

Interactive comment on “Increased Greenland melt triggered by large-scale, year-round precipitation events” by Marilena Oltmanns et al.

Anonymous Referee #1

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General

This is a topical and original new study which uses, satellite-derived Greenland Ice Sheet (GrIS) surface melt, a regional climate model (RCM) and classification of atmospheric synoptic patterns to show that low-pressure systems (cyclones) over Greenland and their associated precipitation are clearly and significantly associated with enhanced surface melt. The time evolution of meteorology and surface mass balance over composite episodes is analysed. According to trends obtained using the RCM from 1979-2012, cyclone-driven surface melt has more than doubled and this positive feedback might well contribute to the decline of the Greenland Ice Sheet. Such a change might also be related to the recently-observed increase in anticyclonic blocking over Greenland, since recent studies suggest that cyclones tend to precede extreme

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blocking episodes, and so the new study nicely complements other recent work on the Greenland Blocking Index (GBI). All this suggests the GrIS might be more sensitive to ongoing climate change than hitherto believed. The study is generally clear and useful with quite a novel perspective, and it should be of wide interest to TC readers, so I recommend publication following the following minor changes.

Specific

Page 2, Line 22: If for higher melt thresholds the net growth of melt extent increases and melt duration decreases, I don't understand how "trends in duration...are qualitatively unaffected by the threshold" – please clarify.

P3, LL5-6: "...allow THE study OF the atmospheric characteristics...".

P6, Figure 3(a) what is "SPD" above figure? Please define.

P6, Table 1 caption, I think end of first sentence should refer to Fig. 2c, not Fig. 1c.

P13 Fig. 10 panels (e) and (f) add "e" to "Refreez".

P13, L11: "...been recognized as THE main driver of...".

P14, L10 "...their slope cannot be taken TO BE representative OF future changes."

Interactive comment on The Cryosphere Discuss., <https://doi.org/10.5194/tc-2018-243>, 2018.

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