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## Geochemical studies on nitrate in the basin of La Paz city, Bolivia, using $^{15}\text{N}$ , $^{17}\text{O}$ and $^{18}\text{O}$

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Water resources in La Paz, the capital of Bolivia, are highly dependent on runoff from its surrounding glaciers, since the city locates in a semi-arid area in the Altiplano with an annual precipitation of about 500 mm/y. This study aims at determination of nitrate cycles using its stable isotopic compositions in Tuni Lake and its basin, which is one of the important water resources of La Paz.

Samples are collected from downstream rivers of the glaciers during the dry season in September, 2010. The sampling points were allocated from an edge of the glacier to the inflow point to the lake. Samples were filtered through a 0.2 micro meter pore-size membrane filter and stored in a refrigerator until analysis. To determine the stable isotopic compositions of nitrate, the sample nitrate was chemically converted to nitrous oxide using a method originally developed for  $^{15}\text{N}/^{14}\text{N}$  and  $^{18}\text{O}/^{16}\text{O}$  isotope ratios of seawater and freshwater nitrate (McIlvin and Altabet, 2005) with slight modification (Tsunogai et al. 2008). The stable isotopic compositions of nitrous oxide were determined using our Continuous-Flow Isotope Ratio Mass Spectrometry system (Komatsu et al. 2008).

Nitrate in glacial melt water had smaller triple oxygen anomalies (+4.1 permil) relative to those in atmospheric nitrate (from +17 to +35 permil), which corresponds to a mixing ratio of atmospheric nitrate to total nitrate of 12-24%, indicating the significance of non-atmospheric origins of nitrate (e.c. microbial oxidation of ammonium) within the glacier. The triple oxygen anomalies of nitrate in downstream river showed systematic variation among three basins ranging from +0.4 to +3.5 permil. The variation may be attributable to the difference in biological activity among the basins.

Keywords: nitrogen cycle, triple oxygen isotopic compositions, nitrogen isotopic composition, nitrate, Glacial melt water, Bolivia