

Interactive
Comment

Interactive comment on “Unexpectedly high ultrafine aerosol concentrations above East Antarctic sea-ice” by R. S. Humphries et al.

Anonymous Referee #2

Received and published: 23 November 2015

General

The paper describes in situ particle number concentration observations in the East Antarctic sea ice region. The main observations are that the particle number concentrations increased very clearly when the ship sailed south across the Polar Front and that the majority of particles in the Polar Cell were in the nucleation mode size range. The measurements were conducted with two condensation particle counters only, which slightly weakens the paper since no detailed size distributions can be obtained from them. However, like the authors correctly write, there are many stations in Antarctica but observations on the sea-ice region are fairly rare. The work seems to be careful, so I can recommend its publication in ACP with minor revisions.

Detailed comments 1) One of the questions is the quality control of the CPC data.

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The fact that the CN3-10 was so clearly higher than CN10 could also be due to some technical issue, or could it? Just to be sure, did you compare the two CPCs after returning north from the polar cell? North of the polar front the two CPCs seem to have shown fairly similar concentrations. But was that only when the ship was sailing southwards? Was it so also when the ship came back to the north? When new particle formation is not present, marine aerosol should be practically all larger than 10 nm.

2) One of the papers the authors have not noticed is Koponen et al., Number size distributions and concentrations of marine aerosols: Observations during a cruise between the English Channel and the coast of Antarctica, JGR, 2002. There are results of another cruise through the sea ice, but again in the Weddell Sea. Check and compare the results with it.

3) P29130 L1-3: "Most studies of aerosol loading do not correct for size varying inlet efficiencies, particularly in the smallest of these size ranges where uncertainties are high." What is this based on? What I know, the community that uses differential mobility particle sizers, inverts their data with inversion routines that include size-dependent losses in the sampling line. That is all routine.

4) In Table 1, please add a column "Location" that would show the max and min latitude and longitude in the respective periods.

5) Please add a map showing the route of the ship and if possible the ice edge – maybe as a satellite image – and perhaps also particle number concentrations with a color-coded line of the ship's route.

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 29125, 2015.

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