Nutrient cycling in Lake Baikal: the world's oldest and deepest lake

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Silicon isotope ($\delta^{30}Si$) geochemistry provides a means to constrain biogeochemical cycling on land and in oceans. Here we present records of $\delta^{30}Si$ from the drainage basin, water column and sediment record of Lake Baikal in Siberia, a World Heritage Site and the world's largest lake.

$\delta^{30}Si$ analysis of water samples from across Lake Baikal and its catchment suggests that only 20-24% of silicic acid entering Lake Baikal today is exported into the sediment record by biogeochemical cycling. Results from a series of ^{210}Pb dated sediment cores reveal that this rate of export is unusually low, with a steady decline in diatom bound $\delta^{30}Si$ over the last 300 years reflecting a long-term decrease in biogenic rates of silicic acid utilisation.

Site-specific diatom isotope fractionation factors developed from modern sedment trap samples (–1.61‰), together with biogenic silica (BSi) concentrations, allows past changes in nutrient utilisation and siliceous productivity to be constrained. From this, we demonstrate that rates of silicic acid supply to Lake Baikal have significantly increased since 1900 AD and investigate the extent to which this can be attributed to anthropgoenic activities around Lake Baikal as well as to regional 21st and 20th Century climate change.