improvements in model resolution.

WMAC also recommended discussing Early Career Scientist networks, at the wider WCRP level.

b. Next meeting

It was commented that the current agenda format was good, half a day on Wednesday being probably enough to discuss all major items relevant to WMAC, including modeling issues raised at the JSC, as this also allows a report back to the JSC. WMAC recommends encouraging the GCs and core projects to more directly address modeling issues and roadblocks in their reports to the JSC (see above).

c. Review of actions and decisions

Actions were reviewed at the end of the session and are summarized in Appendix B.

APPENDIX A – list of contacts

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Appendix B – list of actions

Promoting model development

1. Model development, model and data impediments should be mentioned specifically in Project and GC reports (1 slide as a minimum) – **all projects, WGs and GCs (JSC36)**

Regional climate information

2. Design and implement an evaluation strategy for regional climate information based on global and regional products – **WGRC (spring 2015)**

3. Develop a synthesis paper on the status of model-based climate information on regional scales. As part of this activity consider organizing a science workshop with CORDEX, WGNE, WGCM, WGSIP and core projects – **WGRC (spring 2015)**

ESGF

4. Consider having ESGF representative/talk at next JSC meeting to implement proper governance within WCRP for a whole-of-programme liaison with the ESGF (Extension of WIP portfolio is one option, establishing other IPs is another), be an advocate to help raise the necessary funding – **JSC (JSC36)**

Summer school on model development

5. Design invitation document that sets out requirements and selection criteria to host the school – **WMAC (fall 2014)**

6. Advertise school concept on website and link to specific school website and other relevant summer schools in the community - **JPS (fall 2014)**

WCRP/WWRP International Prize for Model Development

7. Formalize the creation of an annual Model Development Prize together with WWRP specifying eligibility, selection process, nominations, etc. – **WMAC (fall 2014)**

Climate dynamics

8. Encourage SPARC to be the WCRP Point of Contact on atmospheric dynamics and explore, through discussion among core projects, working groups and GCs, the need for a separate Climate Dynamics Panel – **SPARC (SSG, Jan 2015)**

CMIP and DECK

9. Clarify need (or not) for DECK experiments as an entry requirement for other activities – **WGCM/CMIP (Sept 2014)**