

Interactive comment on “Microphysical properties of synoptic scale polar stratospheric clouds: in situ measurements of unexpectedly large HNO₃ containing particles in the Arctic vortex” by S. Molleker et al.

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Received and published: 15 July 2014

The authors have done a good job of bringing together data from two separate campaigns and extracting the maximum scientific value from those data. A careful combination of measurements and careful examination of assumptions and errors associated with those measurements, gives credence to the final conclusions drawn – i.e., that NO_y-rich polar stratospheric cloud particles with effective diameters of up to 35 micrometers were detected. The manuscript reports "forensic" atmospheric science at

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the limits of our technical capabilities. The manuscript is suitable for publication as is, although I do note a few very minor points below. That said, I would encourage the authors to write a paragraph in the conclusions (and sentence in the abstract) about the likely quantitative impact of this observation on our understanding or modelling of polar ozone. Such a discussion could focus on understanding contemporary processes and/or implications for polar ozone under climate change. Although I was able to follow the logic more-or-less, I agree with the other reviewer that, especially for those not in the field, some better sign-posting of the development of the argument would be helpful throughout the manuscript.

Minor points:

Abstract, line 22: spelling of “containing”

P12076, line 5: perhaps say “a mass-closure problem”?

Section 2: is it worth stating explicitly that the FSSP-100 did not suffer from the same multiple counts issues as the FSSP-300, and why it didn't?

P12085/6. Could I ask that special care is taken here to make explicit whether diameter or volume is being compared when particles are described as “bigger” or “twice as big”. The cubic dependence of volume on diameter obviously makes this distinction important!

P12085, line 28: should be “For instance” or “As an example”

P12090: can say simply “Thus, one can only speculate...”

P12092, line 20: spelling of “hypothesised” (choose yourselves whether to adopt the -ized spelling!)

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 12071, 2014.

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