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

Anonymous Referee #1

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This paper tries to monitor the sea ice flux (SIC) changes in Baffin Bay from 1988 to 2015 using the NSIDC sea ice concentration (SIC) and sea ice motion (SIM) datasets. The authors also try and link these changes in SIF to climate variables from the NCEP-NCARR dataset. Thought the datasets used for this study are very relevant and results can be very relevant to understanding the climate variability of sea ice conditions in Baffin Bay, after reading the paper, I do not think the authors understand the sea ice conditions in Baffin Bay and the drivers of the sea ice fluxes properly.

My first concern is why the authors keep comparing the SIF of Baffin Bay with the SIF of Fram Strait. The ice regimes of those two regions are very different. The source of the SIF from Fram Strait comes directly from the Arctic Ocean and a large portion of the ice that flows there is comprised of multi-year ice all year round. In the case of

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Discussion paper

Baffin Bay, the ice flows from Lancaster Sound and Nares strait in the summer months and is a mix of multi-year ice and first-year ice but in the winter, the ice mainly comes from first-year ice generated in polynyas of Lancaster Sound and the northern part of Baffin Bay. A major driver in Baffin Bay is the North Water Polynya (NOW) and nowhere do the authors mention this. Also, that polynya exists because of the ice bridge that is created in Nares Strait in the winter which blocks the inflow of thicker multi-year ice from the Arctic Ocean. Fram Strait and Baffin Bay are thus not comparable in terms of SIF.

Another issue is the separation between before and after the year 2000. The selection of the year 2000 seems arbitrary to me. Many climate change studies (including the IPCC report) state that there was a climate shift around 1998. Why did the authors not look at before and after 1998? Why don't there results show this climate regime shift (it should appear in the NCEP-NCARR dataset).

Also, some results can be explained by the sea ice conditions themselves. For example, the low SIM values on the Greenland coast in the winter months can be explained by the ice conditions. The sea ice along the coast is land fast, i.e. attached to the Greenland coast and does not move (note: the extent varies each year). I would strongly recommend that the authors visit the Canadian Ice Service website (https://www.canada.ca/en/environment-climate-change/services/ice-forecasts-observations/latest-conditions.html) and specifically their 30-year ice atlas (https://www.canada.ca/en/environment-climate-change/services/ice-forecasts-observations/latest-conditions/climatology/30-year-climatic-atlases.html) to better interpret the SIF results.

Overall, I would not reject this paper since it is very relevant to the studied field of climate change but I suggest major reviews after the authors better describe the region of interest and its different drivers. I would suggest to remove the comparison with Fram Strait as they don't have the same ice regimes. I would also study a bit more in detail the ice conditions which can be obtained on a weekly basis from the Canadian

Ice Service in order to improve the interpretation of the results.

Specific comments: In the figure caption, I suggest adding more detailed descriptions of the figures. Specify what the a), b), c) and d) subfigures are etc.

For Figure 7, what is the reference to generate the anomaly map? Usually it's a specific period that is used but it was not specified in the text. Also, what are the units if any for this anomaly map?

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