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High resolution clay mineral record in Lake Baikal sediments: The Holocene and Termination 1 transition

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We analyse clay mineralogy of two 1-m long section cores from elevated plateaus in Southern and Northern Lake Baikal subbasins. Our aim is to identify climate proxies within clay record and to compare our interpretation with available climate reconstructions. Mineralogical signature is determined by X-ray diffraction on oriented aggregates on Holocene and Termination I. Two peak intensity ratios are used to characterize the weathering stage of illite and chlorites. We calculate an hydrolysis index that takes into account the abundance of all clay species and their own sensitivity to chemical weathering. Results are reported along a temptative age model scale. Age model is based on 14C dates on pollen grains and compared to paleomagnetic-derived timescale. The sampling at a centimeter resolution allows for a centennial order reconstruction but chronological uncertainty limits temporal resolution to 1 kyr, at least for the last 13 kyr. The evolution of clay-derived climate proxies is compared between the two locations and, with respect to other climate reconstructions for Lake Baikal area and Siberia. In the Northern Basin, the clay approach emphasizes high weathering conditions as early as the Oldest Dryas. Such conditions are related to active pedogenesis after first meltwater pulse. The lowest chemical weathering condition is consistent with cold palynological assemblages related to Younger Dryas. The recovery of weathering conditions within Holocene soils is a slow and irregular process. In Northern and Southern basins, the most intensive chemical weathering conditions do not occur during the Eurasian climate optimum (Atlantic). Intense secondary clay mineral formation occurs later during the Subboreal. Synchroneous with maximum diatom production, this change is related to warming conditions favourable to Siberian soils develpment. The different weathering processes in Northern and Southern sites are explained by a combination of lithological, topographical and climate parameters.