

Read me for "SWERUS\_leg1\_water\_air\_GHG.zip"

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**Any use of this data, please reference the following paper:**

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

This datapackage contains atmospheric observations of CH<sub>4</sub>, CO<sub>2</sub>, and dissolved CH<sub>4</sub> in surface waters, during leg 1 of the SWERUS-C3 project in the Arctic Ocean in July and August 2014. Datasets were collected onboard the Swedish icebreaker *Oden*. This datapackage consists of three .csv files:

1. SWERUS\_leg1\_air\_GHG\_temporal.csv

Calibrated CH<sub>4</sub>, CO<sub>2</sub> in ppm, measured in the air at 4, 9, 15, 20, and 35 m heights above sea surface. Other variables: standard deviation of CH<sub>4</sub> and CO<sub>2</sub> in ppm, GPS (DOY, latitude, longitude), valve position (inlet height, see below). DOY 192-229. This atmospheric data has been filtered for windspeed, wind direction, and CO<sub>2</sub> > 450 ppm (filters are designed to remove possible ship influence from data).

2. SWERUS\_leg1\_water\_GHG\_temporal.csv

Calibrated dissolved CH<sub>4</sub> in ppm, data measured from an intake in the hull of *Oden* at ca. 8 m depth. Other variables: GPS (latitude, longitude, DOY), seawater salinity, seawater temperature, seawater pH, 10 m windspeed (corrected from measurement height). DOY 189-222.

3. SWERUS\_leg1\_air\_water\_GHG\_spatial.csv

Includes coincident air and water measurements from days 192-222. Same measurements as above BUT all measurements have been gridded and averaged to 0.001 degree resolution (a spatial normalization process which accounts for varying ship speed during the cruise).

DETAILS:

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

- salinity and seawater temperature measured by Seabird SBE45 thermosalinograph

- seawater pH measured online by Endress+Hauser Orbisint CPS11D Memosens electrode (calibration monitored)

- 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.

- measurements of dissolved CH<sub>4</sub> (WEGAS system) were via continuous head-space equilibration, compensated for ambient air contaminations, extrapolated and smoothed with a running mean determination (step width 100 data points)

- G2301 and G2131-i, (Picarro) cavity ring-down spectrometers used for WEGAS (water) measurements of CH<sub>4</sub>.

- FGGA 24EP Model 0010 (Los Gatos Research) cavity ring-down spectrometer used for atmospheric measurements of CH<sub>4</sub> and CO<sub>2</sub>.

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

- air measurements, valve position corresponds to measurement height above sea level:

1= 4 m (rarely used)

2= 9 m

3= 20 m

4= 15 m

5= 35 m