

The Cryosphere Discuss., referee comment RC3
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Comment on tc-2022-51

Anonymous Referee #3

Referee comment on "Evolution of the dynamics, area, and ice production of the Amundsen Sea Polynya, Antarctica, 2016–2021" by Grant J. Macdonald et al., The Cryosphere Discuss., <https://doi.org/10.5194/tc-2022-51-RC3>, 2022

Evolution of the dynamics, area and ice production of the Amundsen Sea Polynya, Antarctica, 2016-2021 by Mcdonald and others.

This study looks at the dynamics of the Amundsen Sea Polynya (ASP) using a combination of active and passive microwave observations. While the results present potentially useful information about the dynamics of the ASP, I agree with Reviewer #1 and Reviewer #3 (first draft) that additional scientific quality assurances need to be taken. The major points raised by those Reviewers would only serve to improve the quality of the manuscript so I was surprised they are rebutted and not implemented. The major problem with only using video is the statements about processes/characteristics cannot be supported clearly with evidence and therefore subject to miss-interpretation. This paper is full of casual statements that maybe true but lack quantitative support which is not scientific. The threshold approach for polynya area is also problematic.

I would encourage the author's to actually implement the suggestions of the previous Reviewers also taking into consideration my comments:

1. The problems with passive microwave data underestimating thin ice (and ponded ice) are well-known so a threshold approach is not ideal. I think a better approach would have been to construct the time series of open water area from PM rather than polynya area based on a threshold. This is done nicely in Moore et al. (2021; 10.1029/2021GL095099).
2. Polynya or open water area can indeed be better estimated by SAR but some attempt to do this quantitatively and consistently needs to be made to illustrate variability and ensure reproducibility. There is no problem manually extracting polynya or open water area from SAR imagery but this should be done carefully and ideally in time series image analysis format. Further, the imagery must be pre-processed (i.e. calibrated and corrected for incidence angle). Not doing these basic things comes across as scientifically lazy and

also introduces errors. Moreover, inclusion of the backscatter scale **IS** the standard in the literature with respect to ice monitoring.

3. Studies that use passive microwave to identify polynya area (or open water) together with SAR need to at least quantitatively compare the two estimates. In the current version of the paper this is not very rigorous and at the very least should also be placed on Figures 5 and 6. Timing of formation/closure should also be considered.