

MOSAiC APIMS Atmospheric Dimethyl Sulfide, Version 1, ReadMe

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What is this?

University of Colorado operated an Atmospheric Pressure Ionization Mass Spectrometer (APIMS) for atmospheric DMS concentration and eddy correlation flux measurements, sampling air from the Polarstern bow meteorological tower. The instrument experienced technical issues during Leg 1 and was not repaired until the beginning of Leg 4. This data set consists of 10-second and 1-minute mean DMS concentration data for Legs 4 and 5. For a method reference see *Blomquist et. al 2010*, <http://doi.org/10.5194/amt-3-1-2010>.

An overview plot of DMS concentrations for ~ 3 months, from July through September 2020, is shown in Figure 1. This period represents the late-spring–summer melt season when we expect the greatest DMS production and emission in the sea ice and open ocean. The highest atmospheric concentrations were observed in the early summer during Leg 4, when the MOSAiC drift was near the ice margins north of Svalbard. The highest concentrations were associated with wind direction from the SE sector, as shown in Figure 2.

Preliminary data files are available to the MOSAiC user community from our project folder on the shared workspace drive:

`/isibhv/projects-dmz/mosaic/Teams_Tasks/02_Atmos/Trace_Gas_Flux_CU_Bigelow/`

What parameters are included?

Data files are supplied in both MATLAB table format and ASCII text. The 10-second data files contain DMS concentration and a few system variables of limited interest to the general user. The 1-minute mean files contain timestamp and DMS concentration only:

datenum: MATLAB datenum UTC timestamp - a serial date number representing the whole and fractional number of days from a fixed, preset date (January 0, 0000) in the proleptic ISO calendar.

yr/mon/day/hr/min/sec: other UTC timestamp variables.

dms_ppt: DMS dry-air mole fraction in parts-per-trillion.

sens_cps_ppt / man_flow_lpm / api_flow_lpm / cal_flow_lpm / std_conc_ppt: APIMS flow rates and operational parameters of limited general interest, only in the 10-sec data set.

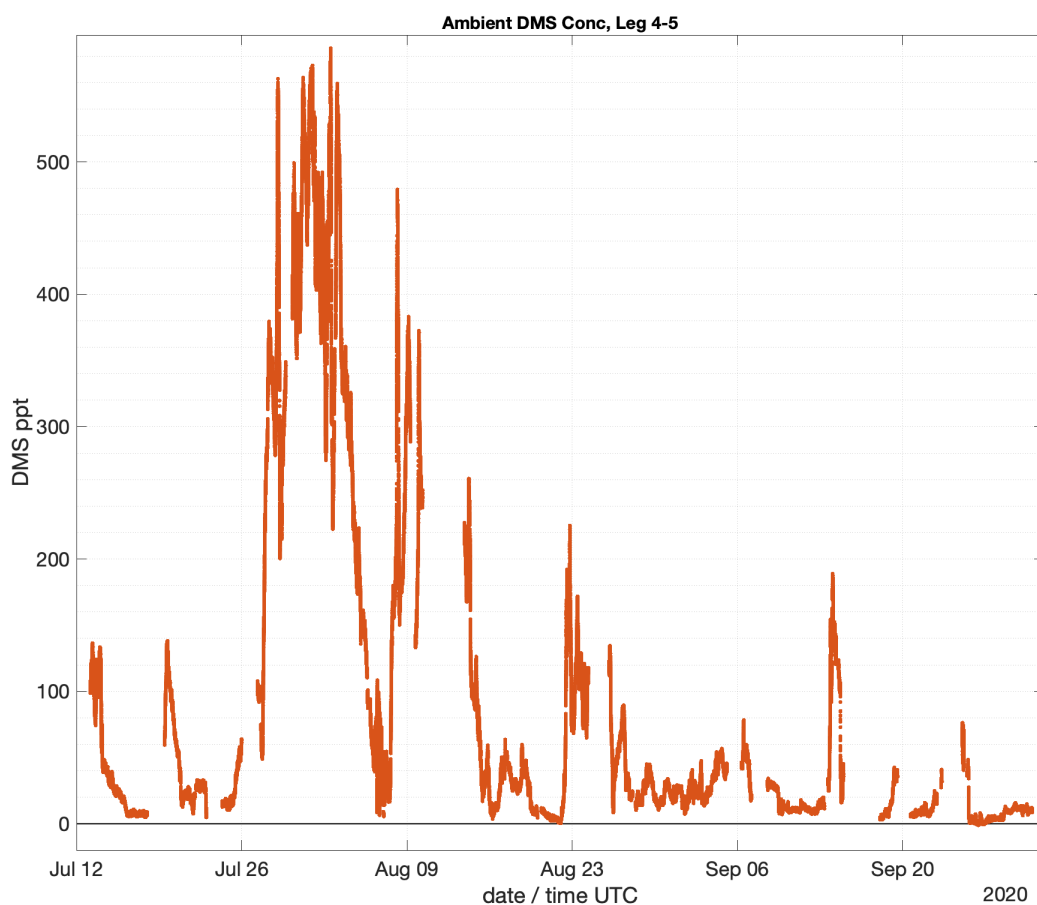


Figure 1: Time series of 1-min mean DMS concentrations for MOSAiC Legs 4 and 5.

Filtering methods.

The APIMS was typically not running during periods when the relative wind direction at the bow was outside of a $\pm 130^\circ$ sector, so there is no data for these periods. DMS is not a contaminant we expect to see from the ship or other human activities on the surrounding ice, but pollutants contaminate the gas inlet tubing and mass spectrometer ion source, decreasing sensitivity and contributing background interferences. A despiking filter was applied to remove a few noise artifacts in the 10-second time series, but no other filtering methods were used on the measurements.

Contacts.

If you notice any issues or have questions, feel free to contact me:

byron.blomquist@colorado.edu.

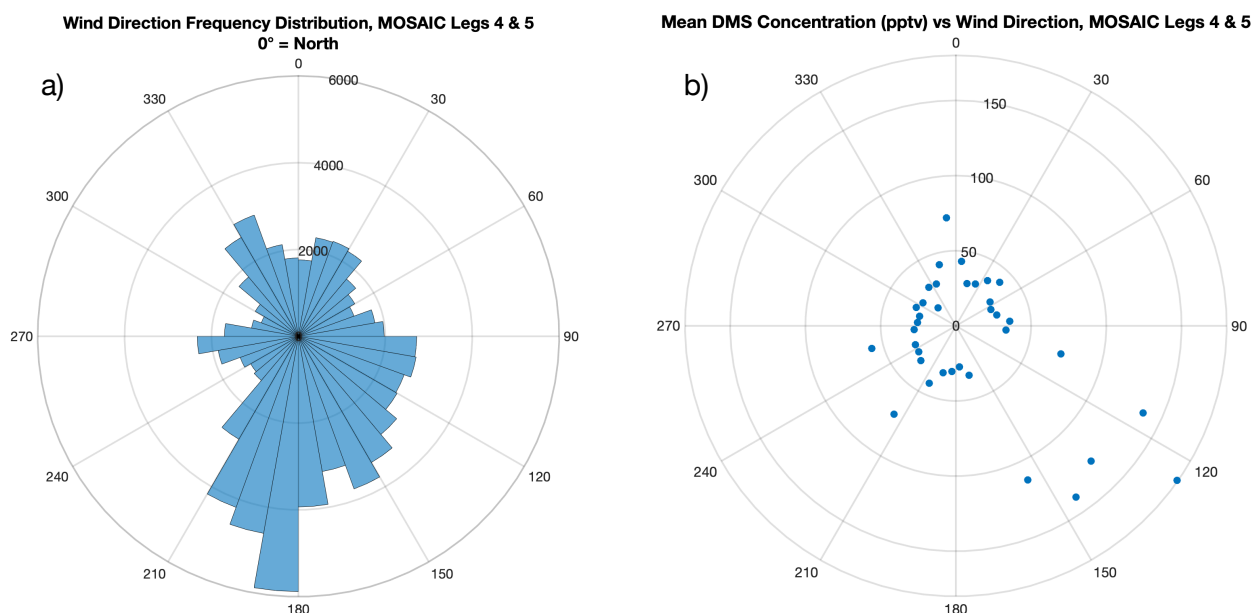


Figure 2: a) 1-minute mean wind direction frequency distribution polar plot for Legs 4 and 5. Winds were predominantly from a S to SW sector from July into September with wind speeds mostly less than 10 m/s. b) Mean DMS concentration vs wind direction. Highest DMS concentrations were for winds from the SE sector, originating over open water (especially during Leg 4).