European Commission's 7th Framework Programme
Grant Agreement No. **226520**

Project acronym: **COMBINE**

Project full title: **Comprehensive Modelling of the Earth System for Better Climate Prediction and Projection**

Instrument: Collaborative Project & Large-scale Integrating Project

Theme 6: *Environment* Area 6.1.1.4: *Future Climate*

ENV.2008.1.1.4.1: *New components in Earth System modelling for better climate projections*

Start date of project: 1 May 2009 Duration: 48 Months

Milestone Reference Number and Title: M7.1: CMIP5 simulations accomplished

Lead work package for this milestone: WP7

Organization name of lead contractor for this milestone: METO

Due date of milestone: 31 January 2011
Actual submission date: 7 February 2011

The goal of this milestone was to accomplish a subset of the Fifth Coupled Model Intercomparison Project (CMIP5) simulations using the COMBINE Earth System Models. The simulations aimed at are

1. A control simulation with all anthropogenic forcings fixed at pre-industrial (AD 1850) conditions; 100 years of integration are requested. This is simulation 3.1 as defined in the CMIP5 protocol[1].
2. The historical simulation where anthropogenic and natural forcings are prescribed as derived from emission inventories according to the CMIP5 protocol; 156 years of integration are requested for the period 1850 – 2005. This is simulation 3.2 of the CMIP5 protocol.
3. A future scenario simulation where anthropogenic forcings are prescribed using the RCP8.5 scenario; 95 years of integration are requested for the period 2006 – 2100. This is simulation 4.2 in the CMIP5 protocol.
4. An idealised experiment where the carbon dioxide concentrations are increased by 1% per year until a quadrupling of the CO2 concentration is reached, starting from pre-industrial conditions. 140 years of integration are requested. This is simulation 6.1 in the CMIP5 protocol.

All simulations are to be carried out with the coupled general circulation model systems.

All seven model systems contribute to this milestone; Table 1 lists these and the responsible partners.

We aimed at a delivery of the model results to the scientific community via the CMIP5 data distribution centres. Due to delays in the international CMIP5 intercomparison project, these data distribution centres are not operational at the time of the delivery of this milestone. Thus, until this way to distribute the data is possible, the simulations results are made available to the project partners in different ways; these may be different for the individual groups. Table 1 details how the data are available for each model system.

Some centres faced difficulties in performing the simulations, but will contribute these soon. More details on this are provided in Table 2.

Table 1: List of available CMIP5 simulation results.

Model	Partner	Pre-industr. control	Historical run	RCP 8.5	+1% per year CO2	How available
CMCC	CMCC	√	√	√[2]	√[2]	Locally at CMCC, request to chiara.cagnazzo@cmcc.it
MPI-ESM/ COSMOS	MPI-M	√	√	√	√	Via FTP at MPI-M, request to marco.giorgetta@zmaw.de

1 The CMIP5 simulation protocol is available online at http://cmip-pcmdi.llnl.gov/cmip5/docs/Taylor_CMIP5_design.pdf.

2 The RCP8.5 and +1% per year CO2 simulations by CMCC are expected to be completed by 15 February 2011.

EC-Earth	DMI	√	√	√	√[3]	Locally available, request to shuting@dmi.dk
HadGEM	METO	√	√	√	√	Locally available, request to chris.d.jones@metoffice.gov.uk
IPSL-CM	IPSL	√	√	√	√	Dods server, request to jean-louis.dufresne@lmd.jussieu.fr
CNRM-CM	MF-CNRM	√	√	√	√	Locally at MF-CNRM, request to salas@cnrm.meteo.fr

Table 2: Delayed simulations, reasons for delay, and expected delivery date.

Model	Partner	Reasons for delay	Expected delivery date
NorESM	UiB	1. Delayed access to the CESM code from NCAR. 2. Difficulties in the coupled Version of NCAR CAM (with Oslo modifications) and the MICOM isopycnic ocean model (NorESM uses different ocean modules for physics and biogeochemistry than NCAR CESM). Currently the ocean mixing/fresh water forcing parameterisations are retuned. The biogeochemical runs may be carried out with an extra - improved spin-up.	Expected: physical run end of April 2011, biogeochemical run end Sept-Dec 2011. The current spin-up of the physical coupled model is at ca. 700 yr. The ocean biogeochemistry is been spun-up offline.

3 The +1% per year CO2 simulation by DMI is currently running.