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Clay minerals and iron oxides in Lake Baikal sediments: The last four glacial cycles in E Eurasia

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Lake Baikal is a unique archive of the Quaternary climate in E Eurasia that has been intensively studied since the 1990's. Although Pleistocene Baikal sediments contain detrital clay minerals as a major component, it has taken a decade to develop a correct basis of their reliable climatic interpretation. We performed an analysis of the number of diatom frustules, quantitative chemical analysis of expandable clay minerals (CEC), magnetic susceptibility and natural remanence magnetization measurements, and diffuse reflectance Vis spectra in about 12.5 m long section VER98-1-13 from Academician Ridge in Lake Baikal. An age model was constructed using palaeomagnetic excursions and relative palaeointensity variations and by correlation with a reference marine d18O record. The resulting climate record covers 3 glacial cycles with millennial resolution and facilitates the identification of regional climatic departures with respect to the global climate of the northern hemisphere and other reference records. The clay mineral record follows a pattern of high CEC in glacials/stadials and low CEC in interglacials that can be interpreted assuming either enhanced dissolution of expandable clay minerals under humid climate or by the enhanced influx of older soils in dry periods. The climate in E Eurasia has probably been strongly affected by Heinrich events or similar cold fluctuations in the N Atlantic region that significantly shortened the warm stages corresponding to MIS7e and MIS5e and caused instability and diversity of climate in the upper part of MIS5. Several environmental proxies indicate that the interglacial corresponding to MIS5, was much less stable than previous interglacial MIS7.

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