

Interactive comment on “Natural new particle formation at the coastal Antarctic site Neumayer” by R. Weller et al.

Anonymous Referee #2

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Manuscript “Natural new particle formation at the coastal Antarctic site Neumayer” by Weller et. al. presents temporarily limited campaign based observations of aerosol size distributions with special focus on new particle formation (NPF) from coastal station Neumayer. Core of the manuscript is data presentation of the NPF events (44 events during 7 months of observations) from three observational periods in 2012 and 2014.

NPF has been subject of research for recent decades and there is available large body of literature on this subject. From point of view of contribution to understanding the NPF and links to meteorology, atmospheric dynamics or chemistry this manuscript does not contribute much to our knowledge. Main and only contribution of this manuscript are observations of NPF from remote site in Antarctica. Manuscript is clearly written, but informative value is rather limited. In summary it says: We do observe now and then

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NPF and growth rate is slow. For all the rest we can only speculate. Data interpretation is weak. On my opinion this does not merit publication of current manuscript in ACP and major revision of the manuscript is needed.

1) Instrumentation used during 2012 is not directly comparable to instrumentation used in 2014. When focusing solely on qualitative definition of presence and absence of NPF, it should not play a major role, however, for comparison of growth rates and size distribution dynamics, direct intercomparison of both systems is necessary and should be presented. It is not uncommon that aerosol size spectrometers vary from each other significantly [Wiedensohler et al., 2012] as well as cut off characteristics of CPCs. Also using GR calculation and size ranges with two decimal precision has no realistic meaning.

2) I understand that it is very demanding on resources and logistics to carry out measurements at such a remote place and it is difficult to run extensive instrumentation set up there. But authors did not explore even which they have available. Data analysis will be more robust if local meteorology and other aerosol and trace gas observations at Neumayer will be better linked to NPF observations. How different are conditions between class I and class II event? How different are conditions between NPF and nonNPF days? Can importance of marine air on NPF be better assessed? Authors have available data from local meteorology, radiation, cloud cover, BC and scattering levels, OPC and two CPC data which are part of core program. Trace gases: Rn222 and O₃ are observed with good temporal resolution, daily data about reactive trace gases. Can authors link air mass origin using trajectories with other observations to assess time spent over the sea/coastal Antarctica for NPF and nonNPF cases? Authors can also try to use water vapor as an air mass tracer of marine and continental air masses. Neumayer is a GAW station and potential of observations conducted there was not explored sufficiently in this manuscript.

Minor comment:

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In Introduction on page 15656 authors present a picture of aerosol having decisive role in radiative forcing. GHG have decisive role, aerosols have largest uncertainty and we do not know how decisive role they actually play.

Reference

Wiedensohler, A., et al. (2012), Mobility particle size spectrometers: harmonization of technical standards and data structure to facilitate high quality long-term observations of atmospheric particle number size distributions, *Atmospheric Measurement Techniques*, 5(3), 657-685.

Interactive comment on *Atmos. Chem. Phys. Discuss.*, 15, 15655, 2015.

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