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Reconstructing past weathering conditions at Lake Baikal using radiogenic Sr, Nd, and Pb and meteoric Be isotopes

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Lake Baikal is the oldest and most voluminous lake in the world, and has been suggested to be representative of global processes in terms of silicate weathering contribution to overall weathering fluxes[1]. On the other hand, the intermediate spatial scale of the catchment allows for a more straightforward assessment of elementary budgets, and results in shorter element residence times, compared to the oceans (i.e. ~330 yrs for Sr[1]). Authigenic Fe-Mn (oxyhydr)oxide phases formed in the lake record the isotope composition of lake water[1] and these sedimentary archives cover at least the last 12 Myr[2]. Hence, Lake Baikal offers a unique opportunity to study the evolution of chemical weathering rates in the past, including during the Quaternary glacial cycles. Here we present first records of past lake compositions in terms of radiogenic (Sr, Nd, Pb) and meteoric Be isotopes, specifically focusing on the last glacial interglacial transition.

Today, the Selenga river, draining the majority of the southern part of the lake's catchment, is the major source of water and solutes to Lake Baikal[3]. Preliminary data on radiogenic Sr and Nd isotopes in authigenic sediment phases suggest that during the last glacial maximum, weathering fluxes originating in the northern parts of the catchment were more important to the overall lake budgets than today. This is consistent with U isotope based evidence indicating that riverine discharge of the Selenga was drastically reduced or even ceased during the last glacial period[4]. Preliminary data show more radiogenic Pb isotope compositions after the last glacial maximum (LGM), which most likely indicates the onset of chemical weathering after the LGM[5]. These data will be complemented by meteoric Be ratios and a record of past ^{10}Be deposition rates, shedding light on the evolution of chemical weathering rate through time and its relationship to radiogenic records.

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