

Title: Supporting data for manuscript titled "Marine and Terrestrial Organic Ice Nucleating Particles in Pristine Marine to Continentally-Influenced Northeast Atlantic Air Masses"

Abstract: Aerosol number, surface area, black carbon mass concentrations, Radon-222 concentrations, and Immersion-mode ice nucleating particle (INP) number concentrations were monitored onboard the RV *Investigator* (voyage IN2016_V02), an Australian Government research platform operated by the Commonwealth Science and Industrial Research Organisation (CSIRO) from 13 March to 15 April in 2016. These data were used to characterize INP composition and abundance present over the Southern Ocean. Measurements were made from the RV *Investigator*'s custom-designed air sampling inlet and a dedicated sampling line for the aerosol concentrator (both located approximately 18.4 m above sea level at the front of the ship), with the exception of the aerosol particles that were collected onto polycarbonate membrane filters in open-faced filter holders that were located approximately 23 m above the ocean surface. Total aerosol surface area and number were determined using a nephelometer and a condensation particle counter, respectively. Black carbon concentrations were determined using a multi-angle absorption photometer (MAAP). Radon (^{222}Rn) concentrations were measured using a 700 L dual flow loop two-filter detector (*Chambers et al.*, 2014; *Griffiths et al.*, 2016), built by the Australian Nuclear Science and Technology Organization (ANSTO) and installed as part of the permanent suite of atmospheric instrumentation onboard the RV *Investigator*. Finally, immersion-mode ice nucleating particles were measured using two methods: the ice spectrometer (IS, offline) and continuous flow diffusion chamber (CFDC, online).

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*Enquiries about the MNF collected data (Nephelometer etc) should be made to the CSIRO Ocean and Atmosphere Data Centre librarians: DataLibrariansOAMNF@csiro.au

Format of data files: Data are separated by instrument. File formats include .txt, .csv, and netcdf.

Location where data were collected: Data were collected onboard the RV *Investigator* (voyage IN2016_V02), an Australian Government research platform operated by the Commonwealth Science and Industrial Research Organisation (CSIRO) during the Clouds, Aerosols, Precipitation, Radiation, and atmospheric Composition Over the southern ocean (CAPRICORN) campaign. The research voyage occurred south of Australia during the late Austral summer and early autumn seasons.

Time period during which data were collected: 2016-03-13 to 2016-04-15

File Information: The archive includes 14 total files, organized by instrument

CFDC/:

CFDC_CAPRICORN.csv
CFDC_CAPRICORN_metadata.rtf

IS/:

IS_aerosol_treatments_CAPRICORN_metadata.rtf
IS_aerosol_Treatments_CAPRICORN.csv
IS_aerosol_untreated_CAPRICORN_metadata.rtf
IS_aerosol_untreated_CAPRICORN.csv
IS_seawater_samplelog_CAPRICORN_metadata.rtf
IS_seawater_samplelog_CAPRICORN.csv
IS_seawater_treatments_CAPRICORN_metadata.rtf
IS_seawater_treatments_CAPRICORN.csv

Miss_Aerosol/:

Aerosol_in2016_v02_rawdata_metadata.rtf
Aerosol_in2016_v02_rawdata.nc

Nephelometer/:

Nephelometer_CAPRICORN_metadata.rtf

Nephelometer_CAPRICORN_raw.nc
Radon/:
Radon_222_CAPRICORN_metadata.rtf
Radon_222_CAPRICORN_rawdata.txt

Definitions of acronyms, site abbreviations, or other project-specific designations used in the data file names or documentation files:

Commonwealth Science and Industrial Research Organisation (CSIRO)

The Clouds, Aerosols, Precipitation, Radiation, and atmospheric Composition Over the southern ocean (CAPRICORN)

Ice nucleating particle (INP)

black carbon (BC)

Variable information: Variable information for each data file is described in the corresponding metadata file.

Uncertainty, precision and accuracy of measurements: Uncertainties, precision and accuracy details are provided in the manuscript.

Environmental or experimental conditions: All aerosol measurements were ambient and seawater samples were taken from CTDs. Ice spectrometer (IS) method is offline, filters were collected on the ship and analyzed in the lab.

Method(s): Data provided were analyzed as described in the publication.

Standards or calibrations that were used: The standards, calibrations and blanks are all described in the publication.

Software: Any text editor or excel program can open the files in the database.

Quality assurance and quality control that have been applied: All data have been quality controlled, details are reported in the publication.

Limitations to reuse:

Use of the CFDC and IS raw data requires prior OK from lead PI (Please contact Paul DeMott, Paul.Demott@colostate.edu).

Use of the Miss_Aerosol raw data requires prior OK from lead PI (Please contact Ruhi Humphries, Ruhi.Humphries@csiro.au, or Ian McRobert, Ian.McRobert@csiro.au).

Use of the Radon data requires prior OK from lead PI (Please contact Alastair Williams, agw@ansto.gov.au, or Scott Chambers, szc@ansto.gov.au).

Related Files: This dataset is used in the paper: C. S. McCluskey, T. C. J. Hill, R. S. Humphries, A. M. Rauker, S. Moreau, P. G. Strutton, S. D. Chambers, A. G. Williams, I. McRobert, J. Ward, M. D. Keywood, J. Harnwell, W. Ponsonby, Z. Loh, P. Krummel, A. Protat, S. M. Kreidenweis, P. J. DeMott (2018), Observations of ice nucleating particles over Southern Ocean waters, *Geophys. Res. Lett.*, Under Review