

Data Paper

Naohiko Hirasawa, Masanori Yabuki, Masataka Shiobara, Yumi Shimode and Makoto Kuji. Long-term all-sky-camera images and evaluated cloud-cover data at Syowa Station, Antarctica. *Polar Data Journal*. 2023, 7, p. 35–49. <https://doi.org/10.20575/00000047>.

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1st submission

Editor Start Date: 3/13/2023

Editor Stop Date: 4/18/2023

Reviewer #1 (3/23/2023–4/3/2023)

Reviewer #2 (3/30/2023–4/18/2023)

Reviewer #1: Anonymous

This paper summarizes the location information of the long-term all-sky image data acquired at Showa Station, Antarctica, the imaging equipment, the analysis method of cloud cover, the details of the data archive, the verification of cloud cover, and the quality information of the data. The data archive contains all-sky imagery from 2006 to 2022, and is available on the Internet after quality checks. I believe that this data set will be very useful for analyzing cloud cover and cloud types in the polar regions. The style of the paper is already in accordance with the style of this journal (PDJ), and it is judged that there will be no problem with its publication.

Reviewer #2: Takashi Yamanouchi

This is a precise expression of the long term data of all-sky camera, and worth publishing in PDJ.

I have found several uncertain descriptins to be clarified or revised before acceptance of the manuscript.

1. LN22: The objective of this measurements is written as "for use as reference data for (other) optical observations"; however, we may have another objective such as to know long term cloud climatology just from these data.
2. LN40: What is "certain processes"?
3. LN55: "Ny-Alesund" should be written with Norwegian character, such as in LN 164.
4. LN104: Why "seventeen" directories? It might be sixteen from 2006 to 2021.
5. LN 131: You used "visual" observations here, but you used "eye" observations in section 5. (3) and Figure 5. It is better to use identical word, and how about "manual" observations?

6. LN150: The stability of the power supply "differs from that in a normal city or at higher temperature", is not a proper wording. The stability of the power supply is low due to the generator system at Syowa Station and not due to the low temperature (stabilizer is in the room).
7. LN160-161: It might be due to the wrong threshold?
8. 183-186: It is difficult to follow these sentences.
9. LN155 - 195: Did you check all the data to assign TFSS, FRST PD and so on? Was that made using some automatic method or just by manually (tremendous work)?
10. LN 219: Why "11 January"? The number of false clouds already increased from August 2019 (Figure 4)
11. LN 221, Section 5. (3): Comparison with "eye" observation was only conducted for monthly mean. It might have some meaning; however, it is much informative if you compare for daily mean. You know, cloud climatology in the Antarctic coastal stations, shows a large occurrence of cloud amount 0, 1 and 9, 10 (we call this distribution "U shape"). So, in those cases, monthly averaged cloud amount loses the precise information.
12. LN 226-227: Label A for January 2012 is from 3 days data of both eye observation and all-sky-camera?
13. General comment: it is desirable to show a long term data for whole observation period (16 years?) comparing with eye observation, in this case monthly mean is unavoidable.

Authors Response:

Dear Editor and Reviewers,

Thank you for your kind comments.

We have revised our manuscript according to your comments. We have added information on the sky radiometer observation and MPL&PMPL observation data publication sites in abstract. The revisions for the reviewers' comments are described below (in red).

Naohiko Hirasawa

Response to reviewer #1;

Thank you for your comment.

We are encouraged by it.

Response to reviewer #2;

This is a precise expression of the long term data of all-sky camera, and worth publishing in PDJ. I have found several uncertain descriptions to be clarified or revised before acceptance of the manuscript.

Thank you for your helpful comments.

We have revised one by one and explain them below.

1. LN22: The objective of this measurements is written as "for use as reference data for (other) optical observations"; however, we may have another objective such as to know long term cloud climatology just from these data.

Thank you very much for pointing out it.

The value of the all-sky camera data itself was firstly noted in abstract.

2. LN40: What is "certain processes"?

There was no intent to identify the process. We replace it with "multiple effects of process".

3. LN55: "Ny-Alesund" should be written with Norwegian character, such as in LN 164.

Thank you for pointing out it. We have replaced it.

4. LN104: Why "seventeen" directories? It might be sixteen from 2006 to 2021.

Thank you for pointing out it. The data coverage is from 2006 to 2022. We replaced "2021" with "2022" after this part.

In other parts of the manuscript, it is described as "2022".

5. LN 131: You used "visual" observations here, but you used "eye" observations in section 5. (3) and Figure 5. It is better to use identical word, and how about "manual" observations?

Thank you very much for pointing out it.

We replaced "visual" here with "eye" and we have conformed to use the identical word, "eye" in our manuscript.

6. LN150: The stability of the power supply "differs from that in a normal city or at higher temperature", is not a proper wording. The stability of the power supply is low due to the generator system at Syowa Station and not due to the low temperature (stabilizer is in the room).

We agree with you. We replaced the sentence with "the working of the camera may become less stable".

7. LN160-161: It might be due to the wrong threshold?

Yes. The threshold used in this algorithm is not appropriate for this thin cloud. However, another threshold may identify a cloudless sky as a cloud. This chapter discusses the limitations of this algorithm one by one. Therefore, we have added the following sentence at the end of this paragraph:

Therefore, the threshold used in this algorithm is not appropriate for this thin cloud. However, another threshold may identify a cloudless sky as a cloud, as discussed below.

8. 183-186: It is difficult to follow these sentences.

Thank you for point out it. We have revised this part as follows:

However, it is difficult to determine this area automatically. Since false cloud areas were not large as 2.96% for type-A and 2.32% for type-B in this case, we did not correct the overestimation due to the manifestation of these phenomena in this analysis. Therefore, note that in the text data files such as "Syowa-cloud-2020-2021.txt", some cases with cloud amount less than 5% include clear skies (completely cloudless).

9. LN155 - 195: Did you checked all the data to assign TFSS, FRST PD and so on? Was that made using some automatic method or just by manually (tremendous work)?

Yes. It was made by manually.

10. LN 219: Why "11 January"? The number of false clouds already increased from August 2019 (Figure 4)

Yes, that is right. In August 2019, the sunshield got not to work properly. The sunshield, which is located at a different position from the sun, creates extra dark pixels. This dark pixel area was at most 5% of the whole analysis area. We replaced the camera system with an older spare one, but the results were even worse, with images like Fig.3a and b often appearing, and the damage to the data after August 2020 is much worse than before April 2020. We decided to allow errors of up to 5% in this cloud estimation data with a warning in this section of this paper. The context of this decision have been added to section 5(2).

11. LN 221, Section 5. (3): Comparison with "eye" observation was only conducted for monthly mean. It might have some meaning; however, it is much informative if you compare for daily mean. You know, cloud climatology in the Antarctic coastal stations, shows a large occurrence of cloud amount 0, 1 and 9, 10 (we call this distribution "U shape"). So, in those cases, monthly averaged cloud amount loose the precise information.

Thank you very much for the important point.

We have done a comparative analysis of the eye observation and the all-sky-camera estimation for one summer season from 10 August 2006 to 30 April 2007, and the results were shown in Fig.7 and Table 2. The "U-shape" appeared at both cloud amount frequencies. The underestimation of the all-sky-camera estimation compared to eye observation was more pronounced for cloud amount smaller than 10. (see the last paragraph of section 5(3)).

We have added the following text to the abstract:

Compared with eye observation, the evaluated cloud amounts from the all-sky-camera are underestimated by about 10 %. Still, the so-called "U-shaped" frequency distribution is common, where the frequency increases near the maximum and minimum cloud amounts.

12. LN 226-227: Label A for January 2012 is from 3 days data of both eye observation and all-sky-camera?

Yes. We revised text and figure caption.

13. General comment: it is desirable to show a long term data for whole observation period (16 years?) comparing with eye observation, in this case monthly mean is unavoidable.

We added Fig.6 for this.

3rd submission

Editor Start Date: 6/14/2023

Editor Stop Date: 6/16/2023

Reviewer #2 (6/14/2023–6/16/2023)

Reviewer #2: Takashi Yamanouchi

The review comments have been properly responded and the manuscript is acceptable to be published in Polar Data Journal.

Editorial Office's note

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