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Measurement of nitrogen and oxygen isotope ratios of nitrate in a shallow ice core drilled in the vicinity of Dome Fuji

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Knowledge of the variability of solar activity is important for astrophysics and geoscience. Ice core samples have been considered that they preserve astronomical events as well as various information on the history of the earth involving climate change and so on. In previous studies, it is reported that nitrate concentration in Antarctic ice core can be a proxy of solar activity [*Traversi et al.*, 2012]. We have focused on nitrogen and oxygen isotope ratios of nitrate expected to be used as archives of isotope fractionations by photochemical reaction in the stratosphere.

In 2010, a shallow ice core was obtained in the vicinity of Dome Fuji station, Antarctica. Dome Fuji is regarded as an ideal site for research of atmospheric reactions because chemical components are directly transported from the stratosphere. In this study, we analyzed nitrogen and oxygen isotope ratios in or near nitrate spikes by using a denitrifier method [*Casciotti et al.*, 2002]. The denitrifier method is based on the isotopic analysis of nitrous oxide generated from nitrate by denitrifying bacteria (*Pseudomonas aureofaciens*).

The fluctuations of nitrogen and oxygen isotope ratios are lager than that of nitrate concentration. The range of nitrogen isotope ratio is similar to that found in previous studies of snow pit samples from Dome C. The changes of nitrogen and oxygen isotope ratios are different in each spike. Precious studies inferred that nitrogen isotope ratio contains NOx signature and oxygen isotope ratios is dependent upon the oxidation pathway that produces nitrate from NOx in the atmosphere [e.g. *Hastings et al.*, 2003]. Our results suggest that it is possible to reveal hidden signature of solar activity with considering chemical reactions in the stratosphere.

References

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