

Review of “Sea-ice thickness on the northern Canadian polar-shelf: A second look after 40 years”

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This is my second review of this paper. I’d like to thank the author for addressing my previous comments and thoroughly revising and updating the manuscript. The paper provides a unique view of sea ice in a very remote area, but expands to look at the importance of dynamics in the formation of multiyear ice, which I found really interesting. My major concerns have all been addressed and I list only a handful of minor comments below.

Minor comments:

Line 8-10: Can this sentence be revised to clarify that data was collected from August 31 to December 10, and the instrument was recovered in May. It might help provide more detail than the general “winter 2009-2010”.

Line 16: revise to read “ When prior data are available *for comparison*”.

Line 21-22: Thank you for adding in this part to clarify that MYI area has declined.

Line 47-50: consider revising to read something like “...because they are estimates from satellite altimeters that suffer from issues relating to snow depth, infrequent measures of sea level height, and a relatively large footprint (20-70 m diameter); in situ validation has been minimal (Kwok et al., 2020).”

Line 59: Consider revising to “More recent studies of ice in this area have focused on...”

Line 86: remove “become”.

Line 103: replace “in-drift” with “import”

Line 108: “ ... when *the* Arctic climate...”

Line 131-132: Were the IPS ever deployed in Byam Martin Channel? Perhaps this text can be updated and suggested as an area of future work in the Discussion section.

Line 154: “ ...south-western side *of* Penny Strait...”

Line 185-186: Can you provide examples in brackets of what moderate and weak drift speeds are?

Line 213 and 215: revise to “southeasterly winds” and “northwesterly winds”.

Line 238: Suggest adding “... and the assumption of no snow”.

Line 364: revise to “... minimal change in multiyear ice *thickness* here during the last four decades”. Population is a little misleading as there is less MYI than previously.

Line 372: It would be worth adding reference here to Kacimi and Kwok (2022) who recently showed amplified thinning of multiyear ice in the Arctic Ocean over the ICESat-2 time period (2018-2021). This would show greater thinning since the Kwok and Untersteiner work in 2011.

- Kacimi, S., & Kwok, R. (2022), Arctic snow depth, ice thickness, and volume from ICESat-2 and CryoSat-2:2018–2021. *Geophysical Research Letters*, 49, e2021GL097448. <https://doi.org/10.1029/2021GL097448>

Line 461: Remove “the” from “... area of ice within *the* which was thicker than 4 m...”

Line 504: replace “within” with “downstream of”.

Line 524-526: Can these two types be referred to qualitatively as well as quantitatively based on thickness and chord length? Perhaps something like: Type 1, large conglomerate pans of MYI, and Type 2, smaller fractured ridges or rubble fields.

Line 530: suggest replacing “thermal wastage” with “loss”.

Line 539-541: I really like this revised conclusions section. I think it expands the implications of this work, but I would suggest revising the last part of the sentence to read “hundreds of kilometers in down-drift directions across the Canadian Polar Shelf and in the Beaufort Sea (via the Beaufort Gyre), Baffin Bay (via Nares Strait) and Greenland Sea (via Fram Strait).

Line 541: replace “they” with “the”.

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