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Paleo-constraints in ensemble climate modelling

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A grand ensemble of paleo-climate models was successfully designed and executed using the climate*prediction*.net distributed computing approach. The physical parameters, initial conditions and boundary conditions were perturbed in a set of experiments distributed to the general public. We are aiming to provide a framework for the evaluation of the climate models to see if they are able to simulate climates that were different from today. This will improve our confidence in the models projections for future climates. A set of robust mid-Holocene, 6kyBP, climatological features were established to benchmark the climate model against in order to assess the model's abilities. This period was chosen due to its abundance of geological evidence.

The models simulate the broad-scale features of the mid-Holocene climate reasonably well, though the model performance decreases when the benchmarks are inspected more closely. The results highlight strengths and weaknesses in the model and stresses the importance of high quality paleo-observations.

A relationship between the climate sensitivity, i.e. the equilibrium temperature response to doubling of pre-industrial CO_2 concentrations, and the 6kyBP East Asian monsoonal moisture budget is found. This provides a climate sensitivity range of 2.5–6.1°C.