

The Cryosphere Discuss., referee comment RC2
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Comment on tc-2021-379

Anonymous Referee #2

Referee comment on "How does a change in climate variability impact the Greenland ice-sheet surface mass balance?" by Tobias Zolles and Andreas Born, The Cryosphere Discuss., <https://doi.org/10.5194/tc-2021-379-RC2>, 2022

This is an original and interesting paper on the effect of climate variability at different timescales (daily to monthly) on the Greenland Ice Sheet surface mass balance, and has potentially important implications for the way that climate forcing data should be used in SMB simulations, as there can be quite large differences (up to several tens of percent) depending on the type and time resolution of forcing data used. I have a few minor comments for the authors' consideration, following which I recommend publication.

ERA-5 data are available back to 1950 and are based on a superior model. Why was the older and shorter ERA-I dataset used?

p.3, line 82 "Temporal continuity is only broken at the year break with arguably negligible consequences". Has this been checked for days near the beginning or end of the year, as weather conditions may be very inconsistent with different years spliced together?

p.8, l.133 "...which is in line with the low effect the dew point change has (fig. 4 k, l)" - it looks like there is quite a large change in the means of dew point relative to other climate variables, so can this point be clarified?

Re. Figure 4 caption comment "If transient variables are taken individually the precipitation lowers SMB the most", I don't fully follow this. To me the means look quite close for panels e & f for precipitation. Other climate variables have their respective climatological and transient forcings affecting their means by typically greater amounts.

Also, the labels "all climatological except" and "all transient except" at the top of Fig. 4 seem unclear and should be clarified.