Geophysical Research Abstracts
Vol. 19, EGU2017-10012, 2017
EGU General Assembly 2017

Investigating precipitation patterns and delta O18 variations in northern Siberia

Neda Darvishsefat (1), Martin Werner (1), Hanno Meyer (2), and Gerrit Lohmann (1)
(1) AWI (Alfred Wegener Institute), Bremerhaven, Germany, (2) AWI (Alfred Wegener Institute), Potsdam, Germany

This study is being conducted as part of the PLOT project (Paleolymnological Transect – Quaternary climate gradients in northern Eurasia), which investigates glacial-interglacial changes of the hydrological cycle in the Eurasian Arctic in the late quaternary. The area of interest in this project is along a west-eastern transect in Northern Russia, from Ladoga lake to El gygytgyn lake, where quaternary climate variations in this region will be studied by selected lake sediments which cover the related period of interest.

In our study, we focus on variations of the stable isotopes of water (H218O and HDO). They act as tracers of climate processes that influence the hydrological cycle and can be used as a proxy to describe changes in the climate. Changes in the fractionation of both oxygen and hydrogen isotopes, delta 18O and delta D, in precipitation and its relation to changes of both climate variables (e.g. temperature) and the hydrological cycle (e.g. precipitation amount) are the main variables of interest. For this purpose, our study utilizes a set of new simulations with the model ECHAM5-WISO, an atmospheric general circulation model with implemented stable water isotope diagnostics, to study the isotope variations in northern Siberia. For the present-day and last glacial maximum (LGM) climate, ECHAM5-WISO has been run with a high horizontal model resolution of approx. 1°x1° (T106 resolution). Model results are compared both to proxy data as well as simulation results using the fully-coupled Earth system model ECHAM5/MPIOM, which has been run in coarser spatial resolution, only.

First analyses compare simulated monthly means of d18O in precipitation, temperature and precipitation amount, as well as interannual values, to observational datasets near the different PLOT lake sites and at further locations (Tiksi, Yakutsk, Irkutsk) in northern Siberia. For the present-day climate, monthly temperatures are well simulated in the ECHAM5-wiso simulation. Precipitation patterns and changes of delta O18 and D show stronger differences, with partially improved model-data agreement for the ECHAM5-wiso simulation with higher spatial resolution, only.