Geophysical Research Abstracts
Vol. 20, EGU2018-3870, 2018
EGU General Assembly 2018

Late Quaternary climatic and environmental history of the Russian Arctic – preliminary results of the Russian-German PLOT (Paleolimnological Transect) project

Martin Melles (1), Andrej Andreev (1), Marlene Baumer (1), Dmitri Bolshiyanov (2,3), Grigory Fedorov (2,3), Raphael Gromig (1), Svetlana Kostrova (4), Sebastian Krastel (5), Elodie Lebas (5), Anna Ludikova (6), Hanno Meyer (4), Luidmila Pestryakova (7), Larissa Savelieva (3), Lyudmila Shumilovskikh (8), Dmitry A. Subetto (9), Bernd Wagner (1), Volker Wennrich (1), and Martin Werner (10)

(1) University of Cologne, Institute of Geology and Mineralogy, Cologne, Germany (mmelles@uni-koeln.de), (2) Arctic and Antarctic Research Institute, St. Petersburg, Russia, (3) St. Petersburg State University, St. Petersburg, Russia, (4) Alfred Wegener Institute for Polar an Marine Research, Potsdam, Germany, (5) University of Kiel, Institute of Geosciences, Kiel, Germany, (6) Institute of Limnology, Russian Academy of Sciences, St. Petersburg, Russia, (7) North-East Federal University Yakutsk, Russia, (8) Georg-August University Göttingen, Dept. of Palynology and Climate Dynamics, Germany, (9) Institute of Northern Water Problems, Russian Academy of Sciences, Petrozavodsk, Russia, (10) Alfred Wegener Institute for Polar an Marine Research, Bremerhaven, Germany

The effects of global warming are documented and predicted to be most pronounced in the Arctic, which plays a crucial, albeit not yet well-understood role within the global climate System. This so-called “Arctic Amplification” is traced back to interplays of temperature, water vapour, cloud cover, Arctic Ocean sea ice, and associated feedbacks, and is hypothesised to trigger mid-latitude climate variations. The reliability of climate projections for high northern latitudes is, however, hampered by the complexity of the underlying natural variability and associated feedback mechanisms. A prerequisite for the improvement and validation of climate projections is a more thorough understanding of the natural variability of past Arctic climate change on a range of geological timescales, when external forcings and boundary conditions have been different. A key record of the climate history in the Arctic has recently become available from Lake El′gygytgyn, NE Russia (e.g. Melles et al. 2012, Science 337, p. 315-320). This record covers the entire Quaternary and penetrates down to 3.6 Ma BP into the Pliocene. Its investigation has provided a number of key findings concerning the long-term climate variability of the Arctic, however, it partly remains an open question, how representative the information is for the circum-arctic history.

As a consequence, we established the project ′PLOT - Paleolimnological Transect′, which aims to recover lake sediment sequences along a >6000 km long longitudinal transect across the Russian Arctic in order to investigate the Late Quaternary climatic and environmental history. The PLOT project is conducted under the umbrella of a bilateral Russian-German agreement in the field of polar and marine research and is funded by the German and Russian Research Ministries. Since 2013 extensive fieldwork, including seismic surveys, coring, and hydrological investigations, was carried out at lakes Ladoga (NW Russia), Bolshoye Shuchye (polar Urals), Emanda (Verkhoyansk Range), Levinson-Lessing and Taymyr (both Taymyr Peninsula), with the special aim to recover preglacial sediments. Fieldwork in the Ural Mountains and on the Taymyr Peninsula was conducted in collaboration with the Russian-Norwegian CHASE (Climate History along the Arctic Seaboard of Eurasia) project. A multiproxy analysis strategy was applied to all cores, including (bio-)geochemical, sedimentological, physical, and biological analyses. First data implies the presence of preglacial sediments in the cores from all lakes except Lake Emanda. Age-depth models, based on radiocarbon dating, OSL dating, paleomagnetic measurements, identification of cryptotephra, and varve counting (where applicable), are in progress. Here, we present and discuss the most important results available thus far from the geophysical site surveys and core analyses, and provide an outlook on the future strategy and foci of the project.