Data Article

Meteorological and surface radiation data observed at the Brazilian Antarctic station on King George Island

Jacyra Soares*, Marco Alves, Flavia Noronha Dutra Ribeiro, Georgia Codato

University of Sao Paulo, Sao Paulo, Brazil

ARTICLE INFO

Article history:
Received 17 May 2019
Received in revised form 26 June 2019
Accepted 3 July 2019
Available online 12 July 2019

Keywords:
Surface radiation balance observational data
Surface wind and temperature observational data
Antarctic peninsula
King George Island
Antarctica

ABSTRACT

The observational data described here was collected between 28 February 2011 and 30 November 2015. The data analysis and interpretation were published in the article “Surface radiation balance and weather conditions on a non-glaciated coastal area in the Antarctic region” [1]. An instrumented tower located on the non-glaciated coastal area of the of the Brazilian Antarctic Comandante Ferraz Station, at King George Island, Antarctic Peninsula was used. It was collected data of air temperature and relative humidity, wind speed and direction, barometric pressure, incident and reflected shortwave radiation, longwave radiation emitted by atmosphere and by surface, and net radiation with a sampling frequency of 0.1 Hz. The data was stored as 5-min averages and automatically transmitted to the Air-Sea Interaction Laboratory, at the University of Sao Paulo, Brazil. The dataset is hosted in the Mendeley repository.

© 2019 The Author(s). Published by Elsevier Inc. This is an open access article under the CC BY license (http://creativecommons.org/licenses/by/4.0/).

DOI of original article: https://doi.org/10.1016/j.polar.2019.04.001.
* Corresponding author.
E-mail addresses: jacyra@usp.br (J. Soares), marco.alvarenga.alves@gmail.com (M. Alves), flaviaribeiro@usp.br (F.N. Dutra Ribeiro), gecodato@usp.br (G. Codato).
1. Data

The data was collected at Brazilian Antarctic Comandante Ferraz Station (62°05′07″ S, 58°23′33″ W), at King George Island (Fig. 1), Antarctic Peninsula. The observed data (air temperature, air relative humidity, wind speed and direction, barometric pressure, incident and reflected shortwave radiation, longwave radiation emitted by atmosphere and by surface, and net radiation) was gathered between 28 February 2011 and 30 November 2015 with some smalls and one large time interruption (Table 1), using an instrumented tower, as displayed in Fig. 2. The data, with sampling frequency of 0.1 Hz, was stored as 5-min average by a datalogger. The 5-min average data is hosted in the Mendeley repository [2].
2. Experimental design, materials, and methods

The extreme weather conditions prevailing at Brazilian Station, along with its special location in a non-glacial coastal area of King George Island (Fig. 1), characterized by complex topography and land cover continuously affected by the temporal and spatial distribution of ice/snow makes Ferraz Station a challenging place for observational studies of surface meteorological conditions.

The atmospheric dataset was obtained using a 12-m tower located in a coastal area of Brazilian Station, 70 m from the Martel Inlet on the east side. In the northern sector is found the Admiralty Bay

![Fig. 1. Location of the Brazilian Antarctic Comandante Ferraz Station (red dot) on King George Island. Image from Google.](image)

| Variable (symbol)                              | Time period               | Sensor                               | Height (m) |
|------------------------------------------------|---------------------------|--------------------------------------|------------|
| Air temperature                               | 21 Nov 2013 – 10 Oct 2014 | CS215 Campbell Sci. Inc.             | 2.2        |
| Air relative humidity (RH)                    | 01 Nov 2014 – 30 Nov 2015 | OS103                                | 10.6       |
| Wind speed (WS)                               | 21 Nov 2013 – 10 Oct 2014 | R. M. Young Company                  |            |
| Wind direction (WD)                           | 26 Oct 2014 – 03 Oct 2015 | R. M. Young Company                  |            |
| Barometric pressure (PRE)                     | 21 Nov 2015 – 30 Nov 2015 | Vaisala                              | 1.5        |
| Incident shortwave radiation (SW\(_\downarrow\)) | 28 Feb 2011 – 24 Feb 2012 | CNR4 + ventilation unit CVF4         | 3.4        |
| Reflected shortwave radiation (SW\(_\uparrow\)) | 21 Mar 2014 – 21 Nov 2015 | Kipp Zonen                           |            |
| Longwave radiation emitted by atmosphere (LW\(_\downarrow\)) | 28 Feb 2011 – 24 Feb 2012 | CNR4 + ventilation unit CVF4         |            |
| Longwave radiation emitted by surface (LW\(_\uparrow\)) | 28 Feb 2011 – 24 Feb 2012 | Kipp Zonen                           |            |
| Net radiation (Rn)                            | 28 Feb 2011 – 24 Feb 2012 | CNR4 + ventilation unit CVF4         |            |
|                                                | 12 Nov 2013 – 11 Oct 2014 | NR Lite 2                            |            |
|                                                | 22 Nov 2014 – 21 Nov 2015 | Kipp Zonen                           |            |
and Stenhouse Glacier. Flagstaff Hill, with a maximum height of 267 m and its base about 400 m away from the tower, is located in the western sector. The Admiralty Bay is also present in the southern sector [1].

Without snow, the surface where the tower is placed consists of rocks and gravels. Near the tower (<10 m) there is a shallow lake (South Lake), which is often frozen except for some summer days.

The ETA Project was carried out between 28 February 2011 and 30 November 2015. The data was obtained with a sampling frequency of 0.1 Hz and stored as 5-min averages by a CR5000 datalogger (Campbell Scientific Inc., UK). The data was automatically transmitted to the Air-Sea Interaction Laboratory, at the University of São Paulo, Brazil, as summarized in Fig. 2. Differences in measurement lengths depend on installation date of equipment and on technical problems [1]. The equipment and their respective heights in the tower are shown in Table 1.

The local time (LT) was used as the standard time (LT = UTC - 4). The duration of the day, in Ferraz Station, varies from 05 hours to 07 minutes on June 19 to 19 hours and 47 minutes on December 20.

The radiation measurements in the Antarctic region may have some problems due to the effects of icing, tilted sensor, and poor cosine response [3,4]. Ice deposition on the sensors was avoided using sensor ventilation and heating. The horizontality of the sensors was periodically verified and adjusted when needed. To weak the effects associated with the poor cosine response from the shortwave sensor present in a shorter temporal resolution data it is recommended to use daily accumulated values of shortwave.

Acknowledgments

This work was supported by CNPq [grant numbers 305357/2012-3 and 407137/2013-0]; the “INCT-APA” [grant CNPq number 574018/2008-5 and FAPERJ E number 16/170.023/2008] and the Brazilian Navy. The second author acknowledges a scholarship from Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - Brasil (CAPES) - Finance Code 001.

Conflict of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.
References

[1] J. Soares, M. Alves, F.N.D. Ribeiro, G. Codato, Surface radiation balance and weather conditions on a non-glaciated coastal area in the Antarctic Region, Polar Sci (2019). https://doi.org/10.1016/j.polar.2019.04.001.

[2] J. Soares, M. Alves, F.N.D. Ribeiro, G. Codato, Antarctic Meteorological Data Recorded at Ferraz Station in King George Island”, Mendeley Data, vol. 2, 2019, 2019, https://doi.org/10.17632/gydv43hcxy.2.

[3] T. Yamanouchi, Variations of incident solar flux and snow albedo on the solar zenith angle and cloud cover, at Mizuho Station, Antarctica, J. Meteorol. Soc. Jpn. 61 (1983) 879–892. https://doi.org/10.2151/jmsj1965.61.6_879. 1983.

[4] D. Van As, M.R. Van den Broeke, R.S.W. Van de Wal, Daily cycle of the surface energy balance on the high Antarctic plateau, Antarct. Sci. 17 (2005) 121–133. https://doi.org/10.1002/joc.1323.