

Interactive comment on “Broadband albedo of Arctic sea ice from MERIS optical data” by Christine Pohl et al.

Anonymous Referee #1

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The characterization of the radiative properties of Arctic sea ice is of substantial importance for many aspects of climate modeling and monitoring. Thus the present effort to improve upon the MERIS record is welcomed, although the record's relatively short length does place some restriction on its use. Also, the manuscript's comparison against ERA5 sea ice albedo is welcomed, although the rather limited scope of the comparison leaves the reader with rather many open questions. This reviewer therefore suggests adding more meat into that section, as the other part of the manuscript (updated NBC) is somewhat light in content for a full Cryosphere paper in itself.

Major comments

- a. Please elaborate on the ERA5 comparison. What are the likely causes for the discrepancies? What is the associated uncertainty in the MERIS estimates, how much of C1

the difference is explainable through them? Are there regionally or temporally changing drivers behind the differences?

b. Both training and evaluation of the method appear to be based on early-season ice, May-June. Some discussion is warranted on whether or not this implies issues in the determination of late-season ice cover, given the surface changes incurred by e.g. melt pond draining or surface refreezing.

c. I approve of the airborne measurement comparison, but have you evaluated against full-summer albedo observations, such as those available from the Tara expedition of 2007-2008? If not, why not as that is in your study period?

d. While I understand the brevity in method description given the authors' past works on the topic, a short summary of a couple of sentences describing the principles behind e.g. the BRDF model for the highly heterogeneous sea ice cover and the choice of melt pond optical properties for the varied types of melt ponds seems in order in section 2.1 to facilitate context for the readers.

e. Is the updated MERIS sea ice albedo dataset available somewhere? The manuscript implies it, but no access method is given anywhere.

Minor comments

2, 9-26: For the legacy orbiter datasets, APP-x and GLASS are mentioned but not CM SAF CLARA. Why the omission?

9, 19-22: For clarity, please mention what the Ebert-Curry parameterization is based on (air temperature, or?)

11, 22: by -> up to, depends on the amount of diffuse radiation in the downwelling flux and the surface BRDF.