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Weathering and denudation fluxes in the Lake Baikal watershed and their delivery to the lake: a study of major ion fluxes, 10Be/9Be ratios and radiogenic isotopes (Sr, Nd)

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Lake Baikal is the world's largest (by volume), deepest, and oldest (30-40 Ma) lake. Climate varies from arid to semi-arid to arctic-boreal with extreme seasonal and spatial differences in temperature and precipitation[1]. The catchment has also been affected by periodic Quaternary glaciations[2]. Although the geology of the catchment is diverse, the most prominent lithologies are granitoids and gneisses[1]. Lake Baikal is therefore a promising site to study the effect of climate on silicate rock weathering.

Here we present new insights into the modern weathering regime and, in anticipation of a paleo-weathering study, we evaluate how these weathering signals are transferred into the lake. *Chemical weathering* rates are higher in the northern part of the catchment, possibly due to the weathering of fine sediments produced during the last glaciation. *Total denudation rates* derived from dissolved riverine $^{10}Be/^{9}Be$ are, however, higher in the southern than in the northern river catchments, possibly due to more widespread permafrost[3] preventing soil erosion. For most rivers, Be-derived denudation rates exceed the summed estimates for chemical and physical erosion, pointing to the potential importance of sediment storage in floodplains. Preliminary results of an inverse model that apportions riverine dissolved loads to silicate, carbonate and evaporite weathering suggest that 74-94% of the Na flux and 19-42% of the total dissolved fluxes are derived from silicate weathering. From a radiogenic isotope perspective, it appears that chemical fluxes from old lithologies are underrepresented in the large rivers sampled in this study. The Sr isotope composition of Lake Baikal implies inputs of 1-6% from these rocks, while Nd contributions are estimated at 26-44% for the Northern Basin, and at 13-19% for the Central and Southern Basins. About 80% of ^{10}Be in the lake is supplied by rivers, the remainder through precipitation.

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