The Cryosphere

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Discussions

Interactive comment on "Spring melt pond fraction in the Canadian Arctic Archipelago predicted from RADARSAT-2" *by* Stephen Edward Lee Howell et al.

Anonymous Referee #2

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The manuscript uses RADARSAT-2 data to estimate melt pond fraction within the Canadian Arctic. The manuscript is clear and well written with figures clearly supporting the presented results and the discussion.

I found the investigation into the correlation between the different regions and the melt pond fraction one of the most important findings of this study. Maybe this finding could be more explicitly stated in the abstract and also in the conclusion? "Static/stable sea ice regions showed a higher detrended correlation." The mentioning of several regions is a bit vague.

Single pol RADARSAT-2 data was used, why is that? Was the combination of HH + HV

lacking? Or did the HH-channel contribute sufficient information? This may have been covered in earlier work by e.g. Scharien et al., but would then be worth reiterating.

The in-situ area only covers areas with a relatively high proportion of melt ponds, were any other in-situ data available that could be used for the validation with a smaller proportion of melt ponds? Moreover, the area covered for the in-situ data is rather small compared to the pixel size of the RADARSAT-2 images. Are there larger datasets, either more locations or covering a larger area that could be used to strengthen the argument?

The comparison between the results using Sentinel-1 and RADARSAT-2 imagery was interesting, but a discussion about why the results are different (e.g. Fig 6) is missing. Both of the images being C-band SAR one would expect the results to align quite well. Please discuss this. The comparison between the RADARSAT-2 and MODIS data, particularly figure 8, seems to suggest large differences between the two sensors, where even the maximum f_p is significantly lower than the RADARSAT-2 estimates. Were there regions in the CAA that showed better agreement between the MODIS and RADARSAT-2 estimates?

Specific comments

Consider moving the information about stages of lake evolution on page 6 to the information about data or similar instead. Readers unfamiliar with melt pond development would be aided by an earlier introduction to the different stages. On P3 it is stated that the evolution stages covered by the field work covers 3 out of 4 stages, but on P 6 R177-179 it states that stage I and II was captured. Please clarify.

Is it expected that the environmental conditions remain reasonably stable in CAA during the month of April? If so maybe that could be added to strengthen the argument for combining RADARSAT-2 data for the analysis?

Minor comments

The use of the words excellent and good in the abstract are slightly abstract. Maybe it would be possible to provide some statistical measure?

P2 L41. What is the difference between sea ice area and extent? Should it possibly say sea ice type and sea ice extent?

P2 L43. Does fp here relate to maximum/mean values? Please clarify

P6. L169. Should it be . . . allows us to place the. . .?

P6. R192. Should this be Figure 8?

Fig 1. Please state what the green star indicates in the figure text.

Fig 7. Should it be -W in the coordinates.

Interactive comment on The Cryosphere Discuss., https://doi.org/10.5194/tc-2020-171, 2020.