

Interactive comment on “Satellite-observed sea ice area flux through Baffin Bay: 1988–2015” by Haibo Bi et al.

Anonymous Referee #3

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Summary

The paper investigates sea ice area flux through Baffin Bay from 1988–2015, using satellite observations of sea ice motion and sea ice concentration (NSIDC). In particular, the authors calculate the ice area flux at three gates in the north, middle and south of Baffin Bay. They evaluate variability and trends of ice area flux as well as links to sea level pressure (SLP) and the North Atlantic Oscillation (NAO) index.

General Comments:

I don't really see that the paper is following a particular thread. The formulation of the goals in the introduction is very brief and general. The authors should make clear if this is rather a method paper, introducing a new data set, or a scientific study to investigate

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sea ice fluxes and related processes in the Baffin Bay.

I find many motivations and conclusions questionable. For example, what is the motivation to compare the derived Baffin bay fluxes with the fluxes in the Fram Strait? I don't see why this is relevant. At most, one could compare the net fluxes of different gates in the Arctic and estimate the total sea ice export. But the mechanisms in both regions are very different. The Fram Strait ice flux is characterised by multiyear sea ice, which is advected by the transpolar drift and exported through the Fram Strait. In contrast, the Baffin Bay ice fluxes are characterised by first-year ice in winter, when multiyear ice is exported through the Nares Strait due to an ice bridge. During summer, this ice bridge is collapsing, and multiyear ice can be exported through the Nares Strait. These processes are not well explained in the paper, but are very relevant to understand ice fluxes in this region.

Another debatable point is the decadal change around the year 2000. This seems arbitrary. The interannual variability seems to be quite substantial and therefore I don't think that there is a significant change in SIF between those particular decades (see Figure 2).

Another major concern is the presentation. There are too many figures, sometimes of low quality, and with too little significance. I strongly recommend to revise the figures in order to better support the findings and main messages of the paper. For example, Figures 8, 9 and 10: It is neither explained the meaning of the lower case letters in the brackets, nor the meaning of the rows (i guess the different gates + Fram Strait?).

I would also suggest to better separate results and discussions. In the results section, findings are often discussed.

Considering all these concerns, I suggest very substantial revisions. Actually, I think that many parts of the paper need to be rewritten, and also the analysis and conclusions need to be reconsidered, before it may be suitable for publication.

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Detailed Comments:

P3L1: What is the motivation to consider three passages at the chosen locations? Please add some explanation.

Figure 1: There are Chinese (?) letters in the figure.

P5L21: What do you mean here (and in other places) with “grid”? Do you mean grid cells, pixels? This needs to be explained better, i.e. use grid cells or pixels.

P10L6-7: can you prove that this change is significant? In view of Figure 2, I would doubt. See my major concern above.

Figure 2: Make the figure larger, please!

Figure 3: The scaling of the arrows changes between 0.1 km/day and 10 km/day. Please use a uniform scaling. Otherwise, the different months are hard to compare.

Figure 7: What are a, b, c and d? There is no information in the figure caption.

Figure 14: Make the figure larger, please!

P17L3: “For passages A and B, the increasing SIM trend (Figure 10b and f) is primarily caused by a positive SIF trend” . . . This doesn’t make sense. SIF is derived using SIM.

P24L4-5: “However, Figure 16 suggests that the monthly SIF is only slightly 5 correlated with the NAO index for the three passages through Baffin Bay ($R = 0.23\sim 0.32$)” . . . Why should they be correlated? See my major concern above.

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