Biogeosciences Discuss., 11, C4106–C4109, 2014
www.biogeosciences-discuss.net/11/C4106/2014/

Biogeosciences
Discussions
Open Access

Interactive comment on "Quantifying the effects of clear-cutting and strip-cutting on nitrate dynamics in a forested watershed using triple oxygen isotopes as tracers" *by* U. Tsunogai et al.

U. Tsunogai et al.

urumu@nagoya-u.jp

Received and published: 6 August 2014

Thank you very much for your valuable and positive comments on our manuscript. We would like to reply to you by citing each of your comment/question.

> p.7423 l. 17; Exchange of oxygen in nitrite (NO2) and nitrate (NO3). The authors mentioned that nitrite concentrations were below the detection limit, which corresponded to nitrite/nitrate ratios less than 10 %. However, oxygen atom in nitrite easily exchanges with that in H2O, the uncertainty in 17O value may cause an error in calculating contributions using eqs. (2)-(4).

The detection limit of nitrite was 0.05 umol/L. As a result, usual nitrite/nitrate ratios

Full Screen / Esc
Printer-friendly Version
Interactive Discussion
Discussion Paper

were less than 2 % for most of the samples. The possible maximum nitrite/nitrate ratio (7%) was the case of the nitrate-depleted samples having nitrate concentration less than 1 umol/L. Because the Delta17O values of such nitrate-depleted samples were less than +1.2‰ possible maximum alternation range in the Delta17O values of nitrate due to the possible contribution of nitrite (Delta17O=0‰ was less than 0.1‰ much less than the error of the Delta17O analyses (±0.2‰. As a result, we used the raw results without any further corrections.

We would like to clarify the detection limit of nitrite in the revised manuscript.

> p. 7425 l. 18 - l.23; variation of 18O and 17O: It is not clear that the authors avoided the sampling after rain or snow. It is known that both isotope ratios are high after snow melt, it is not surprising that the values were high in March-April irrespective of the event, such as clear-cutting or strip-cutting.

Our sampling was done periodically under a definite schedule (every 2 weeks) so that the samples taken just after rain or snow were included in the samples as well. The low and stable nitrate concentration during 2002-03 presented in Fig. 2 implied that such rain or snow event seems to have little direct impact on the nitrate concentration of the discharge. We would like to comment on this in the revised manuscript.

Atmospheric nitrate increase in discharges due to snowmelt irrespective to clear-cutting or strip-cutting had been found in past studies using d18O of nitrate in discharges (e.g. Kendall et al., 1995; Ohte et al., 2004; Piatek et al., 2005; Pellerin et al., 2012), so that we referred them in P7432/L16-20 of the original manuscript. This is also supported by our observation on the export flux increase of atmospheric nitrate prior to the clear-cutting (i.e. spring 2003) (Fig. 3).

> p.7429 l. 10; 18O-atm value should be +87.1.

The -87.1 in the original manuscript was mistype. Thank you.

> p.7430 l.8-10; Why do high 17O values cause the large errors in 18O-re?

BGD

11, C4106–C4109, 2014

The value of d18Oatm (+87.1 per mil) used in the calculation shown in equation 4 was the average value of atmospheric nitrate. Differ from Delta17Oatm, d18Oatm values could have been altered within the forest ecosystem subsequent to deposition so that we should consider errors in the d18Oatm values, i.e. differences in the d18O values between the average of atmospheric NO3- and atmospheric NO3- actually contained in each sample.

The relationship between sample NO3- (sample A and B), NO3-atm, and calculated NO3-re on a Delta17O v.s. d18O plot were presented in the supplementary figure of this reply, together with +-15 permil errors in the d18Oatm value. While the errors in the calculated d18Ore values were small for those having the low Delta17O values (shown as the case of sample B in the figure), the errors in the calculated d18Ore values were large for those having the high Delta17O values more than +10 per mil (shown as sample A in the figure).

We would like to add this explanation in the revised manuscript.

We would like to thank you for the helpful comments and suggestions. We trust that the answers are satisfactory responses to your comments and questions.

Sincerely, Urumu

Cc: D.D. Komatsu, T. Ohyama, A. Suzuki, F. Nakagawa, I. Noguchi, K. Takagi, M. Nomura, K. Fukuzawa, and H. Shibata

---

Interactive comment on Biogeosciences Discuss., 11, 7413, 2014.

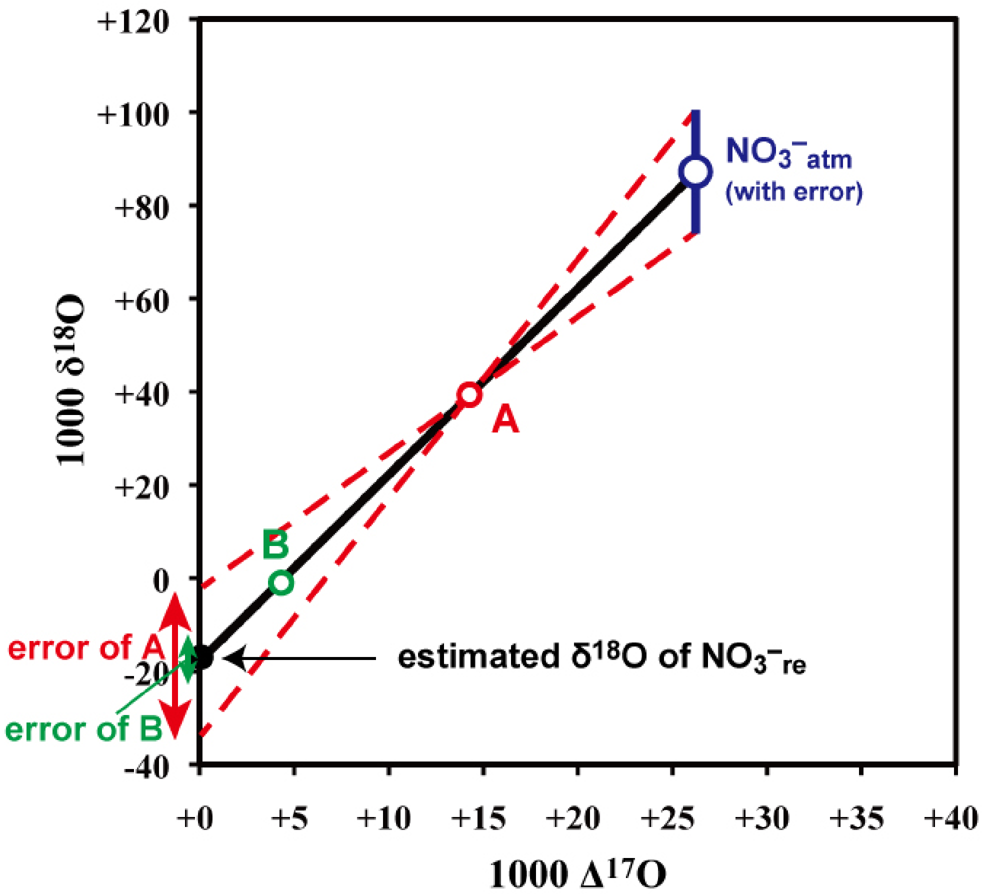

Fig. 1. supplementary figure

BGD

11, C4106–C4109, 2014

Interactive Comment