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: 54 Months

Milestone Reference Number and Title: M8.3
Offline water model runs with new forcings completed

Lead work package for this delivearble: WP 8

Organization name of lead contractor for this milestone: Uni Kassel

Due date of milestone: 31 October 2013
Actual submission date: 06 November 2013

The goal of milestone M8.3 was to analyse the impact of climate change on the global water cycle and water resources. For this purpose the global water model WaterGAP2 and the global land-use change model LandSHIFT were applied for a simulation study that consists of two experiments. First, the impact of climate change on water availability was assessed with the WaterGAP2 model. Second, the LandSHIFT and WaterGAP2 models were coupled in order to facilitate an analysis of the effects of climate change on global crop irrigation water use.

The WaterGAP2 simulations in experiment 1 were done with climate input from 5 Earth System Models (ESMs) from EU COMBINE for a historic period (1960-2006) and for a RCP4.5 and a RCP8.5 scenario until 2100. The data was bias corrected as described in deliverable 8.2. WaterGAP2 was forced with daily values of temperature, precipitation and solar radiation.

In the second experiment, the coupled model was forced with climate data from the MPI-ESM-LR model for the historic period and the RCP8.5 scenario until 2100. Additional scenario information on socio-economic drivers such as crop production, technological change and development of human population required as input for the land-use change simulations with LandSHIFT were taken from the Integrated Assessment Model IMAGE for a baseline scenario (OECD Environmental Outlook).

The model results are available upon request at CESR, University of Kassel.