Data Paper

Yoshihiro Tomikawa, Naohiko Hirasawa, Masaki Tsutsumi, Takuji Nakamura, Masashi Kohma, and Kaoru Sato. Balloon-borne cryogenic frost point hygrometer observations over Syowa Station, Antarctica. Polar Data Journal. 2025, 9, p. 44–52. https://doi.org/10.20575/00000062.

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1st submission

Editor Start Date: 1/6/2025

Editor Stop Date: 3/23/2025

Reviewer #1: (1/8/2025–2/5/2025)

Reviewer #2: (2/7/2025–3/21/2025)

Handling editor comments to the Author: Ryu Uemura

Thank you for submitting your manuscript. Please revise your manuscript according to the reviewers' comments below.

Reviewer #1: Anonymous

The data are generally well explained and may be accepted. However, some additions should be made if possible.

L48–49: The location information of Syowa Station is provided, but it would be beneficial to include the elevation as well, given that this is balloon launch data.

L79–80: It is stated that 37 out of 43 balloon releases are publicly available. However, the reason why data from six releases are not accessible should be explained. This information should also include the status of data quality checks.

L120–121: If possible, adding a picture of the balloon payload in Figure 2 would improve understanding.

Reviewer #2: Anonymous

The paper by Tomikawa et al. presents the cryogenic frost point hygrometers observation data over Syowa Station, Antarctica. This data is valuable and useful as an accurate record of water vapor concentration in the upper troposphere and lower stratosphere over Antarctica. The publication of this paper is significant as it will promote the use of this data.

Some modifications (especially in 3. Measurements and Methods and 4. Data Records) are necessary before publication.

MINOR COMMENTS:

1.) Title and Abstract: May be a matter of taste but I would indicate in the title and the abstract that you used cryogenic frost point hygrometers.

2.) L60: Is NOAA right, or UCAR?

3.) L65: assuming the ascent rate is about 5 m/s

4.) L68: MGPS_R

5.) L70: Hyland and Wexler equation is used for derivation of the saturation vapor pressure. It is required to describe accurately.

6.) L74 and L 76: Both "mostly every three months" and "several times" should be more specifically described.

7.) L88-L104: The type of sensor measured is described here.

8.) L103: Which does "Relative Humidity" indicate "Relative Humidity over water" or "Relative Humidity over liquid water"?

9.) L154: Is NCAR right, or UCAR?

10.) Figure 2: I did not understand what they were trying to show. If there are no good observation photos, combination the schematics and the sensor photos could be shown here.

11.) Figure 3: Dates in the figure should be included so that they do not overlap with the plot. Also, correct where the plot is indistinct (e.g., 20201228).

Authors Response:

Response to reviewer #1:

The authors greatly appreciate his/her critical reading of our manuscript and constructive comments. We have revised the manuscript as much as possible following his/her comments. Our response to each comment is in the following (in red).

The data are generally well explained and may be accepted. However, some additions should be made if possible.

L48–49: The location information of Syowa Station is provided, but it would be beneficial to include the elevation as well, given that this is balloon launch data.

We have added the elevation information of the balloon release point at L50-51.

L79–80: It is stated that 37 out of 43 balloon releases are publicly available. However, the reason why data from six releases are not accessible should be explained. This information should also include the status of data quality checks.

We have described the causes of six unavailable observations at L83-86.

L120–121: If possible, adding a picture of the balloon payload in Figure 2 would improve understanding.

Figure 2 has been replaced by the photo and schematic of the CFH sensor following the reviewer's suggestion.

Response to reviewer #2:

The authors greatly appreciate his/her critical reading of our manuscript and constructive comments. We have revised the manuscript as much as possible following his/her comments. Our response to each comment is in the following.

The paper by Tomikawa et al. presents the cryogenic frost point hygrometers observation data over Syowa Station, Antarctica. This data is valuable and useful as an accurate record of water vapor concentration in the upper troposphere and lower stratosphere over Antarctica. The publication of this paper is significant as it will promote the use of this data.

Some modifications (especially in 3. Measurements and Methods and 4. Data Records) are necessary before publication.

MINOR COMMENTS:

1.) Title and Abstract: May be a matter of taste but I would indicate in the title and the abstract that you used cryogenic frost point hygrometers.

“Cryogenic frostpoint hygrometer” has been added in the title and abstract following the reviewer’s suggestion.

2.) L60: Is NOAA right, or UCAR?

Thank you for pointing this out. NOAA has been deleted because it is correct that the CFH has been developed by Dr. Vömel at the University of Colorado.

3.) L65: assuming the ascent rate is about 5 m/s

The sentence was revised following the reviewer’s suggestion.

4.) L68: MGPS_R

The sentence was revised following the reviewer’s suggestion.

5.) L70: Hyland and Wexler equation is used for derivation of the saturation vapor pressure. It is required to describe accurately.

Thank you for pointing this out. The sentences at L71-74 was revised following the reviewer’s suggestion.

6.) L74 and L 76: Both "mostly every three months" and "several times" should be more specifically described.

Thank you for pointing this out. Since the time interval of the observation was not regular, “mostly every three months” has been deleted. “several times” has been replaced by “in July 2016 and July 2018”.

7.) L88-L104: The type of sensor measured is described here.

The type of hygrometer sensor has been added in the dataset and mentioned at L91.

8.) L103: Which does "Relative Humidity" indicate "Relative Humidity over water" or "Relative Humidity over liquid water"?

“Relative humidity” has been replaced by “Relative humidity over ice”.

9.) L154: Is NCAR right, or UCAR?

As long as we checked, the affiliation of Dr. Vömel is NCAR/EOL.

10.) Figure 2: I did not understand what they were trying to show. If there are no good observation photos, combination the schematics and the sensor photos could be shown here.

Figure 2 has been replaced by the photo and schematic of the CFH sensor following the reviewer's suggestion.

11.) Figure 3: Dates in the figure should be included so that they do not overlap with the plot. Also, correct where the plot is indistinct (e.g., 20201228).

Figure 3 was modified so that the dates in the figure do not overlap with the plot. Also, the observation on 20201228 was performed near the summer solstice, and the balloon was released just before local noon, so it is possible that sunlight reached the photodetector and contaminated the stratospheric water vapor concentration. We have added this explanation at L126-129.

2nd submission

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Editorial Office's note

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