PalMod is a BMBF-funded project focused on understanding earth system dynamics and variability during the last glacial cycle. The PalMod project has a time scale of 4 years, with a potential extension up to 10 years. The first project phase will focus on the time from last glacial maxium to the present, while the second phase will consider the entire last glacial cycle.

WG2 of PalMod aims at understanding and quantifying feedbacks between biogeochemistry and climate during glacial cycles. Four work packages are focused on marine carbon cycle, terrestrial processes, CH₄ cycle, and the dust cycle. Scientific challenges include reproducing glacial CO₂ cycle with comprehensive ESMs, understanding of rapid changes in atmospheric greenhouse gases concentrations during abrupt climate changes, and reconstructing atmospheric lifetime of CH₄ using a coupled atmospheric chemistry model. The main tasks during the first 4 years are to simulate the full glacial CO₂, CH₄ and dust cycles using EMICs, and to prepare comprehensive terrestrial and marine biogeochemistry components of ESMs to fully interactive, orbitally forced glacial cycle simulations planned for phase 2 of the project. Time-slice sensitivity and transient deglaciation simulations with ESMs will be used to investigate a contribution of individual biogeochemical mechanisms. The dust cycle, an important driver for the ocean biogeochemistry, provides a link to WG1 as an interactive component of the physical climate system. The amplitude and timing of terrestrial and marine processes will be constrained using proxies for biogeochemistry including carbon isotopes together with WG3. Calibration of poorly known parameters as well as an optimization of the computational performance of the biogeochemistry models, including usage of acceleration techniques, will be performed in collaboration with WG4.