BMBF project “From the Last Interglacial to the Anthropocene: Modeling a Complete Glacial Cycle” (Palmod):

WP3.3: Data-model interface and data analysis (Förderkennzeichen: 01LP1511A)

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Abstract

Paleoclimatic data-model comparison needs to be quantitative and “intelligent”, in the sense that it allows to identify and evaluate the processes that caused past climate changes. To achieve this, we want to develop and test methods that facilitate data-model comparison and dataanalysis and thereby enable an assessment of the Earth system models (ESMs) used in WG1 and the homogenized paleoclimatic data synthesis generated in WP3.1/WP3.2 of Palmod project.We aim to assimilate time slice and time series products from WP3.1/WP3.2 for selected time in global and regional climate models, in order to provide steady-state as well as transient state estimates periods that are consistent with both data and models and their uncertainties. Finally, we intend to make use of regional climate models for dynamical downscaling of the results obtained by WG1 to facilitate local-scale data-model comparison. Dynamical downscaling will be applied to the global steady-state and short transient simulations of the LGM, mid-Holocene, Heinrich event 1 and the Younger Dryas, using the regional climate model COSMO-CLM. At a regional level, they will be further compared to tree ring densities and pollen data. The “nudging” scheme will be adapted for paleoclimate applications of the regional climate model COSMO-CLM.

The planned modeling experiments from Freie Universität Berlin:

1- Implementation and successful test of state estimation methods in COSMO-CLM.
2- Analysis of climate variations during the mid-Holocene and LGM in regional simulations.
3- Regionalisation of steady-state state estimate for the LGM.
4- Regionalisation of steady-state state estimate for the mid-Holocene.
5- Short transient state estimate of Heinrich event 1 with COSMO-CLM.

According to the modeling tasks, the range of planned work from the scientific view is requested as following:

A. State estimation methods in COSMO-CLM during the first year:

- The model domains have to be adopted. The potential domains are several CORDEX domains at 0.44 degree resolution and ~110×150 grid points.
- The simulations will be at least for a typical climatological period of 30 years.

B. Implementation of Nudging data assimilation:

– For the next 6 months the model system with Nudging scheme will be available for test simulations. This will be done with several climatological runs over selected domains of task A.
– The model simulations will be validated against proxy data.

C. Regional paleo-climate simulations for LGM, Heinrich event 1 and Young Dryas:

- The validated modelling system will be applied for several time-slices of climatological events during Last Glacial Maximum, Heinrich event 1 and Young Dryas.

We have to note that most of the computational load of our project will be focused since the second half of the year 2016 and during the first 6 month we plan to conduct several test simulations to implement the assimilation scheme in COSMO-CLM.

Required computing time and amount of storage space for 2016:

- CPU time [Node hours]: **15.000** (**5,000** for the first half of the year 2016 and **10,000** for the second half of the year)

- GPFS work [GB]: **20.000**

- HPSS arch [GB]: **50.000**

- DOCU [GB]: **0**