

# Report of the 21<sup>st</sup> session of the WCRP Working Group on Coupled Modeling

9-13 October 2017, UK MetOffice, Exeter, UK



January 2018

WCRP Publication No.: 3/2018



## **Disclaimer**

The right of publication in print, electronic and any other form and in any language is reserved by the World Climate Research Programme (WCRP). Short extracts from WCRP publications may be reproduced without authorization provided that the complete source is clearly indicated. Editorial correspondence and requests to publish, reproduce or translate this publication, either as a whole or in part, should be addressed to: [wcrp@wmo.int](mailto:wcrp@wmo.int).

The designations employed and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariats of WCRP Sponsor Organizations – the World Meteorological Organization (WMO), the Intergovernmental Oceanographic Commission (IOC) of UNESCO and the International Council for Science (ICSU) – concerning the legal status of any country or territory, or its authorities, or concerning the delimitation of the frontiers of any country or territory.

Recommendations of working groups and panels shall have no status within WCRP and the Sponsor Organizations until they have been approved by the Joint Scientific Committee (JSC) of WCRP. The recommendations must be concurred with by the Chair of the JSC before being submitted to the designated constituent body or bodies.

## **Executive Summary**

The WGCM-21 session was held at the UK MetOffice, Exeter, UK on 9-13 October 2017, in the context of the pan-WCRP Modeling week held the same week. The main objective of the meeting was to review progress on the implementation of CMIP, including forcing and infrastructure issues, linkages with Vulnerability, Impacts and Adaptation efforts of VIACS, as well as connections with other modeling groups such as WGNE, WGSIP, CORDEX, the Grand Challenge on Clouds, Circulation and Climate Sensitivity and recommendations for the preparation of the next CMIP7 cycle. Breakout groups discussions during the week also suggested a number of additional actions for WGCM in light of the WCRP sponsors' review and development of the new WCRP Strategic Plan.

The present report is meant to complement the detailed PowerPoint Presentations available on the meeting web site and to synthesize discussions and actions agreed at the end of the session.



Informal WGCM-21 evening session ...

# Contents

<b>1. CMIP</b>	<b>1</b>
1.1. Forcings	1
1.2. MIPS	2
1.3. Infrastructure	2
<b>2. Joint session with WGNE</b>	<b>2</b>
<b>3. GC on carbon cycle and group reports</b>	<b>3</b>
<b>4. Joint Session with CORDEX</b>	<b>3</b>
<b>5. VIACS presentation</b>	<b>3</b>
<b>6. Reflections from WMAC BOGs</b>	<b>4</b>
<b>7. CMIP7</b>	<b>5</b>
<b>8. Membership and Next Meeting</b>	<b>5</b>
<b>APPENDIX A – CONTACT LIST</b>	<b>7</b>





**PRESENT:** Cath Senior (Co-chair), Greg Flato (Co-chair), V. Balaji, Dave Bi, Peter Cox, Gokhan Danabasoglu, Veronika Eyring, Pierre Friedlingstein, Filippo Giorgi, Peter Gleckler, Bill Gutowski, Gerhard Krinner, Christian Jakob, Masa Kageyama, Michio Kawamiya, Jerry Meehl, Ron Stouffer, Swapna Panickal, Karl Taylor, Claas Teichman, Bart van den Hurk, Bin Wang, Keith Williams, Ayrton Zadra, Tianjun Zhou

**EXCUSED:** Simon Marsland, Bjorn Stevens, Claudia Tebaldi, Detlev van Vuuren

**WCRP JPS:** Michel Rixen

## 1. CMIP

### 1.1. Forcings

An update on the status of CMIP6 forcing data was given. The latest official CMIP Panel Release of the CMIP6 Forcing Datasets is v6.2.0 (20 September 2017). Compared to the previous CMIP Panel release (dataset collection v6.1.1; 22nd May 2017), the new dataset collection incorporates updates to the CEDS (small but unrealistic aircraft emissions before 1920 are set to zero) and in the IACETH (stratospheric aerosols) forcing datasets (unrealistic volcanic emissions in 1972 were removed and a time-varying background in SAOD introduced). Future climate scenarios now expected Jan 2018.

#### **ACTIONS:**

- a. Modelling Groups to use latest release but no need to re-run if piControl and DECK idealized simulations (1pctCO<sub>2</sub>, abrupt-4xCO<sub>2</sub>) have already been started with v6.1.1 as mean forcing is essentially unchanged (but caveat is that v6.2.0 forcing dataset is being investigated so see below).
- b. The v6.2.0 forcing dataset has now been applied in initial CMIP6 model simulations (see slides from modelling groups at the WGCM meeting website). So far:
  - One modelling center has produced a large difference in response in their model when switching from CMIP5 to CMIP6 v6.2.0 emissions, producing anomalous cooling from about 1950 to 1980, and a faster than observed warming after 1980. It is unclear what specific aspects of the emissions are leading to these differences but they seem to be impacting the aerosol indirect effect simulated in this model (and more specifically to produce large values of short wave cloud forcing in the stratocumulus decks off the west coasts of North and South America). The indirect aerosol scheme of this model is being further evaluated, but we want to make all model groups aware of this issue in case similar problems arise.
  - There are on the other hand two other modelling groups that find hardly any difference in response in their model when switching from CMIP5 to CMIP6 v6.2.0 emissions in a model version with interactive aerosols.

**We would like to encourage all modelling groups to test the CMIP6 historical forcing** and report to the CMIP Panel any unusually responses or features. We are

- in particular looking for results that compare a historical simulation using CMIP5 versus CMIP6 emissions with a model with interactive aerosols.
- c. C4MIP to send an email to modelling groups about a technical land-use forcing issue involving discontinuity between pre-industrial and historical forcing data.

## **1.2. MIPS**

There are no reported issues with the CMIP6-Endorsed-MIPs. Two new MIPs have been proposed, namely Polar Amplification MIP (PAMIP) and Carbon Dioxide Removal MIP (CDRMIP).

### **ACTIONS:**

- a. CMIP panel are reviewing both applications. CDRMIP may be considered as an extension of GeoMIP.

## **1.3. Infrastructure**

A discussion was had on infrastructure status and future requirements for forcing datasets, data request, software for data manipulation and archiving and publishing. This focused on advances since CMIP5 and remaining shortcomings and areas for future improvement. Going forward a number of proposals for a more robust process in these areas were proposed. These will be considered by the CMIP Panel in the future.

### **ACTIONS – near term:**

- a. Karl to agree with Martin Juckes if/when we can we define the latest data request version (1.16 -> 1.2) as an 'official WIP' release and limit further changes to be sanctioned by the WIP.
- b. Every modelling group should appoint a member to the CDNOT (CMIP6 Data Node Operations group)
- c. Modelling groups to get involved in ES-Doc review of short tables (happening now). Training for modelling centres available mid-December.

### **ACTIONS – longer term:**

- d. Consider asking input4MIPs (currently led by Paul Durack at PCMDI) to take a more formal role in the coordination of the forcing datasets during CMIP7
- e. Look for early adopter testing for forcing data among modelling groups. Can each group give a named contact point for forcing testing?
- f. CMIP Panel to consider an additional MIP endorsement criteria related to technical expertise in data standards

## **2. Joint session with WGNE**

Several talks around application of metrics to the CMIP6 submitted data were given and obs4MIPs was discussed. An update on the GC on clouds, circulation and climate was given and one on the WGNE drag project.

## **ACTIONS**

- a. CMIP metrics leads (Veronika/Peter) to communicate with the modelling groups so they are aware that once they have submitted their results to CMIP6 to expect to see the evaluation diagnostics and performance metrics openly available (no password). Water-marking of the results is fine as that is really a protection for those publishing the results. The website at <http://cmip-esmvaltool.dkrz.de/> already shows results produced with the Earth System Model Evaluation Tool (ESMValTool) for CMIP5 simulations. This website will be updated with CMIP6 results as soon as the model output is submitted to the ESGF. All modelling groups are encouraged to quality control the results for their model.

## **3. GC on carbon cycle and group reports**

An update on the GC on carbon cycle was given and all WGCM members reported on their country activities towards CMIP6. Details are available in the published slides.

## **4. Joint Session with CORDEX**

A very useful joint discussion was held about how HighResMIP simulations can inform CORDEX about downscaling global models. There was encouragement to share performance metrics and diagnostics on regional behavior. We also discussed the availability of CMIP6 data on the timescales for CORDEX to use for AR6 and how CMIP5 might provide a more comprehensive group of model to explore range of climate sensitivity. It was noted that an IPCC expert workshop on regional climate is being planned for Spring 2018, and this will provide an opportunity for discussion of needs and potential coordinated activity in support of a regional climate atlas for the IPCC AR6.

## **ACTIONS**

- a. CORDEX co-chairs to send an email to CMIP Panel chair (Veronika) which she will circulate to modelling groups.
- b. Malcolm Roberts to be point of contact for HighResMIP with CORDEX co-chairs.
- c. WGCM and CORDEX co-chairs to have a teleconference to discuss value of downscaling and other issues.
- d. CORDEX and WGCM co-chairs to facilitate communication related to IPCC expert workshop.

## **5. VIACS presentation**

Claas Teichmann presented progress within the vulnerability, Impacts, adaptation and climate services MIP. They are keen to develop online diagnostics metric and visualization relevant to

society using CMIP6 data. Modelling groups might best be engaged around WGs for specific regions or topics rather than look for a single model rep to represent all VIACS interests.

## **ACTIONS**

- a. WGCM co-chairs to ask VIACS board to look at existing guidance documents (Euro-CORDEX, TGICA scenario guidance document (Jason Lowe))- what gaps need filling? Might someone from VIACS sit on the TGICA board?
- b. WGCM co-chairs to ask VIACS to look for a demonstration project over the coming year? e.g. extend existing projects from single to multi-model projects.
- c. Claas Teichmann to draft an email that could be sent to modelling groups by Veronika. Ask modelling groups to come up with a name to subscribe to the mailing list.

## **6. Reflections from WMAC BOGs**

WGCM members were present at most of the WMAC break-out sessions so as a group we reflected on the potential outcomes and actions for WGCM. These were reported back to WMAC.

### **ACTIONS/ outcomes**

#### *Metrics/diagnostics*

- a. To promote T-AMIP as a 'proto-DECK' experiment within modelling community
- b. To consider an open source repository for metrics code (Peter Gleckler)
- c. Peter Gleckler and Veronika to communicate with modelling groups about how the CMIP metrics evaluation will be published.

#### *Infrastructure*

- a. WMAC/WGCM to consider broadening the terms of the WIP but ensuring no loss of focus on CMIP6
- b. WMAC to develop ideas for more stable funding for Infrastructure work

#### *High Resolution Modelling*

- a. WGCM and CORDEX to engage more closely. This will be done through a direct contact from CORDEX to Malcolm Roberts, co-chair of HighResMIP and through a planned telecon between WGCM and CORDEX co-chairs. Issues to be discussed include comparison of global and regional simulations at same resolution and further understanding of modelling of regional climate.

#### *ESM/Seamless*

- a. GC on carbon cycle to build strong links with GC on decadal predictability to support understanding of decadal variations in carbon within IPCC (global stocktake).
- b. As clarity emerges on future of AIMES, WGCM to build and maintain links with AIMES, particularly in the area of representing and evaluating carbon cycle processes in Earth System Models.

*Multi-model synthesis and uncertainty/Linking models to user community*

- a. WGCM to promote literature on multi-model ensemble and extracting information e.g. sub-selecting GCMs to drive regional models
- b. WGCM to promote VIACS diagnostics and working to engage with this community (e.g. through guidance documents, demonstration projects, IPCC –DDC)

## 7. CMIP7

We discussed ideas and requirements for CMIP7. No solutions were decided but some questions and suggestions included were:

- a. Should CMIP7 look to be a less ambitious update than previous CMIPs. e.g. in terms of model development, forcing data, numbers of MIPs,...? There is not enough time for all necessary testing (new models, forcing datasets, data request etc) when modelling groups set ambitious goals for ‘new’ models for each CMIP
- b. The growing dependency on CMIP products by a broad research community and by national and international climate assessments means that basic CMIP activities, such as the creation of forcing datasets, the provision and archiving of CMIP products, and model development, require substantial efforts.
- c. Include a proper beta-testing for all forcing datasets with at least a subset of the modelling groups involved before an official CMIP Panel release is made.
- d. Form a CMIP Data Request Panel
- e. A thorough review of the whole data request is too big a job for one individual – how can we handle this going forward?

## 8. Membership and Next Meeting

All membership issues for 2018 finalized. New members are Balaji (GFDL), Johan Jungclaus (MPI), Brian O’Neill (representing IAM community) and Masahiro Watanabe (JMA). Stepping down this year are Bjorn Stevens (but remaining on the CMIP panel), Claudia Tebaldi, Detlef van Vuuren and Michio Kawamiya. Thanks to all those stepping down, we are enormously grateful for all your active engagement in the work of WGCM.

### **ACTIONS:**

- a. We agreed not to have a face-to-face WGCM meeting in Autumn 2018. Instead we will hold a series of shorter (2-3 hour) teleconference sessions on specific topics that we need to discuss collectively. We will aim to time these optimally for

everyone or at least fairly so no member has to continually be up in the middle of the night!

- b. We will hold the next WGCM alongside the CMIP6 analysis conference in spring 2019. We encourage the CMIP6-Endorsed MIPs to participate in this meeting.
- c. An initial possible location for the CMIP6 conference is Barcelona (offered by Paco Doblas-Reyes now WMAC co-chair), although there are other offers to host. WGCM co-chairs and CMIP Panel chair to develop these ideas and seek funding options.

## APPENDIX A – CONTACT LIST

### Members

Cath Senior (Co-chair)  
Head of Understanding Climate Change  
Met Office Hadley Centre  
Fitzroy Road  
Exeter EX1 3PB  
UK  
[Cath.senior@metoffice.gov.uk](mailto:Cath.senior@metoffice.gov.uk)

Greg Flato (Co-chair)  
Environment Canada  
Canadian Centre for Climate Modelling and Analysis  
PO Box 3085, STN CSC  
University of Victoria  
Victoria, BC, V8W 3V6  
Canada  
[greg.flato@ec.gc.ca](mailto:greg.flato@ec.gc.ca)

Veronika Eyring (CMIP Panel Chair)  
Deutsches Zentrum fuer Luft- und Raumfahrt (DLR)  
Institut für Physik der Atmosphäre (IPA), Oberpfaffenhofen  
82234 Wessling  
Germany  
[veronika.eyring@dlr.de](mailto:veronika.eyring@dlr.de)

Pierre Friedlingstein  
University of Exeter  
College of Engineering, Mathematics and Physical Sciences  
Harrison Building, North Park Road  
Exeter, EX4 4QF  
UK  
[p.friedlingstein@exeter.ac.uk](mailto:p.friedlingstein@exeter.ac.uk)

Masa Kageyama  
LSCE CE Saclay, L'Orme des Merisiers, bât. 701  
91191 Gif-sur-Yvette  
France  
[Masa.Kageyama@lsce.ipsl.fr](mailto:Masa.Kageyama@lsce.ipsl.fr)

Michio Kawamiya  
Group Leader, Integrated Earth System Modeling Research Team  
Research Institute for Global Change  
Japan Agency for Marine-earth Science and Technology  
3173-25, Showamachi, Kanazawa-ku  
Yokohama 236-0001  
Japan  
[kawamiya@jamstec.go.jp](mailto:kawamiya@jamstec.go.jp)

Simon Marsland  
CSIRO Oceans and Atmosphere  
Earth Assessment Program  
Private Bag 1  
Aspendale, VIC 3195  
Australia  
[simon.marsland@csiro.au](mailto:simon.marsland@csiro.au)

Swapna Panickal  
[swapna@tropmet.res.in](mailto:swapna@tropmet.res.in)

Bjorn Stevens  
Max Planck Institute for Meteorology  
Bundestrassse 53  
20146 Hamburg  
Germany  
[bjorn.stevens@mpimet.mpg.de](mailto:bjorn.stevens@mpimet.mpg.de)

Claudia Tebaldi  
NCAR  
PO Box 3000  
Boulder, CO 80307  
USA  
[tebaldi@ucar.edu](mailto:tebaldi@ucar.edu)

Tianjun Zhou  
[zhoutj@lasg.iap.ac.cn](mailto:zhoutj@lasg.iap.ac.cn)

Bart van den Hurk  
KNMI  
[bart.van.den.hurk@knmi.nl](mailto:bart.van.den.hurk@knmi.nl)

Detlef van Vuuren  
PBL – Netherlands Environmental Assessment Agency  
PO BOX 303  
3720 AH Bilthoven  
The Netherlands  
[Detlef.vanvuuren@pbl.nl](mailto:Detlef.vanvuuren@pbl.nl)

**Other invited experts (CMIP panel, WIP panel, ex-officio members)**

V. Balaji  
NOAA/GFDL and Princeton University  
201 Forrestal Road  
Princeton, NJ 08540-6649  
USA  
[v.balaji@noaa.gov](mailto:v.balaji@noaa.gov)

Gokhan Danabasoglu  
NCAR  
1850 Table Mesa Drive

Boulder, CO 80305  
USA  
[gokhan@ucar.edu](mailto:gokhan@ucar.edu)

Gerald Meehl  
National Center for Atmospheric Research (NCAR)  
Climate and Global Dynamics Division  
P.O. Box 3000  
Boulder, CO 80307-3000  
USA  
[meehl@ncar.ucar.edu](mailto:meehl@ncar.ucar.edu)

Peter Gleckler  
Lawrence Livermore National Laboratory  
P.O. Box 808, L-103  
Livermore, CA 94550  
USA  
[gleckler1@llnl.gov](mailto:gleckler1@llnl.gov)

Ron Stouffer  
[University of Arizona](#)  
[Dept of Geosciences](#)  
[Tucson, AZ 85721](#)  
USA  
[ronstouffer@gmail.com](mailto:ronstouffer@gmail.com)

Karl Taylor  
PCMDI Director  
Lawrence Livermore National Laboratory  
P.O. Box 808, L-103  
Livermore, CA 94550  
USA  
[taylor13@llnl.gov](mailto:taylor13@llnl.gov)

## **WCRP JPS**

Dr Michel Rixen  
Senior Scientific Officer  
World Climate Research Programme  
c/o WMO  
7bis, avenue de la Paix  
Case postale 2300  
CH-1211 Geneva 2  
Switzerland  
Tel: +41 22 730 8528  
Fax: +41 22 730 8036  
[mrixen@wmo.int](mailto:mrixen@wmo.int)

**The  
World Climate  
Research Programme  
(WCRP)**

*facilitates analysis and  
prediction of Earth system change  
for use in a range of practical  
applications of direct relevance,  
benefit and value to society.*

