

Melt pond fractions on Arctic summer sea ice retrieved from Sentinel-3 satellite data with a constrained physical forward model

Response to reviewer 2

We thank the reviewer very much for the time and effort to thoroughly read and evaluate our manuscript to improve its quality.

The authors build on previous work on deriving melt pond fraction from Sentinel-3. The main improvement is including open ocean as additional surface type classification. The improvements to the algorithm are impressive when compared to the old algorithm and a better pan arctic melt pond fraction data is really good news! The methodology is sound and detailed, and the authors have done a good job of explaining it all in a logical order. Additionally, the figures are clear and contain a lot of information. I would have liked to see a more thorough assessment of errors (i.e. do they vary based on melt pond fraction), but given the lack of data for the and length of the paper it would be good to see it in future work.

I recommend accepting this paper.

Thank you very much for your positive and encouraging feedback. In the following we will address every comment separately.

Above you mention your interest in a more detailed discussion of errors. We looked into the dependence of the error (i.e. the difference between retrieval output and validation data) on the value of melt pond fraction itself and don't observe a dependence. We will add this information to the manuscript where the uncertainties are discussed.

L43: Satellites don't cover all of the arctic.

We don't claim that all satellites do cover all of the Arctic. However, we say that they can and this is the case for the Sentinel-3 satellites which don't have a pole hole.

L175: ?

Thank you for spotting this wrong citation key which led to the ?. We will correct that.

L373: bothdifferences

We correct this.

In Figure 15, it would be nice to see a few more of the example scenes (and perhaps the S2 image?)

We will add the comparison shown in Figure 15 for some other example scenes to the appendix.