Geophysical Research Abstracts
Vol. 14, EGU2012-10724, 2012
EGU General Assembly 2012

Holocene palaeoclimate in western Siberia based on multiproxy investigation of peat cores

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Western Siberia is a large region that comprises a substantial portion of northern Asia. In spite of its large size, western Siberia is relatively homogenous in terms of its topography, which is dominated by large plains and low hills, and climate. Consequently, this area is an ideal target for studying past climate, because even a restricted number of sampling sites will provide a substantial amount of information regarding palaeoclimatic and palaeohydrological changes that affected western Siberia in the past. The main focus of this project is to investigate changes in temperature and hydrology in this region during the Holocene using several palaeoclimate proxies applied to organic compounds extracted from peat.

We extracted a peat core from a bog located near Tomsk (56˚29′ N, 84˚57′ E). The bog is dominated by peat moss (Sphagnum fuscum). The total length of the core is 650 cm and the base of the core was dated as being $\sim$ 10,500 cal yr BP using 14C dating method. The organic material from the core has been subjected to palynological, molecular and compound-specific stable isotopic analyses.

Our initial hydrogen isotope data that cover the upper 260 cm of the cores show a large variability with respect to the deltaD values of mid- and long-chain n-alkanes, which have identical trends. The deltaD values of n-C23 and n-C29 alkanes are more negative at depths 73-80 cm (-221 and -252 per mil, respectively), 130-140 cm (-217 and -256 per mil) and 250-260 cm (-213 and -255 per mil) than at other depths, e.g. at 0 cm (-197 and -218 per mil) and 210-220 cm (-181 and -202 per mil). We suggest that the more negative n-alkane deltaD values reflect colder climate with D-depleted precipitation. This interpretation is consistent with previously published palaeoclimatic reconstructions of western Siberian climate during the last 3000 yrs. Based on palynological data, the time interval between 500 and 1700 cal yr BP that corresponds to approximately 50-150 cm depths of our core was characterized by a relatively cold climate. Our current work that includes an integration of palynological and organic geochemical methodologies will allow us to address the link between climate, vegetation and the hydrological cycle in western Siberia during the Holocene in greater detail.