The Cryosphere

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Discussions

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Interactive comment on "Validation of the sea ice surface albedo scheme of the regional climate model HIRHAM–NAOSIM using aircraft measurements during the ACLOUD/PASCAL campaigns" *by* Evelyn Jäkel et al.

Anonymous Referee #2

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This manuscript describes a field effort (ACLOUD / PASCAL) to validate an established parameterization (HIRHAM–NAOSIM) for the surface albedo of a sea ice cover. The observations mostly consist of snow covered ice, although some bare ice and some ponded ice surfaces are included.

Major concerns: The overwhelmingly dominant surface type for this study is snow-covered ice. Should that be reflected in the title?

The conclusions of this manuscript, as stated p. 18, line 3 provide only limited scientific

insight. The details of the model parameterization and the data set being used to validate it are nicely described, but there is not a lot of fresh scientific insight that results.

Minor points:

Abstract line 5: "The SIS albedo parameterization was tested using measured quantities of the prognostic variables surface temperature and snow depth to calculate the surface albedo and the individual fractions of the ice surface subtypes (snow covered ice, bare ice, and melt ponds) derived from digital camera images taken onboard of the Polar 5/6 aircraft." It would be helpful to include the albedo measurement in this list (broadband? Spectral?).

abstract line 10: "...a temporal bias was observed..." Is this necessarily a temporal bias? It's probably more likely a surface type bias. I doubt the bias depends explicitly on time, but it more likely depends on surface type.

p. 2, line 2: "...the second main contributor." compared to what process?

p. 2, line 6: "the spread of climate model results with respect to the snow/ice albedo feedback has been discussed" can this be made more specific? I think I understand this sentence is trying to convey that the sensitivity of climate model results to parameters directly related to snow/ice albedo feedback are discussed, but this is not clear.

Table 1: Where do the min and max values come from? 0.51 - 0.57 seems like a range that I would expect to be biased low.

p. 10, line 14: "This implies that the reflected radiation from side directions has a minor contribution than radiation coming from directly below the aircraft." Please rewrite for clarity– ". . . has a minor contribution relative to radiation..."?

p.12 line 6: delete "it", also please explain what is meant by "structured snow covered ice".

p. 14, line 2 -3: If I understand correctly, this albedo parameterization does not account for varying grain size and snow depth? That seems like it is important to mention.

p. 14, line 7: "...also the illumination conditions might have an impact on the variation of the surface albedo. Lower SIS albedo values were measured for all cases under cloudless and broken cloud conditions compared to overcast situations with similar surface temperatures ranges." That is expected and it would be helpful to acknowledge that here.

Interactive comment on The Cryosphere Discuss., https://doi.org/10.5194/tc-2018-266, 2019.