

The Cryosphere Discuss., referee comment RC3 https://doi.org/10.5194/tc-2021-381-RC3, 2022 © Author(s) 2022. This work is distributed under the Creative Commons Attribution 4.0 License.

Comment on tc-2021-381

Anonymous Referee #3

Referee comment on "First results of Antarctic sea ice type retrieval from active and passive microwave remote sensing data" by Christian Melsheimer et al., The Cryosphere Discuss., https://doi.org/10.5194/tc-2021-381-RC3, 2022

Review of "Antarctic sea ice types from active and passive microwave remote sensing" by Melsheimer et al.

Summary

This manuscript describes a method to retrieve three Antarctic sea ice types from passive microwave and scatterometer data: young ice, first-year ice, and multiyear ice. The approach adapts the ECICE method originally developed for the Arctic. Corrections are made for temperature and ice motion to improve performance. Comparisons are made with SAR data and ice chart stage of development fields. The ECICE fields generally compare well, but there are some discrepancies, notably the "formation" of MYI in July in the outer Ross Sea. The authors hypothesize that this is due to snow metamorphosis on FYI that results in a MYI-like signal. Other errors occur due to motion tracking errors.

General Comment

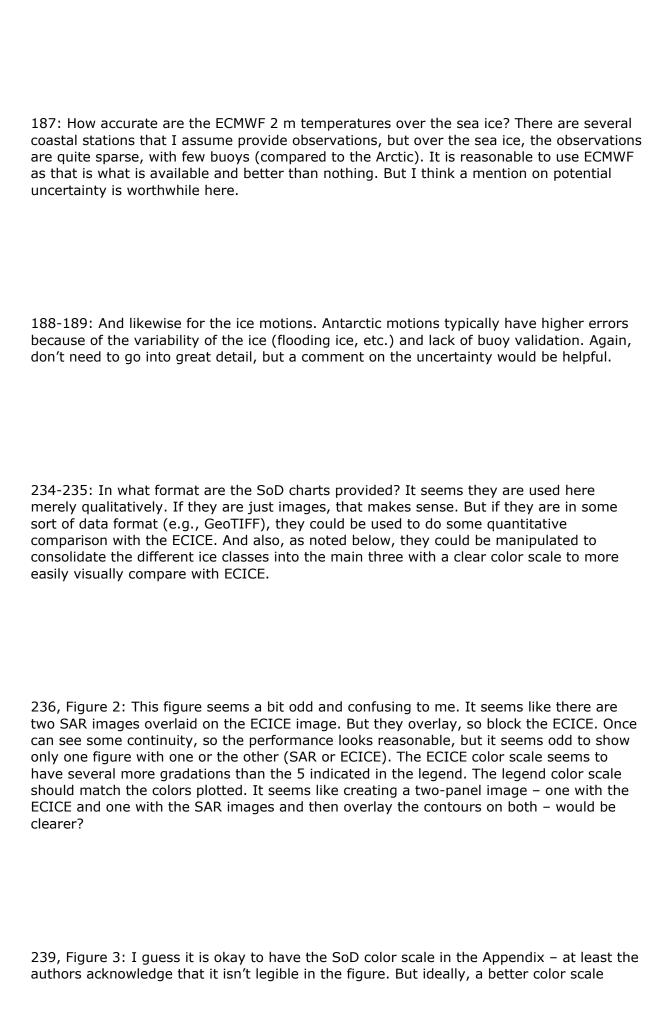
An Antarctic MYI data product is a great contribution. As the authors note, it is challenging to create such a product. The general approach here is a good one. The authors adapt the ECICE method that has been successful in the Arctic. The method appears to work well based on initial comparison with SAR and stage of development ice charts. The comparisons are generally qualitative in nature. I think that at this point, introducing a new method, this is okay. It is hoped that the authors will follow up this work with more quantitative comparisons to develop statistical error estimates. And it is hoped that the data set is expanded to a longer time series in future work. One thing that would help with the qualitative comparisons is if the SoD images could be custom made with a color scale indicating only the three ECICE ice types. This is discussed further in the comments below. But I'm not sure how feasible or easy this would be with the SoD fields. So, I don't think this is essential, though it would make the results easier to interpret. The other issues are all quite minor. The writing is good and the figures are otherwise well done. I recommend acceptance after minor revisions.

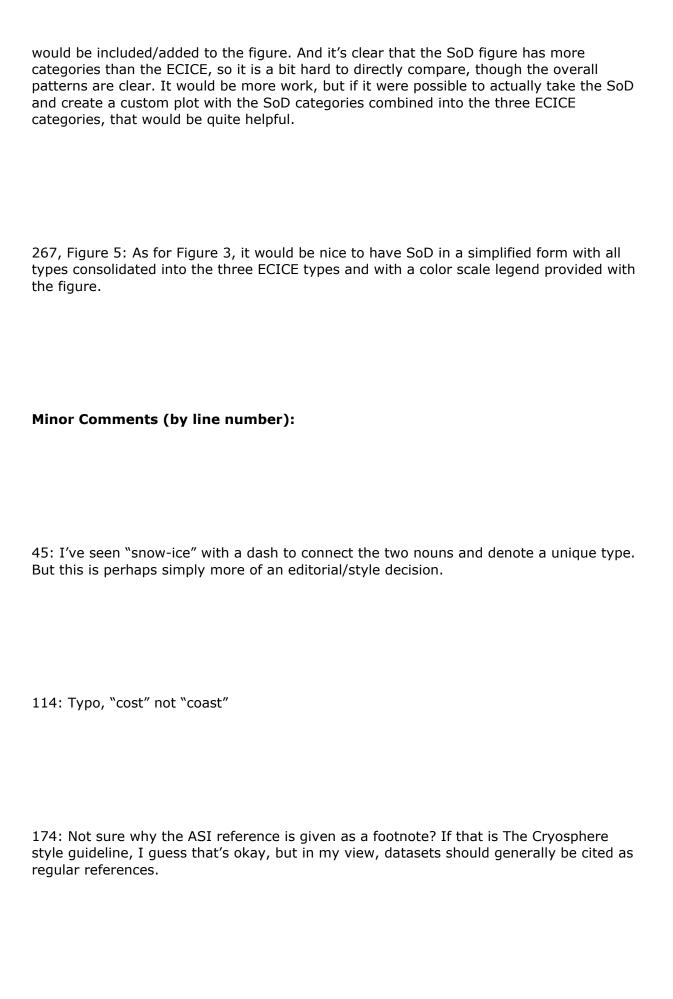
Specific Comments (by line number):

51: One reason why most MYI is in the Weddell Sea is that the gyre that transports MYI away from the coast to the north and northwest also transports in ice from the north and northeast. This is seasonal ice that gets transport into the Weddell, where it compacts along the ice shelve and Antarctic Peninsula and, along with less solar insolation and colder temperatures, allows that FYI to survive into MYI. This seems a salient point to make here as it is the mechanism to form MYI.

90-92: No SSMIS sensor data are used?

174: How is the "beginning of the cold season" defined? Is it the minimum total extent? But at the minimum, there may be regional gains and regional ice losses occurring (the minimum marks when the gains start to outpace the losses). Ideally, you would use the minimum at given grid cell or at least regionally.





346: It seems like the chart color legend (Table A1) should be after the beginning of the Appendix text? But as noted, it would be helpful to create a new legend that combines the relevant classes into the three main types for the figures in the main text of the manuscript.