

Dear Authors,

Thank you very much for your updated review. I think we are very close to acceptance. I can see two last items I would like to see fulfilled:

a)

Well, I believe this still remains cryptic for a non-specialist in the domain. I suggest that you add a short introductory paragraph at the beginning of section 2 (model description) with a tentative title such as: 2.1 New developments on melt pond reflections model. That paragraph would summarize your arguments presented here above.

We thought that derivation of formulas in Sec.2.1 would help a reader in understanding the approach.

However, now we see, by yours and reviewer's reaction, that, vice versa, it was only confusing. We completely rewrote Section 2.1 (NOTE that it is NOT highlighted, because it is completely new). Now there cannot be any misunderstanding about what is new and what are the results of other authors.

Sorry, but I still think it is still not clear what is the original input of this paper modelwise in this chapter 2...it remains "diluted" in the several pages descriptions of the model. **PLEASE**, at least clearly state the originality in a few sentences either before section 2.1 or as a conclusive paragraph at the end of section 2.

b)

I have made a few "formal" suggestions for changes in the phrasing of the newly added sections, as follows:

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-4.4 Verification results

The retrieved and measured pond parameters (melt water depth, and underlying ice thickness, and transport scattering coefficient), as..

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-25 uncertainties, like finite pond size, presence of snow in the receiver field-of-view, clouds in the sky *aso*. Considering this, the retrieval of the underlying ice thickness seems ~~to be~~ rather reasonable. Let us note the fact that microwave sounding methods completely fail absolutely in ice thickness retrieval, when ice is covered with a water layer of indefinite thickness.

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-more pond parameters will not help improving the model and make it closer to reality. We would attribute potentially appearing remaining differences between observed and modeled spectra to possible the potential impact of sediments within the ice.

What about the other potential parameters explaining discrepancy?...under pond ic not flat, presence of impurities, finite pond size,snow in receiver FOV, clouds..?..Why only selecting sediments?

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-10 In ~~its~~ turn, the amount of melt ponds on Arctic sea ice determines the sea ice reflectance and transmittance and thus allows estimating the energy balance above, within, and under sea ice and its response to climate change. The temporal evolution of melt ponds consists of melt stages, which are specific to sea ice type (landfast ice, first-, second-, or multi-year ice). The spring melt pond fraction predicts the autumn Arctic sea-ice ~~content~~-~~extent~~ (?). Therefore, the melt pond fraction dataset obtained from satellite data is required to derive the sea ice ~~content~~ ~~extent~~ (?)-and type during summer melt.