On the importance of the albedo parameterization for the surface mass balance of the Greenland ice sheet in EC-Earth

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General Comments:

The manuscript is improved over the previous version. The limitations of the albedo scheme and model simulations have been made clear. The study highlights many of the challenges involved and improvements that can be made in modeling ice sheet mass balance in a GCM. It indicates the importance of capturing both albedo and refreezing accurately for simulations of both SMB and total ice sheet mass balance.

I think the authors should try to make clear the importance of including schemes that are not currently included in the GCM, such as a representation of bare ice albedo and a refreezing scheme, the importance of accurately capturing the spatial distribution of SMB for input to an ISM, and the importance of capturing ice flow and ice conditions properly in the ISM. These are important results of the study that the modeling community should be aware of, and more important than the finding that one particular configuration of the albedo scheme works best with the current state of the model, when used to force an ISM simulation. In fact the "best" albedo configuration improves simulation with the ISM, but doesn't improve SMB as compared to RACMO2. Additional minor modifications to the text to further emphasize these points would improve the manuscript.

Specific Comments:

1. **Title:** Perhaps "surface mass balance" could be changed to "mass balance", since the authors do explore the link between albedo and overall ice volume through the ISM simulations.
2. **P. 1, Lines 5-9:** The abstract still doesn't mention any specific results of the study, for example, what impact changing the albedo scheme has on SMB, runoff, etc., the impact on overall ice volume when coupled with the ISM simulations, limitations of the albedo scheme, and potential improvements that can be made (for instance including refreezing) for more realistic GCM simulations.
3. **P. 3, Line 16:** Perhaps the authors could also mention here that another outcome of the work is the identification of modifications to the model that will likely improve future simulation of ice sheet mass balance in the GCM.
4. **P. 4, Line 4:** Clarify how the model was evaluated, e.g. "its performance was good in comparison with observational datasets".
5. **P. 4, Line 6:** Add "(T255)" after "truncated at wave number 255".
6. **P. 4, Line 31:** Change "but each group" to "but each of the groups mentioned above" for clarity.
7. **P. 5, Lines 5-6:** The discussion of this equation is still a bit confusing. Perhaps change "A continuous…snowfall flux (F=1 kg m^{-2} h^{-1})" to "When the snowfall rate (F) exceeds 10 kg m^{-2} h^{-1}, snow albedo is fixed at α_{max}. A continuous reset for smaller rates of snowfall is implemented to reduce the importance of small amounts of snowfall on surface albedo."
8. **P. 6, Line 14:** To make it clear that the value α_{max} doesn't vary within a single simulation, make it clear that a set of experiments is performed, e.g. "A set of simulations is performed in which the value of α_{max} is varied…"

9. **P. 7, Line 31:** Why use the period 1960-1989 for RACMO2, when the GCM simulation uses SSTs for the period 1990-2012?
10. **P. 7, Line 31 or 32:** I think the mention of the RACMO2 albedo scheme, mentioned later in the paragraph, should be added here before discussing the figures.
11. **P. 8, Line 8:** "albedo can occasionally drop" refers to temporal variability, but average values are being discussed here. Perhaps revise to read "The positive bias… indicates that in some locations, summertime albedo can drop to values lower than 0.5 (the minimum snow albedo used in this study)."
12. **P. 11, Line 18:** "linear regression" is probably more appropriate than "correlation" in this case.
13. **P. 11, Lines 23-24:** It is not necessarily true that the minimum albedo value is too low (although it probably is too low for snow). If the model accounts for refreezing, SMB may increase to the point that the ice sheet will be stable. Please note this here.
14. **P. 11, Lines 21-25:** It is interesting that in all the GCM simulations, SMB is lower than observed, but forcing with RACMO2 results in the most realistic simulation. This suggests that the spatial distribution of SMB is important to the evolution of the ice sheet, rather than the overall numbers. I think this is a key result that should be emphasized more in other parts of the manuscript.
15. **P. 12, Line 23:** Some of the flaws in the model are known, for example the lack of a refreezing scheme and the lack of a scheme for distinguishing between bare-ice vs. snow. Some of the flaws and limitations of the ice sheet model are also known. These should be mentioned here.
16. **P. 12, Lines 24-25:** Utr-8 produces the best representation of the current state of the ice sheet, when used to force the ice sheet model, but it produces an SMB that is too low relative to RACMO2. There are also substantial differences in terms of albedo. Please clarify that Utr-8 is chosen because of the agreement in terms of ice volume and area. The other discrepancies should be noted here. It should also be noted that adding more realistic schemes to both the GCM and ISM will also change which scheme produces the best results.
17. **P. 13, Line 31:** Perhaps change "solve the..." to "acount for…"
18. **P. 14, Lines 2-11:** As noted above, the results reveal more than the influence of the albedo scheme, but also reveal the importance of capturing the spatial distribution of SMB correctly, of accounting for refreezing in the model, and the need for improvements to ISM simulations. These points should also be noted.
19. **Figure 2, caption:** Specify the period for the RACMO average.

Technical Corrections:

1. **P. 6, Line 9:** Change "generally regarded weak" to "generally regarded as weak"
2. **P. 6, Line 25:** Change "from ERA-Interim" to "from the ERA-Interim"
3. **P. 7, Line 20:** Change "then the other schemes" to "than the other schemes"
4. **P. 7, Line 23:** Add "the" before "accumulation area".
5. **P. 7, Line 32:** Change "on a 11 km" to "at an 11 km"
6. **P. 8, Line 11:** Add "the" before "SMB through…"
7. **P. 8, Line 28:** Fix "froml", and change "which is extensively" to "which has been extensively"
8. **P. 9, Line 7:** Change "spatial resolution" to "spatial resolutions".
9. **P. 10, Line 21:** Change "as are associated changes in SMB" to "producing associated errors in SMB".