

I reevaluated the manuscript submitted by Lewis et al. entitled "Recent Precipitation Decrease Across the Western Greenland Ice Sheet Percolation Zone". The structure of the paper improved and through removal of several parts the reader gets less distracted by numerous presented uncertainty values and parameters. I can support publication after some minor - mostly technical corrections. However, scientifically, I still have concerns about Fig. 11 and conclusions derived from it. According to my understanding, a causal relationship in between trends in SMB and average melt rates is not necessarily the case. A strong accumulation year followed by a strong melt season could still result in average SMB values. The trend in SMB would be unaffected but the average melt rate increased. Since a causality between average melt and trends in SMB is not present, a linear regression for the given significance level does not allow interpretations such as the ones being presented. In addition, only 1/3 of the points are within the confidence bounds, while e.g. strong melt and a strong negative trend in SMB can occur (C1) same as low melt and an even stronger negative trend in SMB (C8). Same occurs for average trends. Melt rates for roughly a trend of $-6 \cdot 10^{-3}$ m w.e. a⁻² are within a range of 0 - 0.11 m w.e. per year in melt. I am quite skeptical concerning the statements in L557-564 as well. I cannot see a confirmation of the hypothesis that percolation and refreezing is enhancing the negative accumulation trends. I know, it would be very intuitive but the cores you present do not show this. For a trend "above" -0.006 m w.e. a⁻², 4 cores result in an average melt rate below 0.04 m w.e. per year and 4 cores are situated at or above 0.08 m w.e. melt per year. I recommend to remove Figure 11 and the corresponding text in L557-564. Especially, since the following lines are contradictory to the statement that melt influences trends within the 20a period.

We would like to thank the reviewer for their time reevaluating this manuscript and for continuing to improve the scientific quality of this paper.

We agree that Figure 11 distracts from the focus of the manuscript. We have removed Figure 11 and L557-564.

Some technical details:

Please present significant digits and be consistent with it. Several occurrences of statements with different levels of accuracy are placed even within given ranges (e.g. L502). I don't see the necessity to present sub mm accuracies especially while accuracy levels do not allow for such precision.

Thank you for noticing this oversight.

We have modified the manuscript to have a consistent number significant figures.

You should differentiate in between accumulation and accumulation rates. Within the latter part of the manuscript (Section 3), you almost exclusively use the term accumulation for given accumulation rates. Be consistent!

We have updated "accumulation" to "accumulation rates," where appropriate, throughout the manuscript

Please carefully correct typos, edits and missing links:

L270-275: 4 sentences in a row start exactly equally

We have modified the beginning of the sentences to avoid repetition

L101 link missing

Link has been updated

I recommend to include more often percentage values especially for trends and errors. This facilitates the assessments of errors and trends especially for accumulation rates.

We have modified L535-536 to include percentage values: "On average, the RCMs have a more

negative precipitation trend than the GreenTrACS record by 0.003 ± 0.005 m w.e. a^{-2} ($0.3 \pm 0.77\%$) for MAR and 0.002 ± 0.005 m w.e. a^{-2} ($0.45 \pm 1.22\%$) for RACMO2.”

We have modified L413-415 to include percentage values: “Average (1966 – 2016) GPR accumulation rates are statistically indistinguishable with average (1962 – 2014) IceBridge Accumulation Radar measurements analyzed by Lewis et al. (2017), with an RMS difference of 0.039 ± 0.033 m w.e. a^{-1} ($6.0 \pm 9.6\%$) along a total of 562.5 km of overlap”

We have modified L425-427 to include percentage values: “Similarly, our 2011-2016 accumulation rates are statistically indistinguishable from average 2009 – 2012 IceBridge snow radar measurements analyzed by Koenig et al. (2016), with an RMS difference of 0.049 ± 0.096 m w.e. a^{-1} ($14.0 \pm 27.7\%$) along a total of 69.7 km of overlap (not shown). “

L312 ...leave-one-out...

This typo has been fixed to “...leave-one-out validation...”

L340 missing unit for Delta-h

We have added units to read “ $\Delta h = 3.56$ m”

L383 I disagree with higher accumulation rates in the SW. I would rather identify higher rates in the central parts of the transects.

We have modified the text to read “...with higher accumulation rates along the main traverse and lower accumulation rates at higher elevations...”

L399 ...firn are within error of those... should be ... are within uncertainty ranges of those...?

We have modified the text to read “Accumulation rates derived from GreenTrACS firn cores are within uncertainty ranges of those...”

I don't see the benefit of the plotted annual accumulation rates in Fig. 5. As far as I remember, those rates are not quoted in the manuscript either.

We use these annual accumulation rates to show the variability in year-to-year accumulation and the benefit of averaging accumulation rates over 5 year periods.

We have modified the text on L 398-399 to read “Annual and epoch-averaged accumulation rates derived from GreenTrACS firn cores are within uncertainty ranges...”

Additionally, we have added the following text “Averaging accumulation rates over five year epochs reduces noise in year-to-year accumulation variability.”

L341 give values for average firn density

We have added the text “average firn density $\rho = 0.55$ g cm^3 ,”

Additional note: A recent TCD manuscript presents values for snow densities at Dye-2 for spring 2015 and the following years. In case you want to simplify your core assessment for Dye-2 consider using those.

Heilig, A., Eisen, O., Schneebeli, M., MacFerrin, M., Stevens, C. M., Vandecrux, B., and Steffen, K.: Spatial and temporal variability of snow accumulation for the South-Western Greenland Ice Sheet, The Cryosphere Discuss., <https://doi.org/10.5194/tc-2019-184>, in review, 2019.

Thank you for pointing out this new and interesting publication.

At Dye-2, we use our firn core densities from Vandecrux et al., (2018) for the top 19.3 m and firn core densities from Bales et al. (2009) for depths between 19.3 and 119.6 m. Near-surface density at Dye-2 has not changed enough between 2015 and 2019 to alter our accumulation results.

Finally, we have added a brief acknowledgement section that reads as follows:

“This project was supported by the US National Science Foundation (NSF) under grants DGE-1313911 and ARC-1417640. We would like to thank Mary Albert for providing field validation measurements, as well as Jason Box, Xavier Fettweis, and Brice Noel for providing the most recent Box13, MAR, and RACMO regional climate model outputs. Our successful data collection would not have been possible without the support of Ch2M Hill Polar Field Services, Kangerlussuaq International Science Support, and the Air National Guard 109th Airlift Wing. We thank the U.S. Ice Drilling Program for support activities through NSF Cooperative Agreement 1836328. Special thanks to Sean Birkel and the Danish Meteorological Institute for location-specific weather forecasts in Greenland. The authors would like to thank two anonymous reviewers for greatly improving the manuscript.”