

**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 size, composition, meteorology, and Immersion-mode ice nucleating particle (INP) number concentrations were monitored at the Mace Head Research Station (53.32 °N, 9.90 °W) from 5-29 August 2015. These data were used to characterize INP composition and abundance in pristine marine air and to investigate the influence of marine organic aerosol plumes associated with offshore ocean biological activity on INP populations. Measurements were made approximately 100 m inland from the Ireland coastline. Aerosol mass and composition were determined using tapered element oscillating microbalance (TEOM) and an aerosol mass spectrometer (AMS), respectively. Aerosol size distributions were measured with an aerosol sizing instrument suite, including scanning electrical mobility particle sizers and an aerodynamic particle sizer. Meteorological conditions were also monitored, including wind speed and direction. Black carbon concentrations were determined using a multi-angle absorption photometer (MAAP). Immersion-mode ice nucleating particles were measured using two filter-based offline methods: the ice spectrometer (IS) and the dynamic filter processing chamber (DFPC). The horizontal ice nucleation chamber - evaporation (HINC-EV) was also used to measure *in-situ* INP number concentrations.

**Contact person:** Paul J. DeMott  
**Email:** [Paul.Demott@colostate.edu](mailto:Paul.Demott@colostate.edu)

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

**Location where data were collected:** Data were collected at the Mace Head Research Station (53.32 °N, 9.90 °W).

**Time period during which data were collected:** 2015-09-05 to 2015-08-29

**File Information:** The archive includes 74 total files, organized by instrument

- AMS\_archive/
  - AMS\_composition\_data.txt
  - AMS\_composition\_metadata.rtf
- AerosolSizeDistributions\_archive/
  - D\_combAer1.73.txt
  - D\_combAer1.73\_metadata.rtf
  - N\_SMPS\_APS\_corrected.txt
  - N\_SMPS\_APS\_corrected\_metadata.rtf
  - S\_SMPS\_APS\_corrected.txt
  - S\_SMPS\_APS\_corrected\_metadata.rtf
  - SizingTimeStamp.txt

SizingTimeStamp\_metadata.rtf  
V\_SMPS\_APS\_corrected.txt  
V\_SMPS\_APS\_corrected\_metadata.rtf  
DFPC\_archive/  
    DFPC\_data.xlsx  
    DFPC\_metadata.rtf  
HINC\_archive/  
    HINC\_data.xlsx  
    HINC\_metadata.rtf  
IS\_archive/  
    BACCHUS\_MH\_CSU\_IS\_20150805\_ALL\_R1.txt  
    BACCHUS\_MH\_CSU\_IS\_20150805\_CLEAN\_R1.txt  
    BACCHUS\_MH\_CSU\_IS\_20150806\_ALL\_R1.txt  
    BACCHUS\_MH\_CSU\_IS\_20150806\_CLEAN\_R1.txt  
    BACCHUS\_MH\_CSU\_IS\_20150807\_ALL\_R1.txt  
    BACCHUS\_MH\_CSU\_IS\_20150807\_CLEAN\_R1.txt  
    BACCHUS\_MH\_CSU\_IS\_20150808\_ALL\_R1.txt  
    BACCHUS\_MH\_CSU\_IS\_20150808\_CLEAN\_R1.txt  
    BACCHUS\_MH\_CSU\_IS\_20150809\_ALL\_HEAT\_R1.txt  
    BACCHUS\_MH\_CSU\_IS\_20150809\_ALL\_R1.txt  
    BACCHUS\_MH\_CSU\_IS\_20150809\_CLEAN\_R1.txt  
    BACCHUS\_MH\_CSU\_IS\_20150809b\_ALL\_R1.txt  
    BACCHUS\_MH\_CSU\_IS\_20150809b\_CLEAN\_R1.txt  
    BACCHUS\_MH\_CSU\_IS\_20150810\_ALL\_R1.txt  
    BACCHUS\_MH\_CSU\_IS\_20150810\_CLEAN\_R1.txt  
    BACCHUS\_MH\_CSU\_IS\_20150811\_ALL\_R1.txt  
    BACCHUS\_MH\_CSU\_IS\_20150812\_ALL\_R1.txt  
    BACCHUS\_MH\_CSU\_IS\_20150814\_ALL\_R1.txt  
    BACCHUS\_MH\_CSU\_IS\_20150814\_CLEAN\_R1.txt  
    BACCHUS\_MH\_CSU\_IS\_20150815\_ALL\_R1.txt  
    BACCHUS\_MH\_CSU\_IS\_20150815\_CLEAN\_R1.txt  
    BACCHUS\_MH\_CSU\_IS\_20150816\_ALL\_R1.txt  
    BACCHUS\_MH\_CSU\_IS\_20150816\_CLEAN\_R1.txt  
    BACCHUS\_MH\_CSU\_IS\_20150817\_ALL\_H2O2\_R1.txt  
    BACCHUS\_MH\_CSU\_IS\_20150817\_ALL\_HEAT\_R1.txt  
    BACCHUS\_MH\_CSU\_IS\_20150817\_ALL\_R1.txt  
    BACCHUS\_MH\_CSU\_IS\_20150818\_ALL\_R1.txt  
    BACCHUS\_MH\_CSU\_IS\_20150819\_ALL\_R1.txt  
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    BACCHUS\_MH\_CSU\_IS\_20150820\_CLEAN\_R1.txt  
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    BACCHUS\_MH\_CSU\_IS\_20150821\_CLEAN\_R1.txt  
    BACCHUS\_MH\_CSU\_IS\_20150822\_ALL\_R1.txt  
    BACCHUS\_MH\_CSU\_IS\_20150822\_CLEAN\_R1.txt  
    BACCHUS\_MH\_CSU\_IS\_20150823\_ALL\_R1.txt  
    BACCHUS\_MH\_CSU\_IS\_20150823\_CLEAN\_R1.txt

BACCHUS\_MH\_CSU\_IS\_20150824\_ALL\_R1.txt  
 BACCHUS\_MH\_CSU\_IS\_20150824\_CLEAN\_R1.txt  
 BACCHUS\_MH\_CSU\_IS\_20150825\_ALL\_R1.txt  
 BACCHUS\_MH\_CSU\_IS\_20150825\_CLEAN\_R1.txt  
 BACCHUS\_MH\_CSU\_IS\_20150826\_ALL\_H2O2\_R1.txt  
 BACCHUS\_MH\_CSU\_IS\_20150826\_ALL\_R1.txt  
 BACCHUS\_MH\_CSU\_IS\_20150826\_CLEAN\_HEAT\_R1.txt  
 BACCHUS\_MH\_CSU\_IS\_20150826\_CLEAN\_R1.txt  
 BACCHUS\_MH\_CSU\_IS\_20150827\_ALL\_R1.txt  
 BACCHUS\_MH\_CSU\_IS\_20150827\_CLEAN\_R1.txt  
 BACCHUS\_MH\_CSU\_IS\_20150828\_ALL\_R1.txt  
 BACCHUS\_MH\_CSU\_IS\_20150828\_CLEAN\_R1.txt  
 IS\_Filter\_Inventory.xlsx  
 IS\_Filter\_Inventory\_metadata.rtf  
 MAAP\_archive/  
     MAAP\_BlackCarbon\_data.txt  
     MAAP\_metadata.rtf  
 Meteorology\_archive/  
     Met\_data.txt  
     Met\_metadata.rtf  
 SectorSampling\_archive/  
     SectorSampling\_data.csv  
     SectorSampling\_metadata.rtf  
 TEOM\_archive/  
     TEOM\_data.xlsx  
     TEOM\_metadata.rtf.

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

Mace Head Research Station (MHD)  
 Ice nucleating particle (INPs)  
 Equivalent black carbon (eBC)  
 NH<sub>4</sub> - ammonium  
 NO<sub>3</sub> - nitrate  
 SO<sub>4</sub> - sulfate  
 Org - organic species  
 Seasalt - sea salt  
 MSA - methanesulfonic acid  
 PM<sub>10</sub> – particulate matter with diameters less than 10 micrometers  
 PM<sub>1</sub> – particulate matter with diameters less than 1 micrometer  
 Marine organic aerosol event 1 and 2 (M1 and M2)  
 Terrestrial organic aerosol even 1 (T1)  
*Ice spectrometer sample filenames:* Clean sector conditions at MHD are defined as periods when equivalent black carbon (eBC) is less than 15 ng m<sup>-3</sup> and wind direction is between 190 to 300 degrees; samples that represent these conditions are listed as “CLEAN”. “ALL” and “continuous” sampling refers to periods of

sampling including both clean sector and non-clean sector periods. Heating treatment was performed on select ice spectrometer filter samples and their filenames are listed as “\_HEAT”. Hydrogen peroxide digestions treatment was performed on select ice spectrometer filter samples and their corresponding filenames are listed as “\_H2O1”.

**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 measurements were ambient. Ice spectrometer (IS) and dynamic filter processing chamber (DFPC) methods are offline, filters were collected at MHD 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 file sin the database.

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

**Related Files** – This dataset is used in the manuscript: McCluskey, C. S., J. Ovadnevaite, M. Rinaldi, J. Atkinson, F. Belosi, D. Ceburnis, S. Marullo, T. C. J. Hill, U. Lohmann, Z. A. Kanji, C. O’Dowd, S. M. Kreidenweis, P. J. DeMott (2018a), Marine and Terrestrial Organic Ice Nucleating Particles in Pristine Marine to Continentally-Influenced Northeast Atlantic Air Masses., J. Geophys. Res, Under Review