

The Cryosphere Discuss., referee comment RC1  
<https://doi.org/10.5194/tc-2021-331-RC1>, 2021  
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## **Comment on tc-2021-331**

Anonymous Referee #1

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Referee comment on "Improving model-satellite comparisons of sea ice melt onset with a satellite simulator" by Abigail Smith et al., The Cryosphere Discuss.,  
<https://doi.org/10.5194/tc-2021-331-RC1>, 2021

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Review of "Improving model-satellite comparisons of sea ice melt onset with a satellite simulator" by A. Smith et al.

The paper uses a brightness temperature satellite simulator to diagnose the timing of melt onset in model simulations, and compare this new metric to other metrics of melt onset. Overall, the paper is well written and worthy of publication subject to the minor corrections listed below:

Line 49: Write out the ACR30 acronym here as this is its first use.

Line 61: What method of regridding was used?

Line 73: "Each .." Describe the method in slightly more detail - How does brightness temperature change as melt occurs?

Line 85: "Surface temperature" - clarify whether this is ice, snow or either surface temperature.

Line 123: What is the justification for the step function as opposed to another functional form?

Line 138: "So here" -> "Therefore" or another replacement.

Line 141: "CICE provides..." I believe CICE can provide the number of layers specified so clarify this isn't the only choice possible. Maybe something like: "CICE was configured to provide"

Lines 140-150: Clarify what thermodynamic model CICE is used? Mushy layer? Bitz-Lipscomb 1999?

Line 152: Lagrangian tracking - I am unfamiliar with this functionality in CICE - is it documented/referenced somewhere? There is a FY ice tracer, but it is not lagragian tracked, instead advected with the Eulerian transport scheme.

Line 154: Clarify what the correlation length is.

Line 159: "(greater than 30cm)(Fig. S2)" -> "(greater than 30cm; Fig. S2)"

Line 180-185: The two thresholds are presumably justified from a bimodal nature of the brightness temperatures. It would be useful to see histograms demonstrating this bimodal nature.

Line 185: "with boundary" -> "with the boundary"

Figures 1, 5, 6, 8: Add the field name and units to the colorbars.

Figures 3, 4, 7: Add markers to the map of the Arctic ocean showing exactly where the a,b,c,d points are.

References: "SIMIP community ... 2020": This doesn't appear to be how to cite: <https://agupubs.onlinelibrary.wiley.com/action/showCitFormats?doi=10.1029%2F2019GL086749>