

Interactive comment on “Satellite Observations of Snowfall Regimes over the Greenland Ice Sheet” by Elin A. McIlhattan et al.

Anonymous Referee #2

Received and published: 8 January 2020

The manuscript entitled “Satellite Observations of Snowfall Regimes over the Greenland Ice Sheet” by McIlhattan et al. uses CloudSat and CALIPSO data to quantify the snowfall over the entire Greenland Ice Sheet. Considering the different regimes of snowfall, the authors extend a previous work of Pettersen et al. from Summit station to the entire Greenland and show interesting findings that can justify underestimation results from Bennartz et al. from a snowfall type rather than from an algorithm perspective. Moreover seasonal results are presented, analyzing how the different regimes impact the accumulation of snowfall, and discussing the annual cycles of precipitation and how they impact the albedo of GIS. Cloud properties and atmospheric circulations models are also considered helping understanding the dynamics that actually impact the region. The manuscript is overall well written and fits the scope of the journal. Data

C1

and methods are described in detail and all the results are thoroughly described and discussed. There are only a couple of very minor comments that the authors could address:

Page 3 Line 14: “been” is repeated.

Page 12 Line 15: “have” is repeated.

Page 12 Line 30-35: you are talking here about opposite skewness of the distribution between winter and summer, but I don’t actually see a negative skew in summer (with the peak to the right and the tail to the left). I would actually still see a tail to the right for summer even if steeper. I’ll leave to the authors if considering this very minor comment or not.

Page 13 Line 1: reading “a distinct nature of the two regimes” makes me think that I should be able to separate the two regimes from the histograms in fig. 9 and this actually not the case since the two distributions are quite totally overlapping. I then understand that these plots tell the story of the IWP behavior for the two regimes, but I would try to describe it better not to lead the reader to a wrong conclusion (being able to distinguish between the regimes thanks to the dBZpath).

Interactive comment on The Cryosphere Discuss., <https://doi.org/10.5194/tc-2019-223>, 2019.

C2