Geophysical Research Abstracts,
Vol. 10, EGU2008-A-06274, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-06274
EGU General Assembly 2008

Carbonate minerals in Late Pleistocene sediments of Lake Hovsgol, Mongolia: implications for the paleoclimatic changes

A.N. Zhdanova (*), E.P. Solotchina

Institute of Geology and Mineralogy, Koptyuga prospect 3, 630090 Novosibirsk, Russia (zhdanova@uiggm.nsc.ru / Fax: +7 383- 3332792)

Lake Hovsgol, on the territory of Mongolia in continental interior Asia, is located in a region critical for understanding global climate change during the Cenozoic. After Lake Baikal, Hovsgol is the second largest and deepest in the Baikal Rift Zone. The presence of carbonate minerals in Lake Hovsgol sediments provides us the opportunity to evaluate past water composition and ionic concentration and to understand paleohydrology and paleochemistry.

The series of short cores (up to 1.80 m depth) have been obtained from different parts of this lake during 2001-2002 as a part of the Russian Academy of Sciences' expeditions. The cores show two distinct sedimentary divisions. The upper part of core (Holocene interval) is dominated by fine diatomaceous clayey ooze and the lower part (Late Pleistocene interval of the sections) is calcareous clayey silt with numerous intervals of graded bedding. The mineral composition of the original samples was analysed by X-ray powder diffraction and IR spectroscopy. It was established that the mineral association in lake sediments of both parts includes layered silicates, quartz, plagioclase, and subordinate an admixture of amphibole and potassium feldspar. Unlike Holocene sediments, the Late Pleistocene section contains carbonates in addition to named minerals. XRD patterns were scanned in the range of 27.5- 32.5˚ (2Θ CuK_{α}) with speed of 0.02˚ 2 Θ/s. An estimate of the amount of Mg^{2+} incorporated into calcite lattice (mole % $MgCO_3$) was made on the basis of the amount of shift of the most intense calcite peak with hkl=104 using calibration curves (Doval, Galan, 1976).

Quantitative estimations of carbonate minerals were made by IR spectroscopy. Samples were prepared using the KBr pellet method.

In Late Pleistocene sediment of Lake Hovsgol carbonate minerals are represented by calcite, low- and high-Mg calcite, Ca-excess dolomite and stoichiometric dolomite.

The amount of total carbonate minerals changes with the depth, the maximal content does not exceed 15-17% of bulk sediment. The lowest part of the section is characterized by the higher amount of all carbonate minerals except dolomite and the maximum amount of magnesium (mole % $MgCO_3$) incorporated into the high-Mg calcite lattice. The amount of high-Mg calcite decreases upward and it is absent in the upper part of Pleistocene sediment (Belling-Allerod warming). The percentage of calcite remains nearly constant with considerable rise (up to 10%) in upper part, where high-Mg calcite is absent or its content is negligible. Dolomite and Ca- excess dolomite are observed in all studied samples and together can constitute about 5% of the total mineral components. Because carbonate precipitation in lake waters or in sediments is responsive to pH, total alkalinity and salinity, the patterns of carbonate formation observed in the Lake Hovsgol bottom sediments are likely reflective of changes in the above parameters in response to regional climatic cycles and lake-level variations. The study of alterations in carbonate mineral composition can help us to reconstruct past changes in moisture balance and in chemical composition of the lake water during prior glacial-interglacial cycles.

This study was supported by RFBR, grant 08-05-64680.