Japan Geoscience Union Meeting 2012
(May 20-25 2012 at Makuhari, Chiba, Japan)
©2012. Japan Geoscience Union. All Rights Reserved.

MIS21-P02 Room:Convention Hall Time:May 23 17:15-18:30

Geochemical studies on nitrate in a basin with tropical glaciers in Bolivia, using ^{15}N, ^{17}O and ^{18}O

NAKAGAWA, Fumiko[1*], OHYAMA, Takuya[1], KOMATSU, Daisuke[1], TSUNOGAI, Urumu[1], UMEDA, Makoto[2], ASAOKA, Yoshihiro[2], Marcelo Gorritty[3]

[1]Fac. Sci., Hokkaido Univ., [2]Grad. Sch. Eng., Tohoku Univ., [3]IIDEPROQ Univ. Mayor de San Andres

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 were collected from downstream rivers of the glaciers four times (September, 2010 and March, September, November 2011). The sampling points were located 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 $^{15}N/^{14}N$ and $^{18}O/^{16}O$ 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 ice had smaller triple oxygen anomalies (+6 permil at Huayna Potosi Glacier and +11 permil at Condoriri Glacier) relative to those in deposited nitrate (+25 permil), which corresponds to a mixing ratio of atmospheric nitrate to total nitrate of 45%, indicating the significance of non-atmospheric origin of nitrate (e.c. microbial oxidation of ammonium) within the glacier. The triple oxygen anomalies of nitrate in downstream river showed systematic variation between two basins ranging from +1.3 to +7.3 permil in Huayna Potosi basin and from +0.4 to +5.5 permil in Condoriri basin, respectively. The variation may be attributable to the difference in biological activity between the basins.

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