

Interactive comment on “Sea Ice Drift and Arch Formation in the Robeson Channel Using Daily Coverage of Sentinel-1 SAR Data During the 2016–2017 Freezing Season” by Mohammed E. Shokr et al.

Anonymous Referee #1

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General Comments

The paper analyzes ice floe movement with SAR satellite data in Robeson Channel during the 2016–2017 freezing season. Individual floes are tracked using daily images and conclusions are drawn on the transport of ice with respect to wind, ice congestion and current. The paper is unable to separate the contributions of wind and current, while no mention is made of tidal affects. The paper also documents the formation of an ice arch in the vicinity of Robeson Channel during the 2016–2017 season. No historical context of this event is given. The paper has an overabundance of parenthetical

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statements and some poor wording.

Specific Comments

46: No mention of tides. The strongest tides in the Canadian Arctic are in Kane Basin to the south. Tides can reverse the strong surface current in Smith Sound on a diurnal basis. What are the tidal effects in Robeson Channel?

56: An ice tracking algorithm using short-time span AVHRR imagery was developed in Nares Strait in 2000. doi.org/10.1080/07055900.2001.9649681

70: Kwok is referring to the absence of both the North Water polynya ice arch to south and the northern ice arch in the vicinity of Robeson Channel. The northern ice arch featured in this paper has occurred 17 times since 1979, and on four occasions it was the only ice arch in the Nares Strait system. The location of the northern ice arch is highly variable. In 2007 there were no ice arches. Normally, the northern ice arch forms first followed by the southern ice arch, at which point Nares Strait becomes solid ice. This paper does not put the ice arch into a historical context. doi.org/10.1038/s41598-019-56780-6

84: What is the re-visit time for RCM? Once per day is poor temporal resolution for ice tracking in this regime.

124: No units for the x-axis for Figure 2

154: How likely is it that the floe travels in a consistent straight line over a 24-hour period?

186–200: Very confusing. 16 floes are mentioned, then 39 floes, while the figure mentions 16 floes and shows 31 floes.

250: Can any useful conclusion be derived from the SSH map? Why is the December 2016 average shown?

295: The description of the wind vectors in the caption is incomprehensible.

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376: Why were these floes moving so fast?

379: Are the authors suggesting the SSH gradient is the reason for the movement? Is there a reference for this?

380: First sentence makes no sense. What is 'it' and what other effects did 'it' overcome?

381: Why are the floes moving northeast under light winds from the south? Tide?

395: How is land fast ice different from sea ice with respect to physical properties. Would this change the drift rate?

425: Reference for Antarctic polynya statement?

426: As stated earlier, there is no context given for the ice arch formation.

Technical Corrections

35: existing?

176-177: Poorly written sentence.

187: '39' not 'thirty-nine'

194: 'Remarkably' has no scientific meaning. Quantify.

246: 'that' not 'which'

260: 'path' not 'bath'

270: Should not give directions for explanations. It is done quite often in the paper.

274-280: I lost count of how many parenthetical statements are in this paper. It really hinders the flow of the narrative.

300: Table 2 has a speed in 'km'. Per day?

324: Be consistent with wind direction. Northerly wind or southward blowing. The

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terms vary throughout the paper. Not sure why northerly is defined here.

342: Do not use 'i.e.' in the narrative.

380: Why is 'continues' in present tense?

400: Three times 'remarkably' has been used the paper.

419: 'polynyas' Also, do not tell the reader what is well known.

482: 'chopping' is a poor term

Interactive comment on The Cryosphere Discuss., <https://doi.org/10.5194/tc-2020-44>, 2020.