4.144 Aerosol Particle Size Distributions and Compositions over the Southern Ocean in the Austral Summer of 2017.

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Abstract:

Aerosol particles in the marine boundary layer, which are emitted from the ocean surface through the sea-spraying process, can affect the cloud formation over the ocean, resulting in their significance in the Earth’s radiative budget. Southern Ocean (SO) is a unique region with rich ecosystems and without significant anthropogenic and continental natural impacts especially in austral summer (e.g., McCoy et al., 2015). The measurements of aerosol particles over the Pacific Ocean sector of SO are sparse and critically needed for understanding the concentration levels of aerosols to assess the role of aerosols as cloud condensation nuclei (CCN) and ice nucleating particles (INPs).

We conducted ship-borne aerosol measurements using our research vessel “*Mirai*” in a framework of the cruise “Trans South Pacific Project” between Japan and Chili (December 27, 2016-March 28, 2017). In the late austral summer of 2017 (February 10-March 3, 2017), RV *Mirai* was deployed over the SO (from Punta Arenas, CHL to Auckland, NZ). We performed in-situ measurements of size distributions of total and non-volatile (at 300ºC) aerosol particles using a scanning mobility particle sizer (TSI, the combination of a differential mobility analyzer model 3080 and a condensation particle counter model 3010), black carbon aerosol using a single particle soot photometer (DMT), and fluorescent bioaerosol particle (FBAP) using a wideband integrated bioaerosol sensor (DMT) in the experimental room located on the top level of RV *Mirai*. We also performed aerosol sampling for the post-analyses of chemical composition, morphology (microscopy), and ice nucleation ability (a cold-stage-based immersion freezing technique; Tobo, 2016).
We will present the temporal variations of size-segregated aerosol concentrations, CCN-proxy (particles larger than Hoppel minimum, Hoppel et al., 1986), volume-fraction-remaining (a diagnosis of the sea-salt impacts), FBAP, organic carbon, and INPs to elucidate the atmospheric physics and chemistry of natural aerosols in this region.