

## ***Interactive comment on “The Arctic Ocean Observation Operator for 6.9 GHz (ARC3O) – Part 2: Development and evaluation” by Clara Burgard et al.***

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Received and published: 30 April 2020

RC: Reviewer Comment, AR: Author Response

RC: Reviewer summary: This is an excellent paper that advances the field of satellite emulation as a way of evaluating sea ice simulations in Earth System Models. There is one drawback to this study that the authors acknowledge in that they do not use a thickness distribution  $g(h)$ , but instead simulate the mean sea ice state in the coupled model chosen for the research. As a consequence, the observational operator is not able to determine the extent to which thin lead ice of thickness  $h$  is important in representing brightness temperature relative to completely open water. Instead, using the

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methods presented, it is only possible to state that sea ice concentration is important, whereas satellites 'see' the gradation in ice thickness as represented in models with the state variable  $g(h)$ . This is a critical point that perhaps could be made in the conclusion of the paper as a potential extension of this work in future studies. Aside from this, the paper was well written, easy to understand, and a technical advance in the field of polar simulation and model analysis.

AR: Thank you very much for the positive feedback. We will address the matter of the ice thickness distribution in the conclusion, as suggested.

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Interactive comment on The Cryosphere Discuss., <https://doi.org/10.5194/tc-2019-318>, 2020.

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