
Data for *Field Data on Artificial Flooding and thickening of Snow-Covered First-Year Sea Ice and the Melting of Thickened Ice.**

*The data for this study was collected during a field campaign in the Vallunden lake on Spitsbergen in 2024.

For questions about the data or test campaign, please contact Tim. C. Hammer (t.c.hammer@tudelft.nl).

1 Data

The background of the data, the data description, the experimental design, materials, methods and limitations of the data have been documented and submitted to the journal article Data in Brief as: *Field Data on Artificial Flooding and thickening of Snow-Covered First-Year Sea Ice and the Melting of Thickened Ice.*

The present document here supports the submitted journal article by providing detailed descriptions of the uploaded data. The test locations, drilling locations, and reference system can be found in the submitted journal publication. The sampling periods of the thermistor strings and data logger are presented in Table 1 and Table 2. Note that the raw data of the data logger had not been necessary chronologically logged which is why sorted data in .mat format has been uploaded to mitigate confusion (i.e., *Site_B(z6-25195)-1719296946-4TU.mat* and *Site_A(z6-25201)-1719296946-4TU.mat*). Detailed descriptions of the data can be found in Table 3-9.

Table 1 Sampling periods of the thermistor string for given measurement periods. Note that the measurement periods in italics are valid for all four test sites.

| Names | Measurement periods | Sampling interval |
|---------------|--|--------------------------|
| <i>Site A</i> | 10.04.2024 20:00 – 11.04.2024 08:00 | 6hrs |
| | 11.04.2024 08:00 – 23.04.2024 16:15 | 15min |
| | <i>23.04.2024 16:15 – 03.05.2024 14:15</i> | 2hrs |
| | <i>03.05.2024 14:15 – 03.05.2024 18:15</i> | 4hrs |
| | <i>03.05.2024 18:15 – 06.05.2024 12:15</i> | 6hrs |
| | <i>06.05.2024 12:15 – 24.06.2024 12:15</i> | 2hrs |
| <i>Site B</i> | 21.03.2024 19:00 – 10.04.2024 19:00 | 6hrs |
| | 10.04.2024 19:00 – 23.04.2024 16:15 | 15min |
| <i>Site C</i> | 10.04.2024 20:00 – 23.04.2024 16:15 | 15min |
| <i>Site D</i> | 10.04.2024 21:00 – 23.04.2024 16:15 | 15min |

Table 2 Sampling periods of the sorted data provided by the Data logger for given measurement periods.

| Names | Measurement periods | Sorted sampling interval |
|----------------|-------------------------------------|---------------------------------|
| <i>Site A*</i> | 11.04.2024 16:55 – 18.06.2024 20:35 | 5min |
| <i>Site B</i> | 21.03.2024 20:35 – 18.03.2024 23:35 | 5min |

*No data between 13.04.2024 16:16 and 14.04.2024 as data logger was temporally removed to fix problems with the network configuration.

Table 3 Data description of data collected with a thermistor string. For example (Site A): reflar0104td_2024-06-25_07-27-47.csv. The description are based on the SAMS Enterprise SIMBA User Manual 004_ACTIVE.pdf.

| Column | Message type | Explanation |
|--------|---------------|--|
| A | SN | Sample period number (increments each time the SIMBA unit wakes up). |
| B | msgtype | Message type: 10 = Unheated temperature profile The following relate to the heated mode. Each set of measurements is the change (positive is a rise) relative to the initial temperature. 11 = Temperature change at time HST1. 12 = Temperature change at time HST1+HST2. 13 = Temperature change at time HST1+HST2+HST3. 14 = Temperature change at time HST1+HST2+HST3+HST4. Heater |
| C | messages | Message number of the data transmission (e.g. 1 of 2) |
| D | SendTime | Time of sample according to the SIMBA unit clock (in ASCII format). |
| E | MOMSN | The iridium message number for that modem. A sequential number for each message it sends. |
| F | recs | Total number of records in message (total of both parts if message split). Usually the same as the number of sensors on the chain. |
| G | sensors | Total number of sensors. |
| H | software | Software version. |
| I | H_MeasureTime | Total time of heating for heating cycles from start of heating (in seconds) |
| J | H_Dutycycle | No longer used. Always 0. |
| K | H_Endvolt | Reported voltage applied to heaters (measured at end of heating cycle). Should be 8V with healthy batteries. Only applies to heated profiles. |
| L- | T 0 to T239 | Reported Sensor temperatures or temperature change in the case of heating cycles Celsius. Unused records set to default -99.9. Note that last sensor is an external air temperature measurement. |

Table 4 Data description of data collected with a radiometer and anemometer. Document name (Site B): Site_B(z6-25195)-1719296946-4TU.mat.

| Column | Message type | Explanation |
|--------|---------------------------------|---|
| 1 | Timestamps | Time of sample according to the SIMBA unit clock (in ASCII format). |
| 2 | Radiometer Incident Short Wave | Measured incident short wave in W/m ² |
| 3 | Radiometer Reflected Short Wave | Measured reflected short wave in W/m ² |
| 4 | Radiometer Incident Long Wave | Measured incident long wave in W/m ² |
| 5 | Radiometer Emitted Long Wave | Measured emitted long wave in W/m ² |
| 6 | Radiometer Net Radiation | Internally calculated net radiation in W/m ² |
| 7 | Anemometer Wind Direction | Measured wind direction in ° with reference to true North |
| 8 | Anemometer Wind Speed | Measured wind speed in m/s |
| 9 | Anemometer Gust Speed | Measured gust speed in m/s |
| 10 | Anemometer Temp | Internal measurement of temperature in °C |
| 11 | Anemometer X-axis level | Tilt of the sensor in a range of -90° to 90° in the x-axis |
| 12 | Anemometer Y-axis level | Tilt of the sensor in a range of -90° to 90° in the y-axis |
| 13 | Barometer Reference Pressure | Measured reference pressure in kPa |

| | | |
|----|------------------------------|---|
| 14 | Barometer Logger Temperature | Internal measurement of temperature in °C |
|----|------------------------------|---|

Table 5 Data description of data collected with a radiometer. Document name (Site A): Site_A(z6-25201)-1719296946-4TU.mat.

| Column | Message type | Format |
|--------|---------------------------------|---|
| 1 | Timestamps | Time of sample according to the SIMBA unit clock (in ASCII format). |
| 2 | Radiometer Incident Short Wave | Measured incident short wave in W/m ² |
| 3 | Radiometer Reflected Short Wave | Measured reflected short wave in W/m ² |
| 4 | Radiometer Incident Long Wave | Measured incident long wave in W/m ² |
| 5 | Radiometer Emitted Long Wave | Measured emitted long wave in W/m ² |
| 6 | Radiometer Net Radiation | Internally calculated net radiation in W/m ² |
| 7 | Barometer Reference Pressure | Measured reference pressure in kPa |
| 8 | Barometer Logger Temperature | Internal measurement of temperature in °C |

Table 6 Description of meta-data documented during the ice core sampling. Document name: Core_matix.xlsx.

| Column | Message type | Explanation |
|--------|------------------|---|
| A | Label | DD_MM_SX_L#_FX DD = Day MM = Month SX = Site X (X = A, B, C, or D – see picture xy) L# = Location # (# = 0,1,2,3,4,5,6,7) FX = Function X (X = Bulk salinity(S), Density(D), Biological assessment(Bio) or Thin sectioning(Thin) The entry for each label row is linked to a separate spread sheet. The spread sheet gives meta information about the ice core (e.g., additional measurements taken at the drilling location or at the station when determining temperature or density; additional comments; or ice core pictures). |
| B | Date | DD_MM (DD = Day, MM = Month) |
| C | Site | A, B, C or D |
| D | Location | 0,1,2,3,4,5,6,7 |
| E | Purpose | Also Function; Bulk salinity, Density, Biological assessment or Thin sectioning |
| F | Picture included | Yes or no |
| G | Comments | - |

Note that a separate worksheet is provided per ice core.

Table 7 Description of temperature data measured in specific intervals in the ice core. Table document name: Temperature_measurements_all.xlsx.

| Column | Message type | Format |
|--------|--------------|---|
| A | Date | DD-MM-YYYY DD = Day MM = Month YYYY = Year |
| B | Site | A, B, C or D (see Figure 2 of submitted journal publication) |
| C | Location | 0,1,2,3,4,5,6,7 (see Figure 6 of submitted journal publication) |
| D | Height | Measurement position along the ice core within the established coordinate system (see Figure 7 of submitted journal publication). |
| E | Temperature | Measured temperature in the centre of the ice core in °C. |

| | | |
|---|----------|----------------------|
| F | Comments | Documented comments. |
|---|----------|----------------------|

Note that a separate worksheet is provided per test day.

Table 8 Description of density data measured for specific ice sample sections. Table document name: Density_measurements_all.xlsx.

| Column | Message type | Format |
|--------|----------------|--|
| A | Date | DD-MM-YYYY DD = Day MM = Month YYYY = Year |
| B | Site | A, B, C or D (see Figure 2 of submitted journal publication) |
| C | Location | 0,1,2,3,4,5,6,7 (see Figure 6 of submitted journal publication) |
| D | Start | Measured start position of the tested ice core section within the established coordinate system (see Figure 7 of submitted journal publication). |
| E | End | Measured end position of the tested ice core section within the established coordinate system (see see Figure of submitted journal publication). |
| F | Dry mass | Measured dry mass of the ice core section in g. |
| G | Submerged mass | Measured submerged mass of the ice core section in g. |
| H | Paraffin temp | Measured temperature of paraffin in °C. |
| I | Comments | Documented comments. |

Note that a separate worksheet is provided per test day.

Table 9 Description of bulk salinity data measured in specific intervals in the ice core. Table document name: Bulk_salinity_measurements_all.xlsx.

| Column | Message type | Format |
|--------|---------------|--|
| A | Date | DD DD = Day |
| B | Site | A, B, C or D (see Figure 2 of submitted journal publication) |
| C | Location | L# (# = 0,1,2,3,4,5,6,7) (see Figure 6 of submitted journal publication) |
| D | start | Measured start position of the tested ice core section within the established coordinate system (see Figure 7 of submitted journal publication). |
| E | end | Measured end position of the tested ice core section within the established coordinate system (see Figure 7 of submitted journal publication). |
| F | bulk salinity | Measured bulk salinity in ppt |
| G | temp | Measured liquid temperature during bulk salinity measurement in °C. |
| I | Comments | Documented comments. |

Note that a separate worksheet is provided per test day.