The Cryosphere Discussions

The Cryosphere Discuss., referee comment RC2
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Comment on tc-2021-388

Anonymous Referee #2

Referee comment on "The impact of climate oscillations on the surface energy budget over the Greenland Ice Sheet in a changing climate" by Tiago Silva et al., The Cryosphere Discuss., https://doi.org/10.5194/tc-2021-388-RC2, 2022

This is an interesting novel study of the effects of the NAO and GBI and their combined influence on the Greenland Ice Sheet surface energy balance. The paper is fairly insightful and is reasonably well presented overall, although it would be useful to add an explanation of exactly how the NAG (influence of the North Atlantic over Greenland) time series was derived. It should also be clarified somewhere whether the reported correlation coefficients are based on detrended datasets. The analysis is based on an interesting and worthwhile hypothesis that the tilt within North Atlantic jet stream structures may have differing spatial (and temporal) effects on the near-surface impacts of jet-stream changes, and is best quantified by combining NAO and GBI rather than taking one of these measures in isolation.

Specific comments

Line 92 (P4): why not use the most recent (and best) ERA5 ECMWF reanalysis (which is available back to 1950) to force the RACMO for the whole time period?

Line 97 (P4) “based on the lowest 5% albedo values between 2000 and 2015” – how many values/how frequent?

L162 (P7) etc. – are the reported correlation coefficients based on de-trended data?

L183 (P8): how exactly is the NAG time series calculated?

L187 (P8) “the influences exerted by NAO and GBI may differ” – this is an interesting result.

L190 (P8) “the 95th percentile of IWV is mainly connected to positive NAG phases in summer and winter”: Fig. S3 suggests (dark circles) that high IWV is mainly associated with the neutral (grey) cluster then.

L198 (P8) “in winter +NAG frequently contributes the most to surface accumulation”. What is the reason for this? If +NAG means more Greenland Blocking, this should be associated with fewer storms in south-east Greenland.

Fig. 3 (and elsewhere): are the reported correlation coefficients based on de-trended data?

L238 (P12) “-NA in winter promotes more IWP at the Northeast” – this seems unclear from Fig. 4(a).

L240 (P12) “The RH2m…” – where is this shown? Should this refer to the q2m plots?