



Spatial structure of climate and proxy variability during the Glacial and the Holocene

Maria Reschke, Andrew Dolman, and Thomas Laepple

Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung, Potsdam, Germany

Climate proxy records show strong centennial to millennial variability during both, the Glacial and the Holocene. Currently, it is unclear to what extent these variations represent large scale climate variations, local effects or proxy specific noise.

Here we analyze the spatial correlation structure of more than 50 high resolution temperature related proxy records mainly from marine sediments spanning the Holocene and the Last Glacial Maximum. We analyze the mean correlation level of nearby sites as well as the spatial decorrelation length and compare the estimated correlations to the spatial correlation structure of modern observations and long climate simulations. We further use a proxy system model for marine sediment proxies to estimate the expected correlations accounting for time-uncertainty, bioturbation and different noise sources.

Our results provide a first estimate how the spatial structure of climate variations depends on the mean climate state and further provides insights into the uncertainties of commonly used climate archives.