

Review of

Spatiotemporal variability of shortwave radiation introduced by clouds over the Arctic sea ice

by Barrientos et al.

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General comments:

The paper presents results from a drifting ice floe station north of Svalbard, where RV Polarstern operated in June 2017. Based on measurements at 15 pyranometer stations on 13 days, the spatiotemporal variability of atmospheric global transmittance is analyzed. Five typical sky conditions are identified, mainly by use of instruments installed on the ship, and in corresponding case studies, the values of the mean and variance of atmospheric global transmittance are discussed in more detail.

The subject is appropriate for AMT and the paper presents novel data. The paper is generally clearly written and well structured. The abstract provides a complete summary, and the results are sufficient to support the conclusions, which are substantial. The review of existing published work is very good, the number of references is appropriate, and authors clearly indicate their own new contribution. English usage and grammar is adequate. Overall, figures and tables are clear and their captions self-explanatory. However, few figures should be improved according to specific comments below.

Specific comments:

As mainly atmospheric global transmittance is discussed (and not global irradiance) the title could be changed.

Figure 2 indicates enormous problems with the horizontal leveling and/or with the cleanliness of the sensors on about half of the measurement days.

What was the criteria to differentiate between an unlevelled and a completely unlevelled station?

Authors should further comment why days with liquid droplets on the domes were used in the analysis and how this probably influenced the results.

As mentioned in the conclusions, the relevance of the results for the energy budget of the sea ice could not be assessed. The authors should describe in a little bit more detail in the outlook what would be necessary to do so.

Table 2 could be omitted.

In the following figures, a larger font should be used:

- Figure 1 (d)
- Figure 6 (f)
- Figure 7 (f)
- Figure 9 (f)

- Figure 10 (f)
- Figure 12 (f)

Technical corrections:

- Page 2, Line 19: replace “sea-ice floe” by “sea ice floe”
- Page 3, Line 15: replace “Juelich” by Jülich
- Page 4, Line 28: replace “better than than 2 %” by “better than 2 %”
- Page 6, Line 13: replace “Wendisch et al” by “Wendisch et al.” This error occurs several times in the text.
- Page 11, Line 12: replace “dominated with by an anticyclonic” by “dominated by an anticyclonic”
- Page 12, Line 8: replace “Schade et al,” by “Schade et al.,”. This error occurs several times in the text.
- Page 19, Table 1: replace “responsivity per year)” by “responsivity per year”
- Page 21, Table 3: replace “Ambient temperature [Ta], atmospheric global transmittance (ATg) [-]” by “Ambient temperature Ta [K], atmospheric global transmittance ATg [-]”