Geophysical Research Abstracts,
Vol. 11, EGU2009-239-2, 2009
EGU General Assembly 2009

Mechanisms driving the Holocene vegetation and climate dynamics in central Asia: case study – the Altai Mountains

N. Rudaya (1) and P. Tarasov (2)

(1) Institute of Archaeology and Ethnography SB RAS, Ak. Lavrentieva 17, Novosibirsk 630090, Russia, (2) Palaeontology Department, Institute of Geological Sciences, Free University of Berlin, Malteserstr. 74-100, Building D, Berlin 12249, Germany

Quantitative reconstruction of the Holocene vegetation and climate dynamics in the semiarid Mongolian Altai based on the palynological investigation of two sediment cores recovered from Hoton-Nur Lake (48°37'18"N, 88°20'45"E, 2083 m) in 1980 and 2004 (Tarasov et al., 2000, Rudaya et al., in press), suggests that boreal woodland replaced the primarily open landscape of northwestern Mongolia at about 10 kyr BP in response to a increase in precipitation from 200–250 mm/yr to 450–550 mm/yr. A decline of the forest vegetation and a return to a predominance of open vegetation types occurred after 5 kyr BP when precipitation sums dropped dawn to 250–300 mm/yr. This pattern resembles oxygen isotope records of monsoon dynamics from China, demonstrating an abrupt strengthening of the summer monsoon at 12 kyr BP and an associated increase in precipitation and in lake levels between 11 and 8 kyr BP, followed by the stepwise attenuation of the monsoon circulation and climate aridization towards the modern levels. The records from the neighboring areas of Kazakhstan and Russia, situated west and north of Hoton-Nur, demonstrate spatially and temporally different Holocene vegetation and climate histories, indicating that the Altai Mountains as a climate boundary are of pivotal importance for the Holocene environmental history of Central Asia. For example, during the first half of the Holocene the areas west of the Mongolian Altai range was drier than present whereas the areas east of the range was moister than present. A shift towards wetter conditions occurred in the western region only during the second half of the Holocene, when the mid-latitudinal belt, stretching from the Baltic Sea to Kazakhstan and southern Siberia, came under the control of the Atlantic air masses. At the same time conditions of the Mongolian Altai became relatively dry. The pollen records from the northern region, including Russian Altai display two precipitation maxima during past 12 kyr. In line with the records from the eastern and western regions, the early Holocene (summer monsoon-associated) maximum was more pronounced in the eastern part of the northern region and the late Holocene (westerly-associated) maximum could be better seen in its western part.

References

Tarasov, P., Dorofeyuk, N., Metel'tseva, E., 2000. Holocene vegetation and climate changes in Hoton-Nur basin, northwest Mongolia. Boreas 29/2, 117–126.

Rudaya, N., Tarasov, P., Dorofeyuk, N., Solovieva, N., Kalugin, I., Andreev, A., Daryin, A., Diekmann, B., Riedel, F., Tserendash, N. & Wagner, M. (2008) Holocene environments and climate in the Mongolian Altai reconstructed from the Hoton-Nur pollen and diatom records: a step towards better understanding climate dynamics in Central Asia. Quaternary Science Reviews, in press. 10.1016/j.quascirev.2008.10.013