

Project: **1407**

Project title: **Digital Twin for Paleoclimate**

Principal investigator: **Gerrit Lohmann**

Report period: **2023-11-01 to 2024-10-31**

Maximum of 2 pages including figures. 9 pt minimum font size.

During the reporting period, we worked on model setup for mid-Holocene as well as pre-industrial climate and conducted spin-ups used for initializing the mid-Holocene simulations (e.g. Fig. 1).

During spinup for the medium-resolution configuration, inconsistencies within the radiative scheme of the atmospheric model were identified that would lead to anomalous heating in the mid-Holocene configuration. This was addressed so that the model version is ready now for production runs. So far, for verification purposes, simulations initialized from climatology have been performed with the AWI-CM3 low- and medium-resolution model setup in the mid-Holocene and partly pre-industrial model configuration (e.g. Fig 2).

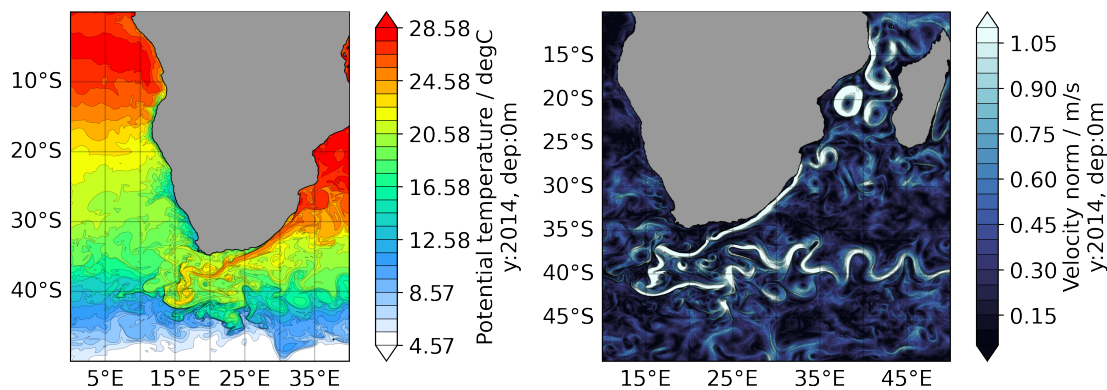


Fig. 1: SST (left) and surface ocean velocity (right) of the state in the highest resolution setup that will be used to initialize the mid-Holocene simulation. The figures show eddy activity and upwelling of cold waters in the Agulhas Current region and southwest Africa.

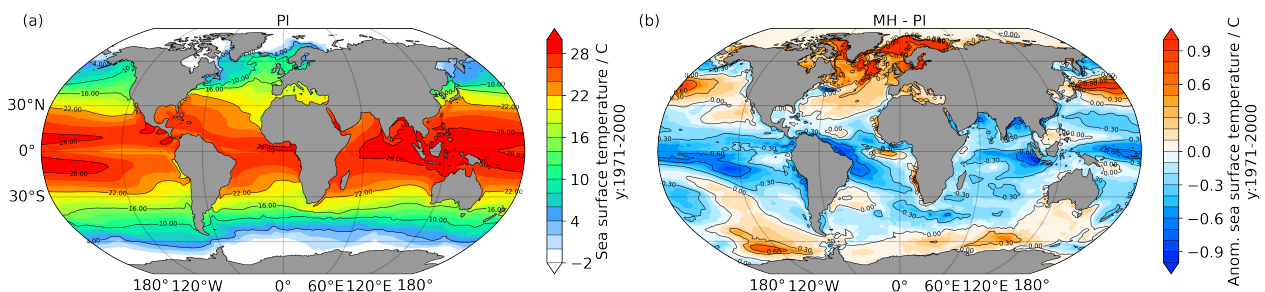


Fig. 2: (a) Pre-industrial (PI) SST and (b) mid-Holocene (MH) minus PI SST in the low-resolution configuration. The figure shows the mean SST over the last 30 years of 80-year simulations with constant PI/MH greenhouse gas and orbital forcing. Both simulations have been initialized from present-day climatology. Panel (b) shows a clear low-latitude cooling and (especially northern-hemisphere) high-latitude warming, qualitatively consistent with proxy data and expected response to insolation anomalies.