

# **Addendum to the CMIP5 Experiment Design Document: A compendium of relevant emails sent to the modeling groups**

## **CMIP5 Update**

13 November 2010:

Dear all,

Here are some items that should be of interest to those of you participating in CMIP5. Please pass on this information, especially to those who are responsible for preparing the model output for the CMIP5 archive.

1. For those of you doing the emissions-driven simulations: Unless it's too late, it is recommended that the recently produced gridded fossil fuel emissions data from Andres (hosted by IPSL) and the land use data from Houghton (hosted at MPI) should be used for the historical simulations. More information should appear soon on the CMIP5 website.

These fossil fuel emissions data can be retrieved from:

<http://dods.ipsl.jussieu.fr/cpipsl/ANDRES/>

File name is : CMIP5\_gridcar\_CO2\_emissions\_fossil\_fuel\_Andres\_1751-2007\_monthly\_SC\_mask11.nc

It is a monthly dataset, units are gC/m2/s

Also provided is an ascii file that contains the globally integrated emissions for every month.

CMIP5\_gridcar\_CO2\_emissions\_fossil\_fuel\_Andres\_1751-2007\_monthly\_SC\_grid1x1.txt

The land use file can be found at MPI:

<http://www.mpimet.mpg.de/en/wissenschaft/land-im-erdsystem/wechselwirkung-klimate-biogeosphaere/landcover-change-emission-data.html>

File name is: carbon\_emissions\_landuse\_20person.nc

It is an annual dataset, units are also gC/m2/s

2. Again for those of you with coupled carbon climate models (ESM's): The CMIP5 expts. 5.4 and 5.5 are designed to isolate the climate change effects on carbon uptake from the uptake due to CO2 concentration increases (in the absence of climate change). Originally there were two options proposed for these experiments: analyze 1%/yr CO2 increase runs or analyze historical+RCP4.5 runs. At the WGCM meeting last month and in subsequent discussion, it was decided that for groups who have not yet performed these experiments, it would be better if they would base these runs on the idealized 1%/yr CO2 increase (rather than the historical+RCP4.5 simulations). There will, of course, also be interest in the historical+RCP4.5 runs, so groups who have already done these runs, should contribute them to the archive.

3. We recently posted a revised document describing the model output requirements for

CMIP5 (see [http://cmip-pcmdi.llnl.gov/cmip5/output\\_req.html?submenuheader=2#metadata](http://cmip-pcmdi.llnl.gov/cmip5/output_req.html?submenuheader=2#metadata) ). (Those of you who have chosen \*not\* to use CMOR2 to rewrite your model output should study this document carefully; those of you using CMOR may refer to the CMOR documentation for most of the information you need to know. The CMOR documentation has also been recently revised with expanded descriptions of what you must supply.) At the beginning of the output requirements document there is a link directing the user to the bottom of the document where a list of the changes that were made can be found. Nearly all the changes were simply to improve clarity. Please note, however, that a new global attribute is now required for most simulations (parent\_experiment\_rip), which identifies which ensemble member the child experiments was spawned from. This information will be essential for many CMIP5 studies.

4. The so-called "data reference syntax" document has also been revised. Again, many of the changes should simply make it easier to understand. Data providers will be especially interested in the official "short names" of the CMIP5 experiments, since these names are used in constructing filenames. This document can be obtained through the following link: [http://cmip-pcmdi.llnl.gov/cmip5/output\\_req.html?submenuheader=2#req\\_format](http://cmip-pcmdi.llnl.gov/cmip5/output_req.html?submenuheader=2#req_format)

5. The latest version of CMOR2 was just released on 12 November 2010. The changes made were summarized on an announcement made to those of you on the cmor email list. It also includes the latest "requested variables" CMOR tables (also posted at [http://cmip-pcmdi.llnl.gov/cmip5/output\\_req.html?submenuheader=2#req\\_list](http://cmip-pcmdi.llnl.gov/cmip5/output_req.html?submenuheader=2#req_list) ), which includes a number of formerly missing "standard names", and also some corrections. Please download the latest version of CMOR, the CMOR tables and the documentation before continuing to process your data.

6. At the WGCM meeting there was agreement that it would be useful for model evaluation and detection/attribution studies to extend the CMIP5 historical runs to near-present (as we have for AMIP), rather than ending them in 2005. In fact since the CMIP5 project is ongoing, it would be useful to have simulations extended to at least the end of 2012 using some estimate of recent and future forcing. There is, however, no community-wide accepted observationally-based concentration/emissions past 2005. Groups are therefore free to use whatever concentrations, solar forcing, SO2 emissions etc. they want to use in extending these runs. It is also o.k. for detection/attribution studies to simply splice one of the RCP runs to the end of the historical simulations. No matter what forcing is chosen it is important to consider the following:

a) The groups should take care that there are no substantial discontinuities in the forcing in passing from the "past" to the "future", defined to be the end of 2005.

b) It is recommended that if an ensemble of "all-forcings" historical simulations have been run, then **\*each\*** member of the ensemble should be carried to the end of 2012. Thus, a full ensemble of runs (through year 2012) would be available for analysis.

c) It is recommended that all historical runs with only a subset of forcing (e.g., GHG only,

natural forcing only) should also be extended through the year 2012.

d) If one of the RCP forcings is used to extend the historical run, it may not matter too much which RCP is chosen, and CMIP5 makes no strong recommendation. If a modeling group has no preference, they might choose the RCP8.5 expt., as at least one group (the Hadley Centre) has made this choice already.

e) For all-forcing (anthro + natural) historical runs, the extended portions of these runs should be treated as a new runs spawned from the parent historical runs at the end of year 2005. If this run is forced by an RCP that extends at least to the end of the 21st century, then nothing special needs to be done. If, however, some other forcing is used or if the run is an RCP run that is truncated after a few years (say ending in 2012), then the run should be considered a "historical extension" experiment with its output placed in a directory named historicalExt. The "forcing" attribute (a netCDF global attribute) should describe what forcing is used to extend the run, and this information will also need to be recorded when entering information about the run in the METAFOR questionnaire. Placing the extended portion of the historical runs in a separate place will help guard against users assuming that these runs are necessarily based on historically-measured concentrations, land-use changes, solar forcing, etc. For these historicalExt experiments, the ensemble member (designated by the "rip" value appearing in the filename and recorded as netCDF global attributes) will be identical to the historical run it extends. Also for the runs, the identifying netCDF global attributes should be defined as follows: experiment="historical extension" and experiment\_id="historicalExt". The "Data Reference Syntax" document and the CMOR tables will be revised shortly to include these "new" experiments.

f) If one chooses to do historical runs with only a subset of forcing (e.g., GHG only, natural forcing only, single-forcing experiments, etc.), then all the data for the complete historical period and in the extended portion (from 2006-2012) would be kept together, no matter what forcing was used (in the historicalNat, historicalGHG, or historicalMisc directories). (In these clearly "unrealistic" cases, naive users will be less likely to access the output and possibly misuse it.)

7. For your information, We've posted (see <http://cmip-pcmdi.llnl.gov/cmip5/terms.html?submenuheader=3>) the latest (and final) version of the the two different terms of use governing the CMIP5 model output. It looks like about half the groups plan to release their data for "unrestricted" use and half for "non-commercial educational and research purposes" only.

Carry on!

Best regards,  
your faithful CMIP5 comrades (Karl's lame attempt to try to develop a little esprit de corps here),  
Karl and Ron

## **Bias corrections for decadal predictions**

17 February 2011

Dear All,

The joint CMIP-WGCM-WGSIP Decadal Climate Prediction Panel (<http://www.wcrp-climate.org/decadal/cmip5.shtml#dcpp>) has prepared the attached document with recommendations on 'Data and Bias Correction for Decadal Climate Predictions'.

The document can also be found on the CLIVAR WGSIP and WGCM websites, as well as the WCRP Decadal Climate Prediction website: <http://www.wcrp-climate.org/decadal/index.shtml>

The document explains the use of bias correction in decadal predictions, outlines which bias corrected data should be submitted to the CMIP5 archive and emphasizes the importance of clearly reporting what bias correction has been used.

Please distribute widely.

Best wishes

Anna Pirani

## **Additional “start dates” for decadal predictions**

12 September 2011:

Dear CMIP modelers:

At and following a recent Aspen Decadal Prediction Workshop, there was considerable discussion about the limitations of the decadal experiments called for by CMIP5. The WCRP's Decadal Prediction Panel (DCPP) and the CMIP Panel have reviewed the arguments and have agreed to encourage modeling groups to modify their priorities/plans to perform decadal prediction runs (identified as expt. 1.1, 1.1-E, and 1.1-I in the CMIP5 design document: [http://cmip-pcmdi.llnl.gov/cmip5/docs/Taylor\\_CMIP5\\_design.pdf](http://cmip-pcmdi.llnl.gov/cmip5/docs/Taylor_CMIP5_design.pdf)) as follows:

Rather than limiting the number of start dates for predictions to every 5th year plus every year after 2000, perform predictions starting near the end of \*every\* year from 1960 through near present. For each start date (1960, 1961, ... ~2010) perform an ensemble of at least 3 runs, and up to 10 runs, with a priority to include as many of these initialization dates as possible (i.e., increasing the number of initialization dates is preferred to increasing the size of the ensembles beyond 3 members). If you cannot include every year as a start date, include the core years (1960, 1965, 1970, .... 2000, 2005) and then add additional runs evenly distributed over the period 1960-2010.

If limited resources mean you are unable to produce the full suite of CMIP5 near-term experiments (1.1 - 1.6, 3.3, 3.1-S, and 6.1-S), please prioritize as follows :

1. perform 10-year core expts. initialized in 1960, 1965, 1970, 1975, 1980, 1985, 1990, 1995, 2000 and 2005 and 30-year expts. initialized in 1960, 1980, and 2005.
2. perform all or a subset of Tier 1 experiments that you think will be most helpful in interpreting the core experiments, and include the additional decadal experiment start dates called for above in your consideration.

The main reason for including additional start dates is that it appears that the set of 10 start dates called for by the CMIP5 core may be too few for robust bias adjustment and other statistical calculations. While the "Tier 1.1-I" predictions (start dates for every year following year 2000) add some data they are not evenly distributed over the 1961-2010... period of interest.

Best regards,

Karl Taylor, Ron Stouffer (CMIP Panel Chair), and George Boer (DCPP Chair)

## Request for sea level diagnostics

23 September 2011:

Dear CMIP5 contributors:

The CMIP5 modeling panel has received a request from IPCC WG1 to urge you to report from your CMIP runs the global mean sea level change due to thermal expansion (named "zostoga") and sea surface height above geoid (zos). The highest priority is to compute this for the historical, piControl, and RCP runs (including both the prescribed concentration and ESM runs). [Be sure that for the control, the period reported covers all the historical and RCP periods, although there will also be scientific interest in this variable for the idealized 1%/yr CO<sub>2</sub> run, among others.]

We understand that the zostoga diagnostic is not routinely performed by many modeling groups, but it is of considerable interest to the adaptation, vulnerability, and impacts communities, and the "sea level" chapter and the "model evaluation" chapter of the AR5 plan to plot the changes in global sea level due to thermal expansion. In order to include a preliminary plot in the first draft, they need the zostoga time-series as soon as possible. Therefore, if you are able to compute the time-series, but for whatever reason you think that making it accessible on the CMIP5 output archive will be delayed, then in the short term please consider also sending the data in whatever format you like to Jonathan Gregory ([j.m.gregory@reading.ac.uk](mailto:j.m.gregory@reading.ac.uk)) and Peter Gleckler ([gleckler1@llnl.gov](mailto:gleckler1@llnl.gov)) who will be preparing the IPCC plots.

Information on how to compute zostoga can be found at [http://www.clivar.org/organization/wgond/references/WGOMD\\_CMIP5\\_ocean\\_fields.pdf](http://www.clivar.org/organization/wgond/references/WGOMD_CMIP5_ocean_fields.pdf)

sect 4.2.7, p23 and footnote 14, especially equation 4.48 on p44. This quantity is derived from the volume-mean change in density of the ocean due to change in in-situ temperature only, with no change in salinity or pressure. In calculating this quantity, modellers should use the same 3D salinity and pressure reference fields for all times in all of their experiments with a particular model. A good choice would be a point in the control run near the start of the historical runs.

Another important sea level quantity for IPCC WG1 is the sea surface height above the geoid (zos). This quantity provides the information on patterns of local sea level change. In ocean models with a free surface, it is a diagnostic, and should not require special calculations. We therefore hope that modellers will provide this diagnostic to CMIP5 as a matter of priority. There is a discussion of this quantity and how to calculate it in the same document as quoted above, sect 4.2.5, p25. It is more complicated to obtain from rigid-lid ocean models but this is also routinely done. Please contact Jonathan Gregory ([j.m.gregory@reading.ac.uk](mailto:j.m.gregory@reading.ac.uk)) if you need further advice.

Best regards,

Ron Stouffer (CMIP Panel Chair) and Karl Taylor

## **Modifications to specifications for decadal prediction experiments**

3 January 2012

Dear CMIP modellers:

The decadal prediction component of CMIP5 attempts to coordinate some aspects of the new and evolving effort in initialized decadal climate prediction. Based on the experience gained and on discussions at the Aspen Decadal Prediction Workshop and at meetings of WGSIP, WGCM, TSFC and elsewhere, the CMIP Panel and the DCPD recommend the following modifications to the experimental design and list of requested model output:

A. Additional decadal prediction simulations called for (besides those described in the CMIP5 design document: [http://cmip-pcmdi.llnl.gov/cmip5/docs/Taylor\\_CMIP5\\_design.pdf](http://cmip-pcmdi.llnl.gov/cmip5/docs/Taylor_CMIP5_design.pdf)):

1. Additional start dates (every year, rather than every 5th year), as described in an email sent to you in September, which is copied below.
2. An historical (1850 - at least 2005) simulation (or ensemble of simulations) made with your "decadal prediction" model, but initialized from a control run. The "historical" experiment is described in Table 3 of CMIP5 design document). This experiment is considered to be "Tier 1" for decadal prediction models.

B. Changes to the "List of Requested Model Output" ([http://cmip-pcmdi.llnl.gov/cmip5/data\\_description.html](http://cmip-pcmdi.llnl.gov/cmip5/data_description.html)):

For decadal prediction output (only), the priority should be reduced to "low" for the following "sub-daily" frequency variables:

1. CMOR Table 6hrLev: Fields (Sampled Every 6 Hours) for Driving Regional Models
2. CMOR Table 6hrPlev: Fields (Sampled Every 6 Hours) for Storm-Track Analysis and other Advanced Diagnostic Applications
3. CMOR Table 3hr: 2-D Atmospheric and Surface Fields Sampled Every 3 Hours

The addition of the "historical" experiment for decadal prediction models is motivated by our interest in assessing the value of initialized decadal forecasts compared to forced simulations. (Many groups are already performing simulations for this purpose.) It also will allow us to compare on equal footing the decadal prediction models with those performing only the "long-term" suite of CMIP5 runs.

The reduction in priority of "sub-daily" decadal prediction data sets is made in consideration of the enormous amount of data requested and the complications in dealing with drift correction and with other difficulties and statistical uncertainties (given the relatively few core decadal prediction experiments called for by CMIP5). The priority of

daily decadal prediction data (CMOR Table day: Daily Mean Atmosphere, Ocean and Surface Fields) is \*NOT\* reduced.

Best regards,

Karl Taylor, Ron Stouffer (CMIP Panel Chair), and George Boer (DCPP Chair)