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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Oxygen isotope mass balance of atmospheric nitrate at Dome C, East Antarctica, during the OPALE campaign" *by* J. Savarino et al.

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Savarino et al. report observations of the complete isotopic composition of nitrate aerosol collected in Dome C, Antarctica during the summer of 2011/12. The nitrogen isotopes, especially the very depleted values in the spring, are indicative of a snow-photolytic source. The observed O-17xs values are compared with calculated values using observations of oxidant concentrations during the field campaign. The observed O-17xs values were consistently $\sim$4 permil higher than what was calculated. The authors explored possible reasons for this discrepancy, but none of the known chemistry was able to account for all or most of the difference. They conclude that there are un-

known processes contributing to the atmospheric nitrate budget over this east Antarctic region.

The manuscript is very well written. My only major thought when reading this manuscript is that a discrepancy between observed and calculated O-17xs also exists at the global scale (see Figure 2d in Alexander et al., 2009). In other words, this discrepancy is not just limited to Dome C, and I think this should be mentioned in the text. The only way to alleviate this discrepancy in Alexander et al. [2009] was to assume a bulk O-17xs value for O3 of 35 permil. Since then the Savarino group has published observations that the O-17xs of O3 is closer to 25 permil, but there has since been no suggestion of how to account for this calculated versus observed discrepancy in nitrate O-17xs that would be of relatively similar magnitude on the global scale.

At the beginning of page 24062, it would be helpful if the authors would elaborate why the spring sees a maximum in snow photochemistry when one would expect this to occur closer to the middle of the summer when the solar zenith angle is highest.

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 24041, 2015.