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Interactive comment on "Quantifying the nitrogen equilibrium and photochemistry-induced isotopic effects between NO and NO_2" *by* Jianghanyang Li et al.

Joel Savarino

joel.savarino@cnrs.fr

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Regarding the link between the atmospheric variation of 15N and that observed by Hastings, 2004 on nitrate in Greenland snow, I question this causal link. It is indeed easy to show that a 1cm layer of snow at a density of 0.1 and a concentration of 10-6 Mol/L (values in the low range) of nitrate is equivalent to a 500m thick atmospheric layer at 50-12 mol/mol of NOx. It is thus not realistic to think that such thick atmosphere can be leached out in one day, especially giving the stratification of the atmosphere on such icy surfaces (the snow is a low-pass filter). The lack of concentration variation in snow observed by Hastings but also by Erbland et al. 2013 for Antarctica (fig 24 sup-

plementary information) do not argue in favor of a direct link between the atmosphere and snow on hourly time-scale. Therefore, either the (necessarily small) amount of nitrogen deposited daily must have an extreme isotopic composition to be able to imprint the snow at this time-scale (as suggested by Hastings in her paper) and therefore incompatible with the fractionation proposed by the authors, or the isotopic variation observed by Hastings is only incidental and is more a reflection of spatial variability or, in other words, of a poorly estimated spatial signal-to-noise ratio than a robust observation.

I will suggest the authors to be very careful with such polar confrontation. In my view the paper is strong enough even without this confrontation. It contains robust quantification, clear delineated domains, and the possibility to test the conclusions.

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