

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

R. S. Humphries et al.

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We would like to thank reviewer 3 for the time and effort put into their review. Responses to the reviewer’s summarising points are given below.

1. Inclusion of details of the precursor species and mechanisms in the introduction is unnecessary for this manuscript as the primary focus here is about the magnitude of the aerosol number concentration, rather than any insight on the chemical mechanism. Indeed, two new particle events are observed and the one that was found to be a local event has been described in a separate publication now in ACP. Inclusion of precursors has been included in the final section as part of speculative, but important discussion, however no new evidence for chemical
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mechanisms is introduced in this manuscript, therefore, we feel it unsuitable to include in the introduction.

2. If changes in MBL dynamics were able to modulate the changes in particle concentrations, one would expect correlations between particle concentrations and other meteorological parameters (e.g. wind speed, humidity, etc). No such correlations exist other than with atmospheric pressure, which is discussed in detail in the manuscript. The absence of any relevant correlations, together with the other evidence discussed in the manuscript that points to the AFT as the source, makes the MBL as a source highly unlikely. Consequently, nothing has been changed in the manuscript.
3. Additional text has been added to paragraph five of section 3.2 discussing the option of upwind MBL formation more explicitly than was previously included.
4. Other comparative measurements have already been discussed in section 3, and additional details have been included with respect to reviewer 2’s comments. The manuscript of Contini et al. (2010) suggested by the reviewer, while very interesting, is not relevant to this background study since the high concentrations of nanoparticles observed can generally be attributed to pollution events from the nearby research station.
There were no significant correlations between aerosol number concentrations and meteorological parameters other than atmospheric pressure. The first paragraph of section 3.3 has been altered to make this more apparent.