Answers to Reviewer 1

We thank the reviewer for spending the time and effort to review our study. The comments are very constructive and helped to further improve the manuscript. In this document we reply to every reviewer's comment. The comments of the reviewer are marked in black and our replies in blue. In the revised document, all changes are marked in blue.

1. Line 93: Are the SIC thresholds chosen arbitrarily, or based on previous studies? Relatedly, how are these percentages calculated (I assume daily AMSR2 SIC products)?

Previous studies widely used 15 and 80 % to define the marginal ice zone (Strong and Rigor, 2013) following the definition of the World Meteorological Organization (WMO, 1985) for "close ice" (sic > 80 %). In this study, we define sea ice by setting the upper threshold even higher to avoid cloud formation often associated with leads.

We added further information in line 93:

„By using the daily sea ice concentration dataset (version 5.4) obtained by the second Advanced Microwave Scanning Radiometer (AMSR2), we differentiate between open water (sea ice concentration (sic) < 15 %) and sea ice (sic > 90 %). This assumption is more strict than in previous studies (80 %; Strong and Rigor, 2013) to avoid cloud formation associated with leads."

WMO (1985), World Meteorological Organization sea-ice nomenclature, terminology, codes and illustrated glossary, WMO/DMM/BMO 259-TP145. Secretariat of the World Meteorological Organization.

Strong, C. and Rigor, I. G.: Arctic marginal ice zone trending wider in summer and narrower in winter, Geophysical Research Letters, 40, 4864–4868, https://doi.org/10.1002/grl.50928, _eprint: https://onlinelibrary.wiley.com/doi/pdf/10.1002/grl.50928, 2013.

2. Lines 414-416: While I think it is totally acceptable to apply the Maahn et al. (2014) Z-S relation to the MiRAC observations for back-of-the-envelope calcuations, it is likely that the rosette habit assumption used to derive Z-S does not translate very well to the microphysical composition of oceanic snow-producing clouds generated under CAO conditions, especially when comparing snow event categories differentiated by snowrate intensity. Acknowledging this methodological shortcoming is advised, but its overall effect does not detract from the larger message conveyed in the manuscript.

We absolutely agree with the reviewer and added a note in line 415.

„Note that rosette habits might not capture the microphysical composition of oceanic snow-producing clouds under CAO conditions very well."

3. Line 432: ClaudSat → CloudSat

We corrected the typo.

4. Line 470: Kulie et al. (2016) and Kulie and Milani (2018) partition CloudSat-observed snow events by "shallow" and "deep" categories, with special emphasis on high latitude regions prone to CAO's. They highlight the light nature of shallow snow in CAO regions with appropriate (but unresolved) blind zone related caveats. This study clearly indicates that CloudSat estimated

snowfall occurrence and rate/amount are significantly impacted by blind zone limitations that hamper efforts to quantify snowfall with the best available spaceborne instruments.

This is a nice additional information for the manuscript. We modified line 470 as follows:

„This study confirms the finding of Kulie et al. (2016) and Kulie and Milani (2018) that CloudSat observes mainly light snow events in high latitudes during CAOs. The previous studies highlight the by then unresolved blind zone limitations. This study resolves the caveats on snowfall occurrence and amount that lead to an underestimation of the total precipitation amount by 51 pp. This finding hampers efforts to quantify snowfall, especially light one during CAOs, with the best available spaceborne instruments.“

5. General comment: It might be worth mentioning that a combined CloudSat/CALIPSO product exists that will more successfully identify low-level cloud structures compared to the CloudSat 2B-Geoprof product.

The reviewer is right. We added a comment on the DARDAR product and explain why we do not use this product in line 125.

„Contrary to this study, Mioche et al. (2015) investigate the radar-lidar combined product DARDAR that might more successfully identify low-level cloud structures compared to the ’2B-Geoprof’ product. However, DARDAR interpolates the CPR data in the vertical to the finer resolution of the lidar (Winker et al., 2003), still detects ground clutter erroneously as near-surface supercooled droplets, and thus overestimates surface near cloud fraction (Blanchard et al., 2014).“

6. General comment: Mateling et al. (2023; JGR) was just published. It focuses on CAO snowfall production in the North Atlantic Ocean using CloudSat products - another highly relevant manuscript that would benefit from the information gained from the current study.

Thanks a lot for this comment. We will get in touch with the corresponding authors and discuss the implications on their results.