

Interactive comment on “A compilation of tropospheric measurements of gas-phase and aerosol chemistry in polar regions” by R. Sander and J. Bottenheim

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This paper is a comprehensive compilation of gas phase and aerosol measurements of the polar troposphere which have been undertaken so far in both hemispheres. It essentially is the update of the compilation published as a supplement to Simpson et al. (2007), which contained only measurements until 2007. The information listed for the chemical parameter include averages (medians), occasionally the range and time period for each location. Data were drawn from the peer reviewed literature as well as some data sets available on the internet.

This work pulls together available measurements scattered throughout the literature of

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a broad number of chemical parameters in the still emerging field of polar atmospheric chemistry. It is a useful reference for the Atmospheric and Earth sciences community, e.g. for modellers who want to assess temporal trends or field scientists investigating atmospheric change in the polar regions. In addition, the previous version was probably not visible to many interested in the topic as it was published only as a supplement of a review paper. It is therefore appropriate for publication in 'Earth System Science Data' after addressing the minor comments (including omitted studies) below:

p.586 As this compilation will represent for some a starting point of their research it is important to establish more context. In the introduction, I would at least point explicitly to the individual AICI review papers 2007 and 2012 (this work is part of the joint ACP/ESSD special issue 'New perspectives on Air-Ice Chemical Interactions (AICI)'), i.e. Grannas et al. (2007), Simpson et al. (2007), Dominé et al. (2008), Anderson and Neff (2008), Abbatt et al. (2012) etc.

p.588 While it is sensible to limit the size of the data compilation, references to gas phase measurements in polar firn and ice cores need to be mentioned here. They both require more interpretation, but are the only means of going beyond the modern observational period of the past 50 years. Cite for example

- ACP Special issue 'Firn air: archive of the recent atmosphere', Editor(s): W. T. Sturges, T. Blunier, R. van de Wal, and V. Petrenko, ACP, 2011

- Polar ice core records of greenhouse gases e.g. from the Global Change Master Directory (<http://gcmd.nasa.gov>) or the National Snow & Ice Data Center (<http://nsidc.org>)

p.609 Include reference of Kerbrat et al. (2012), cited on p.644.

Include data from the following studies & update the references accordingly:

p.635 surface O₃ in Antarctica from the 1960s (Oltmans et al., 1976)

p.635 surface O₃ in Draunning Maud Land/Antarctica (Bauguitte et al., 2011)

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p.639 H₂O₂ from Summit (summer 2003, spring 2004) and South Pole (summer 2003) (Frey et al., 2009a)

p.641 NO and NO₂ from Concordia/Antarctica (Frey et al., 2012a)

p.657 CH₃OOH from Summit (summer 2003, spring 2004) and South Pole (summer 2003) (Frey et al., 2009a)

p.674 Mercury (Hg) from Concordia/Antarctica (Dommergue et al., 2012)

p.678 year-round atmospheric particulate nitrate (NO₃-) from Concordia/Antarctica in 2007 (Frey et al., 2009b)

Figure 1 & Table 3

This is confusing: East Antarctic Plateau is commonly referred to as a region, it's not a station! data in tables should be annotated rather with 'ant'?

Note also that Slusher et al. (2012) measured a number of chemical species on the ANTCTI 2005 airborne campaign across the East Antarctic Plateau, which should also be included.

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