



# Meteorological data from ice-free areas in Yukidori Zawa, Langhovde and Kizahashi Hama, Skarvsnes, and Skallen on Sôya Coast, East Antarctica during January 2017–December 2018

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**Abstract:** Meteorological data recorded by automatic weather stations (AWSs) installed at ice-free areas in the middle of Yukidori Zawa, near the coast of Kizahashi Hama, and at the southern shore of Skallen Ôike during the JARE-58 and 60 (2017–2018) was summarized in tables and figures. Almost 2-year data of air temperature, relative humidity, air pressure, wind conditions, solar radiations including photosynthetically active radiation and ultraviolet radiation, were compiled in 3 text files from each AWS: 10-min; 1-hr and daily.

## 1. Background and summary

This report presents meteorological data recorded by three automatic weather stations (AWSs)

at Yukidori Zawa (Yukidori Valley) in Langhovde, at Kizahashi Hama in Skarvsnes, and at the southern shore of Skallen Ôike in Skallen on the Sôya Coast of East Antarctica, between the 58th Japanese Antarctic Research Expedition (JARE-58) in December 2016 and JARE-60 in December 2018. This study, part of the National Institute of Polar Research (NIPR) project “Monitoring of terrestrial ecosystems (mission code; AMB),” had recorded environmental conditions for terrestrial organisms research in several major ice-free areas of Syowa Oasis since 2009. The AWSs continuously monitored wind speed and direction, air temperature, relative humidity, solar radiation, photosynthetically active radiation (PAR), ultraviolet radiation (UV), and air pressure. They logged them automatically at intervals of 10 min, 1 h, and 1 day. Previously we reported the meteorological data recorded at Yukidori Zawa and Kizahashi Hama from 2009 to 2014 in JARE Data Reports<sup>1</sup>, data obtained at Yukidori Zawa, Kizahashi Hama and Skallen from 2014 to 2016 in JARE Data Reports<sup>2</sup> and Polar Data Journal<sup>3</sup>. Using the meteorological data obtained from the previous observations and those at Syowa Station for two years from 2010 to 2011, meteorological features in the ice-free areas had also been discussed<sup>4</sup>.

## 2. Locations

Yukidori Zawa, a valley in central Langhovde, is Antarctic Specially Protected Area No. 141, where a relatively rich community of mosses and lichens distributes ice-free areas along a seasonal stream in Syowa Oasis<sup>3</sup>. An AWS was installed at a flat site beside the middle stream of the valley at 39°44.37'E, 69°14.47'S (Fig. 1 b), approximately 53 m above sea level (a.s.l.) as determined by a handy GPS (GPS Map 62, Garmin). The other AWS was installed at a coastal site in the southeastern part of Kizahashi Hama, a sandy beach in central Skarvsnes, at 39°36.72' E, 69°28.42' S at an elevation of ca. 3 m a.s.l. (Fig. 1c), and another AWS was installed at the southern shore of Skallen Ôike at 39°24.22' E, 69°40.42' S at an elevation of ca. 10 m a.s.l. (Fig. 1d). These positions were plotted on maps supplied by the Geospatial Information Authority of Japan (Fig. 1b, c, d).

## 3. Methods

All AWS consisted of the same models of a data logger (CR1000-4M-XT, Campbell Scientific, USA), sensors (an anemometer, a hydro-thermometer, three photosensors, and a barometer), and batteries. Precise information on the sensors and batteries are described in the previous report<sup>3</sup>. The logger, barometer, and batteries were stored in a water-resistant plastic container (Pelican Products, USA), and the other sensors were mounted on a tripod. The tripod and the container were fixed with stainless steel wires which were anchored to bedrocks and piled up by rocks so as not to be moved

by wind. All sensors had been pre-calibrated by a manufacturer (CS Tokki Co., Sapporo, Japan) and confirmed the accuracy within the specifications of each sensor, which were listed in the table of the previous report<sup>4</sup>. Sampling intervals of signals from the anemometer, three photosensors, and thermometer were set every second, and signals from the hydrometer and the barometer were sampled every 60 seconds for saving battery consumption.

The AWS at Yukidori Zawa was installed on 25 December 2009; that at Kizahashi Hama was installed on 2 February 2010, and that at Skallen was installed on 13 January 2014. Maintenance of the AWSs and exchange of the sensors were carried out occasionally when serious damages were found. Data collection and batteries replacement are being done within every two years since 2010.

#### 4. Data Records

Every 10 min, the logger compiled a data file containing a 10-min average of wind speed, vector wind direction, and radiations (solar radiation, PAR, and UV). These data were the average of signals before 10 min of the time stamp. Instantaneous values of temperature, relative humidity, and air pressure were also stored with the time stamp. Every 60 min, it compiled 60-min averaged wind speed, vector wind direction, and radiations, based on signals for 60-min before time stamp, and instantaneous values of temperature, humidity, and air pressure at the recorded time. Also, every 24 h it created a summary of daily average wind speed and vector wind direction, temperature, humidity, solar radiation, PAR, UV, and air pressure, based on signals for a day before time stamp. This file also included the daily maximum wind conditions (speed and direction), the maximum and the minimum values of temperature, humidity, air pressure with timestamps when the events occurred. The data files were retrieved by the authors during the JARE-60 summer party. We have converted the 10-min, 60-min, and 24-h data from the AWS data loggers to CSV files. For the present report, timestamps from 1 January 2017 to 31 December 2018 were listed. For Yukidori Zawa, data retrieval had been done on 28 December 2018 due to the operational condition of the JARE-60; the data could be downloaded were from 1 January 2017 to 28 December 2018 of the timestamp.

Following is the list of data files.

1. Data from Yukidori Zawa AWS

- 1-1. 10-min\_data\_Yukidori2017J-2018D.csv

- 1-2 1-hr\_data\_Yukidori2017J-2018D.csv

- 1-3 1-day\_data\_Yukidori2017J-2018D.csv

2. Data from Kizahashi Hama AWS

- 2-1. 10-min\_data\_Kizahashi2017J-2018D.csv

- 2-2 1-hr\_data\_Kizahashi2017J-2018D.csv

2-3 1-day\_data\_Kizahashi2017J-2018D.csv

### 3. 3. Data from Skallen AWS

2-1. 10-min\_data\_Skallen2017J-2018D.csv

2-2 1-hr\_data\_Skallen2017J-2018D.csv

2-3 1-day\_data\_Skallen2017J-2018D.csv

## 5. Technical Validation

We noticed the data of vector wind direction at Yukidori Zawa had been recorded against magnetic north ( $49^\circ$  shifted westward to true north), then we corrected the data by subtracted 49 degrees. Erratic records, such as over-scaled data of the specification of the sensors and no data records, were checked through in all CSV files. We found two points of over-scaled data of the daily minimum temperature from Yukidori Zawa AWS. In these two cases, we recalculate the 1-hour and daily average temperature, using 10-min records. Then, daily minimum temperatures at the two erratic points were re-evaluated from the 10-min records, too. There were no erratic data from the other two AWSs during the present observation period. Therefore, we presented directly downloaded data from these two AWSs without correction. All sensors had been pre-calibrated ones, the quality of the data was followed within the specification of each sensor<sup>3</sup>, but no post-calibration had been done.

We had checked the AWSs every summer and noticed any serious damages on sensors during December 2016–January 2019. Examples of quick look results, such as air temperature, solar radiation, and wind conditions for two years using the daily averaged data from three sites, are shown in [Figures 2](#) (Yukidori Zawa), [3](#) (Kizahashi Hama), and [4](#) (Skallen), and an example of the format in 10-min data files is shown in [Table 1](#).

## 6. Usage Notes

Before using the data for publication or presentation in any media, please request permission in writing. Inquiries should be addressed to:

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7. Figures

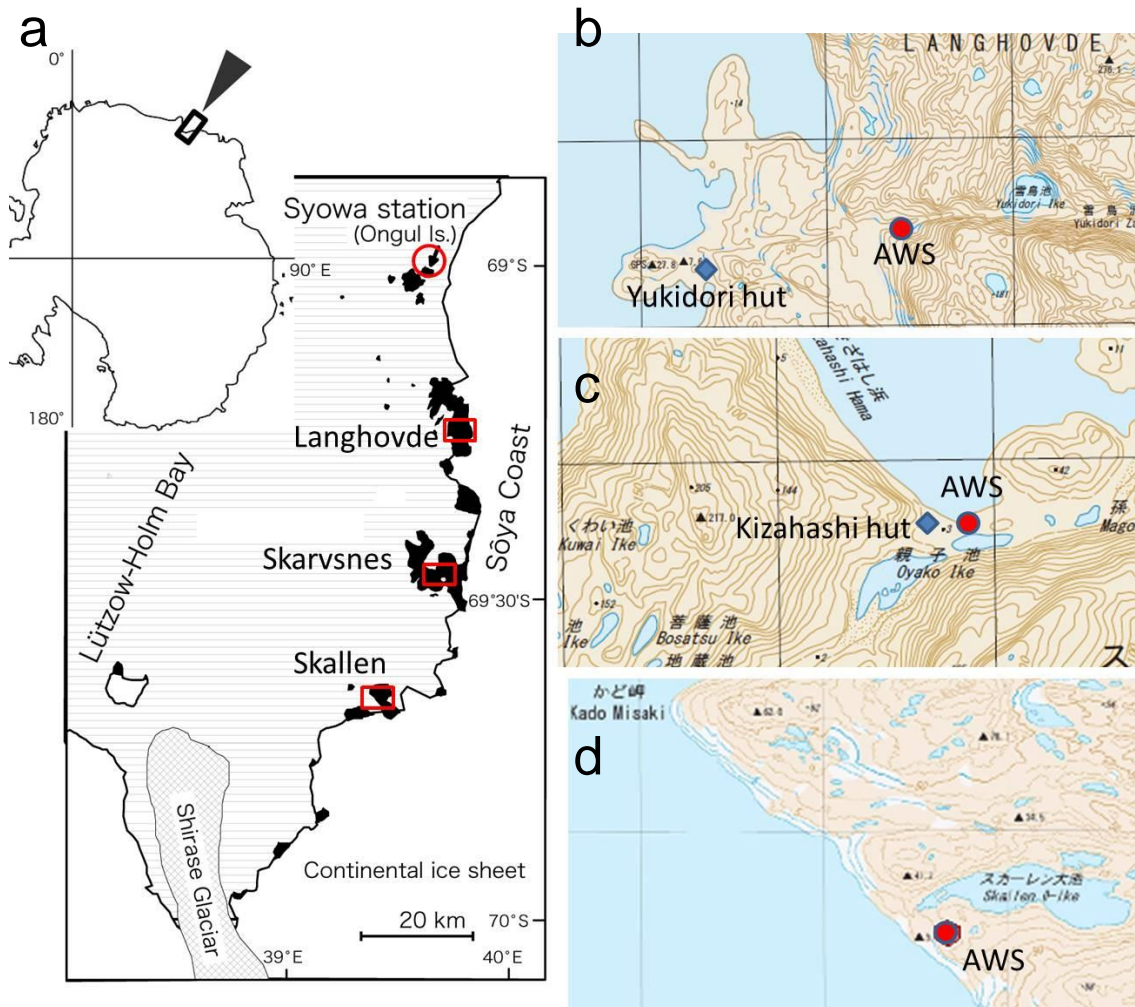


Figure 1. Maps of AWS sites.

A location map of Syowa Oasis (ice-free areas shown in black) on the Sōya Coast, East Antarctica (a). Positions of Yukidori Zawa AWS (b), Kizahashi Hama AWS (c), and Skallen AWS (d). Locations (b, c, d) of three ice-free areas are outlined in red squares (a).

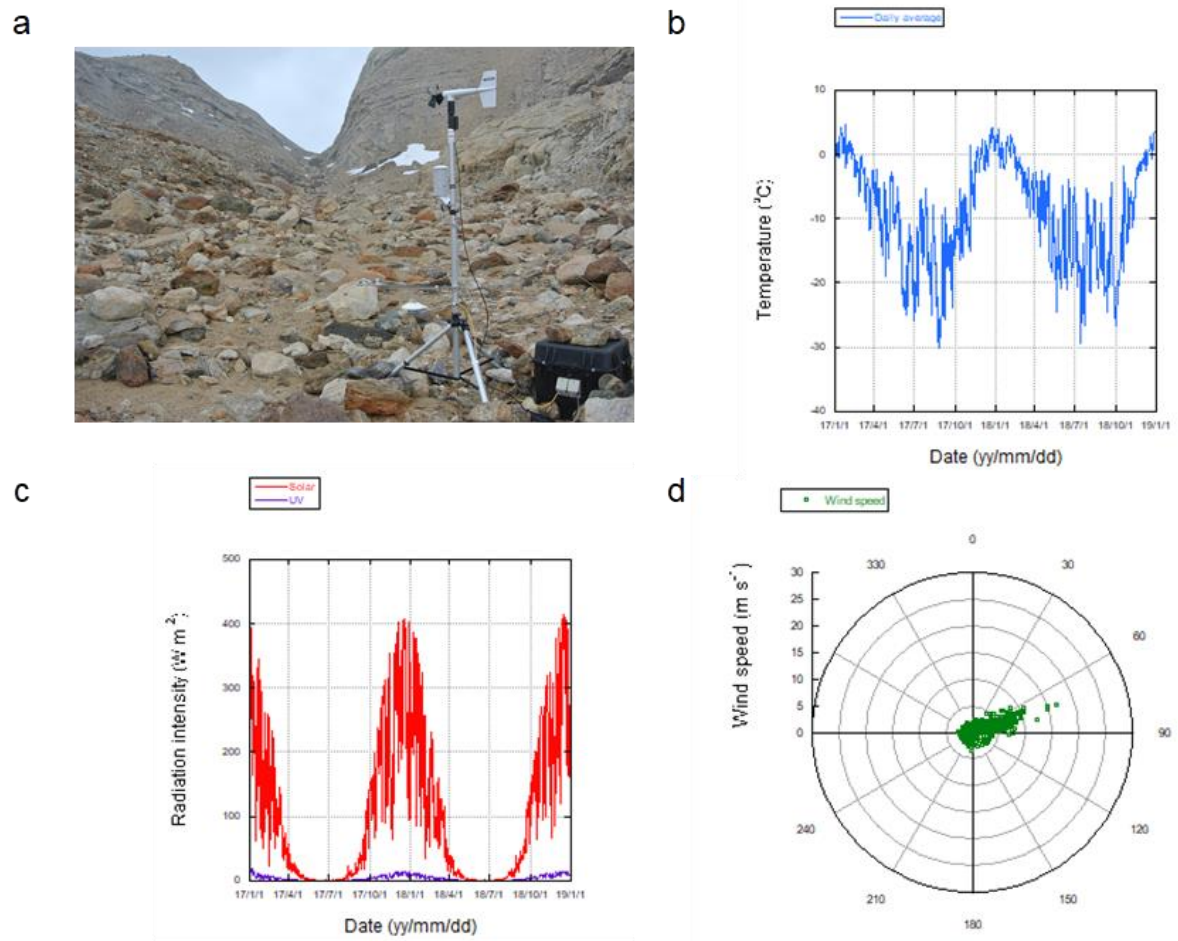


Figure 2. Yukidori Zawa AWS (a) and examples of graphical expressions of daily averaged data of air temperature (b), solar and UV radiations (c), and wind conditions (d) recorded at Yukidori Zawa from 1 January 2017 to 28 December 2018.

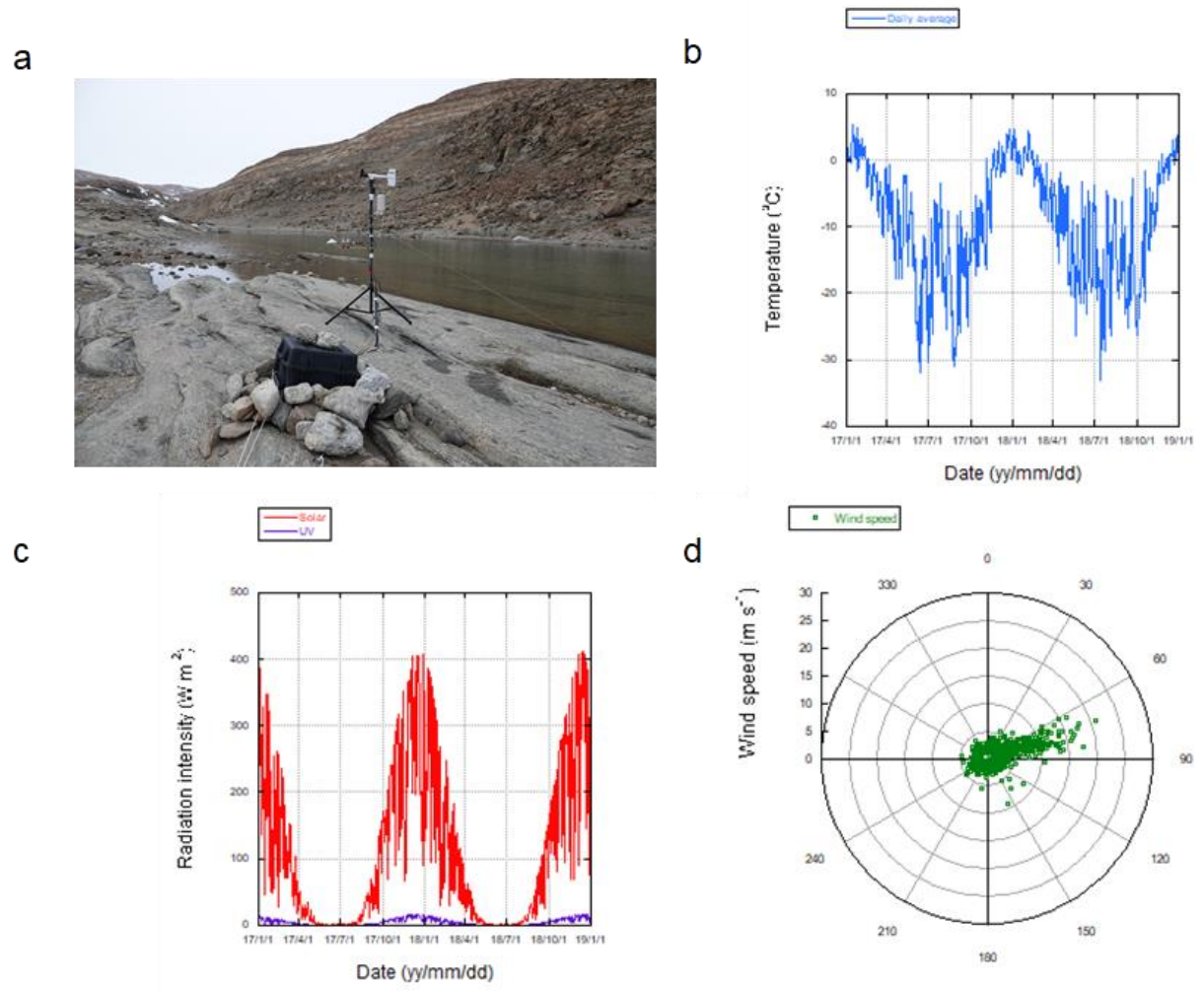


Figure 3. Kizhashi Hama AWS (a) and examples of the graphical expression of daily averaged data of air temperature (b), solar and UV radiations (c), and wind conditions (d) recorded at Kizhashi Hama from 1 January 2017 to 31 December 2018.

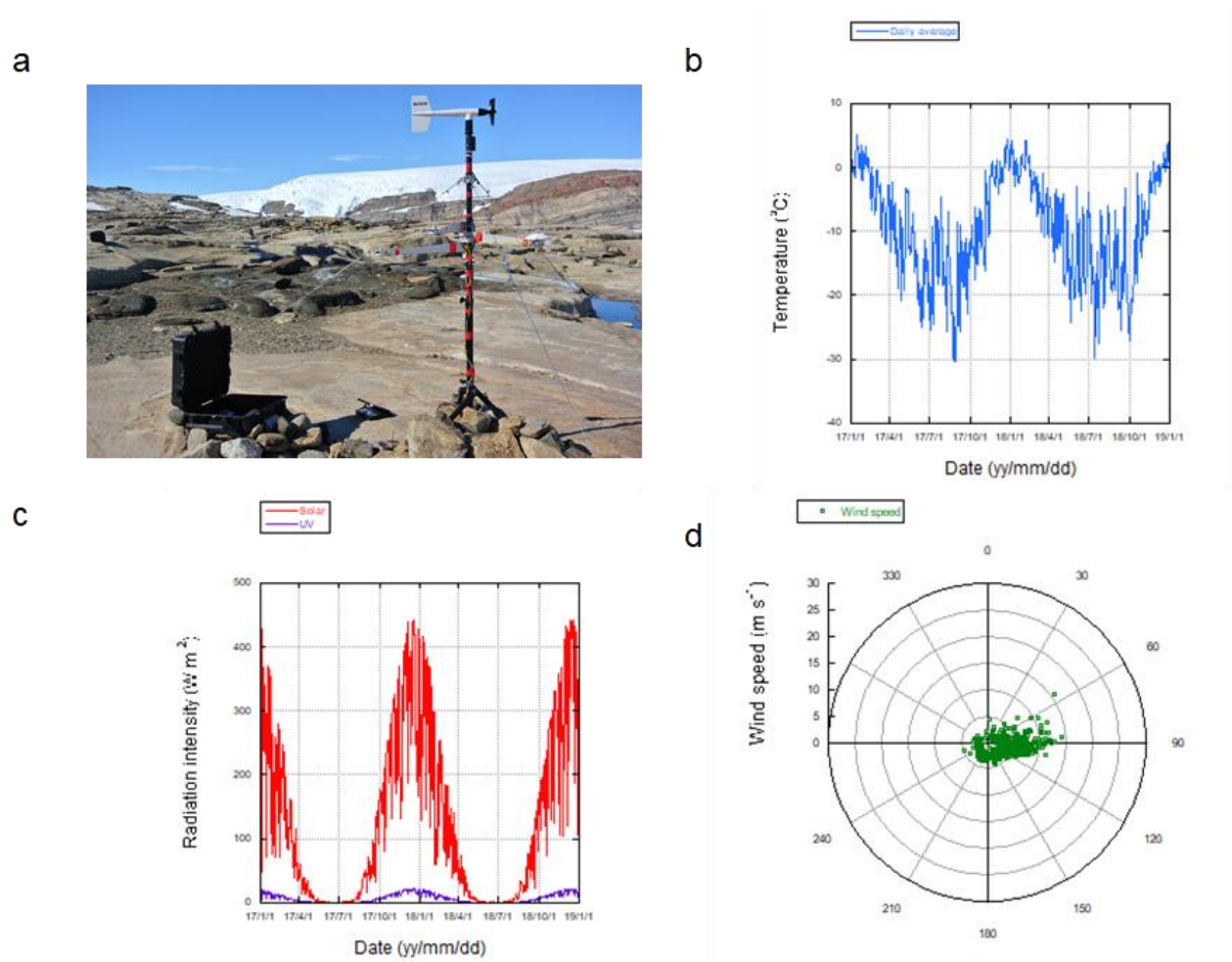


Figure 4. Skallen AWS (a) and examples of the graphical expression of daily averaged data of air temperature (b), solar and UV radiations (c), and wind conditions (d) recorded at Skallen from 1 January 2017 to 31 December 2018.



## 8. Tables

Table 1. An example of the 10-min data format.

Column 1 is timestamp (yy/mm/dd hh:mm, local time (GMT+3hrs)), 2 is wind speed ( $\text{m s}^{-1}$ ), 3 is vector wind direction (degree from true north), 4 is air temperature ( $^{\circ}\text{C}$ ), 5 is relative humidity (%), 6 is solar radiation ( $\text{W m}^{-2}$ ), 7 is photosynthetic active radiation (PAR,  $\mu\text{mol m}^{-2} \text{s}^{-1}$ ), 8 is UV radiation ( $\text{W m}^{-2}$ ), and 9 is air pressure (hPa). The format (number of columns) for 1-hr data is the same as this table.

<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>
TIME STAMP	Wind speed	Vector wind direction	Air temperature	Relative humidity	Solar radiation	PAR	UV	Air pressure
2017/1/1 00:00	3.9	67	1.3	43	14	35	1.3	987
2017/1/1 00:10	3.9	70	1.3	41	11	31	1.2	987
2017/1/1 00:20	3.7	69	1.0	41	10	31	1.2	987

### Members who carried out the field study

The AWSs of Yukidori Zawa and Kizahashi Hama were installed by Sakae Kudoh, Yukiko Tanabe, Masaki Uchida, and Takashi Osono (JARE-51 summer), and the AWS at Skallen was installed by Sakae Kudoh (JARE-55 summer). Data acquisition was made by Masahiro Otani, Shou Shimada, Tomotake Wada, and Josef Elster (JARE-60 summer).

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#### Data Citation

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