4.210 Aerosol properties across the southern polar front in summer .

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Abstract:

In a study of aerosols both north and south of the polar front in the Austral spring of 2012 Humphries et al. (2016) have reported an order of magnitude step change in aerosol number concentrations across the Antarctic polar front, with those south of the front averaging over 1000 cm^{-3}. They postulated that this was due to the region being influenced by aerosols generated in the free troposphere that were being advected down. A return voyage to this region was made in the summer (February) of 2017 on the RV Investigator, with a more extensive range of aerosols measurements, including aerosol number concentrations and submicron size distributions. These measurements were augmented with a number of other instruments measuring trace gas species, including radon, an important tracer for atmospheric transport.
The results show interesting seasonal differences, with the step change in number concentrations virtually absent across the proposed frontal boundary. Despite this, there was evidence of free-tropospheric composition while crossing the atmospheric boundary. The dataset also shows some evidence of the modification of cloud behavior by ships emissions.
References:
Humphries, R. S., Klekociuk, A. R., Schofield, R., Keywood, M., Ward, J., & Wilson, S. R. (2016). Unexpectedly high ultrafine aerosol concentrations above East Antarctic sea ice. *Atmospheric Chemistry and Physics*, *16*(4), 2185–2206. http://doi.org/10.5194/acp-16-2185-2016