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From the Last Interglacial to the Anthropocene: Modelling a Complete Glacial Cycle (PalMod)

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We will give a short overview and update on the current status of the national climate modelling initiative PalMod (Paleo Modelling, www.palmod.de). PalMod focuses on the understanding of the climate system dynamics and its variability during the last glacial cycle. The initiative is funded by the German Federal Ministry of Education and Research (BMBF) and its specific topics are: (i) to identify and quantify the relative contributions of the fundamental processes which determined the Earth's climate trajectory and variability during the last glacial cycle, (ii) to simulate with comprehensive Earth System Models (ESMs) the climate from the peak of the last interglacial - the Eemian warm period - up to the present, including the changes in the spectrum of variability, and (iii) to assess possible future climate trajectories beyond this century during the next millennia with sophisticated ESMs tested in such a way. The research is intended to be conducted over a period of 10 years, but with shorter funding cycles. PalMod kicked off in February 2016.

The first phase focuses on the last deglaciation (app. the last 23.000 years). From the ESM perspective PalMod pushes forward model development by coupling ESM with dynamical ice sheet models. Computer scientists work on speeding up climate models using different concepts (like parallelisation in time) and one working group is dedicated to perform a comprehensive data synthesis to validate model performance.

The envisioned approach is innovative in three respects. First, the consortium aims at simulating a full glacial cycle in transient mode and with comprehensive ESMs which allow full interactions between the physical and biogeochemical components of the Earth system, including ice sheets. Second, we shall address climate variability during the last glacial cycle on a large range of time scales, from interannual to multi-millennial, and attempt to quantify the relative contributions of external forcing and processes internal to the Earth system to climate variability at different time scales. Third, in order to achieve a higher level of understanding of natural climate variability at time scales of millennia, its governing processes and implications for the future climate, we bring together three different research communities: the Earth system modeling community, the proxy data community and the computational science community.

The consortium consists of 18 partners including all major modelling centers within Germany. The funding comprises approximately 65 PostDoc positions and more than 120 scientists are involved. PalMod is coordinated at the Helmholtz Centre for Ocean Research Kiel (GEOMAR).