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Stable isotope variations of diatoms as an indicator of Holocene climate change in Lake Hovsgol, Mongolia

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A 82.5 cm-long gravity core (HS-15) was retrieved from the central part of Lake Hovsgol, Mongolia. The core sediments are mainly composed of structureless and finely laminated diatomaceous mud. Five AMS radiocarbon ages for organic matter were obtained from the core sediment. The age of the sediments near the surface (3~4 cm in core depth) is estimated to be about 1,110 yr BP. Thus the reservoir effect of 734 years can be extrapolated. According to age-depth relationship, the sedimentation rate ranges from 8.3 to 15.7 cm/kyr with the higher rate in the upper part. Oxygen, carbon and nitrogen isotopes of diatoms are also analyzed. The core is divided into two parts with the transitional boundary between the core depth of 16 and 24 cm based on stable isotope contents of diatoms. In the lower part (ca. 1500~6500 cal. yr BP), the $\delta^{18}O$ values are gradually enriched by ca. 0.5‰ whereas the $\delta^{13}C$ and $\delta^{15}N$ are depleted. The higher $\delta^{18}O$ data may indicate $\delta^{18}O$ enrichment of the lake water and the depletion of $\delta^{13}C$ and $\delta^{15}N$ should reflect the decrease of diatom productivity, which resulted from the decrease in nutrients influx. These isotope trends may imply drier climate with lower precipitation/evaporation ratio around this region. In the upper part (ca. 0~1000 cal. yr BP), the $\delta^{18}O$ is rapidly depleted by ~1.5‰ whereas the $\delta^{15}N$ is enriched. It can imply the abrupt increase in regional precipitation/evaporation ratio and runoff to the lake. As a result, the $\delta^{18}O$ of the lake water became depleted and the diatom productivity increased.