

## Overview

A series of short term experiments have been proposed for AR5. In these experiments, climate models are to be integrated for about 30 years to investigate issues involving decadal predictability, changes in regional extremes, impacts of atmospheric chemistry/air quality and changes in short lived species on climate. Since the resources needed to fully investigate any one of these important issues is quite large, each modeling group should be free to pursue questions that interest them in these wide fields of scientific investigation. However, looking forward to the science investigations which will seek to reach conclusions that span multiple models, it is important to perform these experiments in such a way to allow such multi-model comparisons. This document seeks to provide such an outline.

The following pages will put forth a general framework, a model intercomparison project (MIP) for each area of interest. Groups are encouraged to provide data to the CMIP5 database from as many of the different types of experiments outlined below, as they see fit. More detailed proposals for other MIPs are encouraged.

The overall view is that the RCP4.5 scenario will be used for the short term experiments. This scenario will include emissions for short lived species and land use changes. Groups will also be provided the observed ocean conditions interpolated to a grid using some form of ocean data analysis (Detlef to provide reference, others?). In each case, a relatively large number (~10) of ensemble integrations will be needed to find signals in the relatively noisy solutions, although 3 member ensembles are a minimum to participate.

{In all cases outlined below where AOGCMs are used, a 100 year present day control integration (using present day greenhouse gases and other forcings) and a integration where CO<sub>2</sub> increases at a rate of 1% per year (compounded – doubling occurs at year 70) should be performed. – discussion point}. Where atmosphere-only models using prescribed SSTs are used (so-called time slice experiments), a set of present day integrations and a set of integrations using SSTs from 2026 to 2035 are to be performed.

One detailed issue that arises in these experiments is exactly what month should be used to initialize the integrations (the start year is addressed below). Various start months are used by groups. Since the focus is on the decadal time scale and since changing this date could involve restructuring of the post processing systems, any month of the start year can be used. The start month needs documented in the metadata for the model integrations and will be used in the analysis phase of the intercomparison.

Variable list to be archived can be found at the PCMDI web site. For the physical climate variables, the long term variable list and frequencies should be used.

## **Three Types of integrations**

### **Initial value – decadal predictions**

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### **Atmospheric chemistry – short lived species**

These integrations seek to investigate the impact of aerosols and other short lived species on climate and air quality. These integrations can start from either observations as outlined above or from other model integrations.

The models used will include enough atmospheric chemistry to simulate the evolution of the short lived species. The atmospheric chemistry part of the climate model could be very complex. A template for archiving the atmospheric chemistry and short lived specie variables for the intercomparison will be provided (See <http://> as an example of a CMOR table (Karl: This table needs modified by the chem. Folks...)).

The model type used in these experiments can either be an AOGCM or an atmosphere-only model using prescribed SSTs and sea ice. In the case where groups are using AOGCMs, the start date should be 2005 and continue until 2035. Other start dates can also be used (see decadal predictability section above). If an atmosphere-only model is used, then SSTs and sea ice should be obtained from other AOGCMs integrations (e.g. the CMIP3 simulations, the decadal experiments outlined above, etc.). Groups can either use time varying SSTs and sea ice (2005 to 2035) or a time slice for the period 2026 to 2035.

### **Regional climate change and extremes**

These integrations seek to investigate regional climate changes and changes in extremes. It is expected that higher resolution atmospheric components will be used in these integrations.

The model type used in these experiments again can either be an AOGCM or an atmosphere-only model using prescribed SSTs and sea ice. In the case where groups are using AOGCMs, the start date should be 2005 and continue until 2035. Other start dates can also be used (see above). If an atmosphere-only model is used, then SSTs and sea ice should be obtained from other AOGCMs integrations (see above). Groups can either use time varying SSTs and sea ice (2005 to 2035) or a time slice for the period 2026 to 2035.