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Interactive comment on "Large mixing ratios of atmospheric nitrous acid (HONO) at Concordia (East Antarctic plateau) in summer: a strong source from surface snow?" *by* M. Legrand et al.

Anonymous Referee #2

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This is a nice piece of work discussing the abundance of nitrous acid during the austral summer 2011/2012 at the Concordia site, located on the East Antarctic plateau. HONO was measured by means a long path absorption photometer (LOPAP).

These measurements led to hourly mixing ratios of HONO measured in December 2011/January 2012 of 35±5.0pptv, similar to those measured in December 2010/January 2011.

While these large concentrations suggest a local source of HONO, in addition to weak production from the oxidation of NO by the OH radical, they also point toward a possible

interference from HNO4.

This paper nicely combines field data, with laboratory based measurements and modelling. All conclusions are reasonable to me and certainly discussed in detail.

However, as one of the main outcome of this study arises from the two laboratory investigations performed at BAS and PSI, I was wondering if some more information could be added.

On the photochemical experiments performed on collected ice, which was used to derive somehow the yield of HONO (at least compared to NOx), I'm surprised by the use of a quite powerful lamp (1000 W) in a quite small reactor. While the wavelength dependence is clear, what about the energy dependence? The gas flow in this system is quite high, lowering certainly the residence time in the reactor and also the photolysis of HONO. But it is difficult to really assess that from the information provided. Did you assess how much HONO was photolyzed in your system? As NO2 and HONO would get degraded at different rates, this may have affected your HONO to NOx ratio. Any comment on that?

The production of HONO via organic matter is disregarded because of the low amount of complex organic acids measured. But is this the right metric for that? Indeed, low amount of such organic material but well located in the snow pack could potentially have a big impact through some catalytic reactions (where big quantities are not required but rather the availability of the catalytic material).

The interference of HNO4 seems to be clear. However HNO4 has been discussed to be a source of HONO in the marine boundary layer via cloud chemistry (see Williams et al, Atmos. Chem. Phys., 2, 39-54, 2002). Could the same type of chemistry occur in the specifically cold environment of the Antarctic? Would it then be a significant source of HONO?

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 11749, 2014.