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Atmospheric CH_4 and CO_2 measurements during SWERUS-C3, leg 2

Contact info for questions about these datasets:

Brett Thornton, brett.thornton@geo.su.se
Patrick Crill, patrick.crill@geo.su.se

Any use of this data, please reference the following two papers:

Berchet, A., Pison, I., Crill, P. M., Thornton, B., Bousquet, P., Thonat, T., Hocking, T., Thanwerdas, J., Paris, J.-D., and Saunois, M. (2020): Using ship-borne observations of methane isotopic ratio in the Arctic Ocean to understand methane sources in the Arctic, Atmos. Chem. Phys., https://doi.org/10.5194/acp-2019-595

Thornton, B. F., M. C. Geibel, P. M. Crill, C. Humborg, and C.-M. Mörth (2016), Methane fluxes from the sea to the atmosphere across the Siberian shelf seas, Geophys. Res. Lett., 43, https://doi.org/10.1002/2016GL068977

This datapackage contains atmospheric observations of CH_4 and CO_2, during the SWERUS-C3 project in the Arctic Ocean during July, August, and September 2014. Datasets were collected onboard the Swedish icebreaker *Oden*. **This datapackage consists of one .csv** file:

SWERUS_leg2_air_GHG_temporal.csv

Calibrated CH_4, CO_2 in ppm, measured in the air at 9, 15, 20, and 35 m heights above sea surface. Other variables: SQL-style date and time, GPS (DOY, latitude, longitude), valve position (inlet height, see below). This atmospheric data has been filtered for windspeed, wind direction, and $CO_2 > 450$ ppm (filters are designed to remove possible ship influence from data). Data period is DOY 229-269 of 2014.

Additional CH4 and CO2 atmospheric concentration data for earlier in the SWERUS cruise (DOY 192–229) are available in a separate

datapackage here: https://bolin.su.se/data/thornton-2016

DETAILS:

- DOY and time refer to UTC time, not local time.

- windspeed was determined by *Oden*'s sonic anemometers at 35m above sea level and corrected to a height of 10m above sea level (following Andersson et al.: ws(10m)=ws(35m)*(1+((1.3e-3)^(0.5)/0.41)*log(10/35)) Windspeeds were cross-verified with speeds derived from 3D sonic anemometers at 20 m height on *Oden*'s bow meteorological mast.

- FGGA 24EP Model 0010 (Los Gatos Research) cavity ring-down spectrometer used for atmospheric measurements of CH_4 and CO_2.

- CH_4 and CO_2 air measurements are 70 s means. Dwell time per measurement height was 2 minutes; only last 70 s are averaged to avoid mixing from previous inlet in instrument measurement cell.

- in SWERUS_leg2_air_GHG_temporal.csv, valve position corresponds to measurement height above sea level: 1= 4 m (not used in this dataset), 2= 9 m, 3= 20 m, 4= 15 m, 5= 35 m