The German contribution to the CMIP5 (IPCC/AR5)

K. Glushak¹, S. Legutke¹, H.-D. Hollweg¹, J. Wegner¹, H. Widmann¹, K. Fieg¹, M. Lautenschlager¹, M. Giorgetta², J. Jungclaus², C. Reick²

(1) The German Climate Computing Center (DKRZ), Hamburg, Germany
(2) Max Planck Institute for Meteorology, Hamburg, Germany

CMIP5 overview
The Coupled Model Intercomparison Project Phase 5 (CMIP5) is enabling a comprehensive and systematic evaluation and intercomparison of Earth System Models (ESM), run in a standardised configuration and responding to standardised forcing. The CMIP5 experiments are based on the ESM developed at the Max Planck Institute for Meteorology (MPI-ESM) are performed at the DKRZ using the modeling environment IMDI. IMDI was developed at DKRZ and is adapted to the specific needs of MPI-ESM and the requirements given by the CMIP5 protocol. IMDI offers many benefits, such as flexibility in model and experiment configuration. The global climate-change experiments (see scheme on the right) were divided into five groups presented in Fig I-V.

The IMDI model environment
The IMDI (Integrating Model and Data Infrastructure) software provides support for the full suite of workflow steps involved in the performance of experiments with earth system models. The suite starts with the source code retrieval and ends with the visualization of model diagnostic output. The infrastructure is extendable in order to accommodate new projects, models and platforms, and facilitates the replacement of components in coupled models, while still being low in maintenance. It is highly modularized and thereby gives the user a common ‘look & feel’ for all activities in the workflow independent of the models or platforms. All aspects of an experiment configuration are laid down in setup files. Scripts to perform the different experiment tasks (compilation, pre-processing, simulation, monitoring, post-processing, and archiving) are assembled according to the setup files with the help of meta-scripts from fragments of script code (k-shell, python, m4, gmake). The fragments are grouped into sub-directories according to whether they depend on the project, on the components or the platforms, or on both or none of them. The particular activities reported here CMIP5 are run on the HPC platforms at the DKRZ (IBM Power6).

The IMDI workflow
The IMDI workflow includes model compilation, monitoring, post-processing, as well as archiving of the model raw output data. The monitoring can be done for all workflow steps, graphical monitoring is possible of the model results (see Fig 6).