



Holocene vegetation and environments in the Mongolian Altai derived from the Hoton-Nur pollen and diatom records

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Over past twenty years desertification and land degradation became a serious environmental and socio-economic problem in the arid and semi-arid regions of Central Asia. Especially drastic changes are registered in the mountainous regions with the highest biodiversity and concentration of economically valuable resources. One of the important tasks for the geoscientists working in Central Asia is to evaluate whether desertification processes are influenced (i) by the anthropogenic pressure on the landscapes; (ii) primarily driven by the natural processes or (iii) by the combination of different factors. The answer on these questions requires detailed local- to regional-scale environmental and climate reconstructions using various environmental archives and proxies. The current study is dealing with Hoton-Nur Lake (48°40'N, 88°18'E, 2083 m a.s.l.), which occupies an intermountain depression on the eastern slope of the Mongolian Altai (MA). In 2004 a 257 cm long sediment core was recovered from the 32 m depth in the southeast part of the lake. A total of 100 and 58 samples for the fine-resolution pollen and diatom analysis respectively were taken from the core. Samples prepared for the pollen analysis were used to count coniferous stomata and other non-pollen palynomorphs. In order to achieve a reliable interpretation of the fossil pollen record we compiled a set of 41 recent pollen spectra from the region

between 47-52° N and 83-93° E (NW Mongolia, southern Siberia and eastern Kazakhstan) represented by different climatic, altitudinal belts and vegetation communities. The surface pollen data were compared with a set of climatic variables used in the vegetation modeling. Another purpose was to check whether different pollen ratios (*Artemisia/Chenopodiaceae*, *Artemisia/Cyperaceae* etc.) can be satisfactorily applied in the NW Mongolia. The biomization method was applied for the vegetation reconstruction. The results of study various bioproxies and using of pollen-based biomization method allow us to suggest following scheme of Holocene environment dynamic in MA. The Late Glacial and the onset of Holocene (ca 11,500 cal yr BP) is characterized by extreme continental cold and dry climate determined cold sedge steppe development on the high elevations. Forbs and grass steppe with elements of semi-desert vegetation was probably spread in the middle mountain belts. In the early Holocene (10,500 - 11,500 cal yr BP) climate became dryer but not warmer. In vegetation composition was no significant changes. Age of ca 9000 cal yr BP is marked by increase humidity and weakening of climate continentality reflected also in vegetation features - woodland started spreading in MA. Sedge and grass steppe decreased and replaced to dwarf birch tundra on the high elevations. The wettest conditions observed between ca 6500 - 9300 cal yr BP. It is a period of maximal dark coniferous forest development in MA. Between 3000 and 6600 cal yr BP climate became more arid and continental. Coniferous forest occupied less area; tundra, steppe, and semi-desert elements took a larger part in vegetation cover. Period from ca 3000 cal yr BP to our time in MA is characterized by progressive deforestation. Pollen and diatom records after ca 800 cal yr BP show further increase of climate aridity. Coniferous forests decreased their area and spread only on the west slope of MA. Around the lake developed mainly dry and cold grass and sedge steppe, alpine dwarf birch tundra, and lower - semi-desert communities. Changes in pollen and non-pollen composition of Hoton-Nur Lake sediment during the late Holocene have not evidenced of significant human influence in the region but the diatom record between ca 1200 and 2900 cal yr BP revealed dramatic increase of acidophilic *Aulacoseira distans* concentration. In this time the transition from hunting to pastoralism culture was almost essentially complete in MA. Increased pasture pressure, natural deforestation forced by climatic change was probably the reason of significant changes of MA environment in the late Holocene.