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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.

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In this study, daily high spatial resolution Sentinel-1 images are used creatively to observe the ice floe motion and ice arch formation process in the RC. As it is difficult to reach high accuracy tracking of individual ice floes using an automated scheme (e.g. using the familiar maximum cross correlation approach), ice floes are tracked manually and the motion vectors were calculated and related to wind maps from ERA5 reanalysis. The study offers information on ice drift in two regimes; north of the RC in a close pack/drift ice and inside RC in an open drift regime. The paper offers new information

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Discussion paper

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that highlight the gross ice floe motion in the two regimes and the process of ice arch formation as triggered by the northerly wind that keeps modulating the shape until it stabilized. Conditions for stability are described in Section 4.2. The motion tracking has higher accuracy compared to the previous studies which used gridded motion mapping of the ice cover, not individual ice floes.

During the course of this study we found that most tracking methods cannot retrieve ice motion/ice drift results in narrow strait such as the Nares Strait (not presented in this manuscript). An examples of ice motion results is presented in Figure 1 where ice motion vectors (in green arrows) covered areas in Lincoln Sea. Only a few vectors were retrieved in Robeson Channel. (Figure 1 is from a study done by members of our group)

Available ice motion products covering the Robeson Channel are limited. Their spatial resolution is low (the highest is 0.083°). We can verify their accuracy using the results from this study. Manual identification of ice floes is the most effective processing for retrieving ice motion using daily Sentinel-1 images.

In this study, a very large amount of data is generated using daily images. The analysis in the study offers qualitative and quantitative results. For example, we summarized the characteristics. Qualitative results address links between ice motion on one hand and wind/current and ice concentration on the other hand. Quantitative results show regression between ice floe speed and wind speed. The R2 of the regression equation is 0.599, which shows strong impact of wind on ice motion under the specified conditions. More detailed information is offered at Lines 320 to 368, including Figs. 10 and 11.

We downloaded some papers from TC and manuscripts from TCD. We don't find much difference in length compared to the present manuscript. However, we will shorten the manuscript and probably delete Fig. 4 or Fig. 5 or both.

We thank the reviewer for major and minor comments and we shall address them if a

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revised version is warranted.

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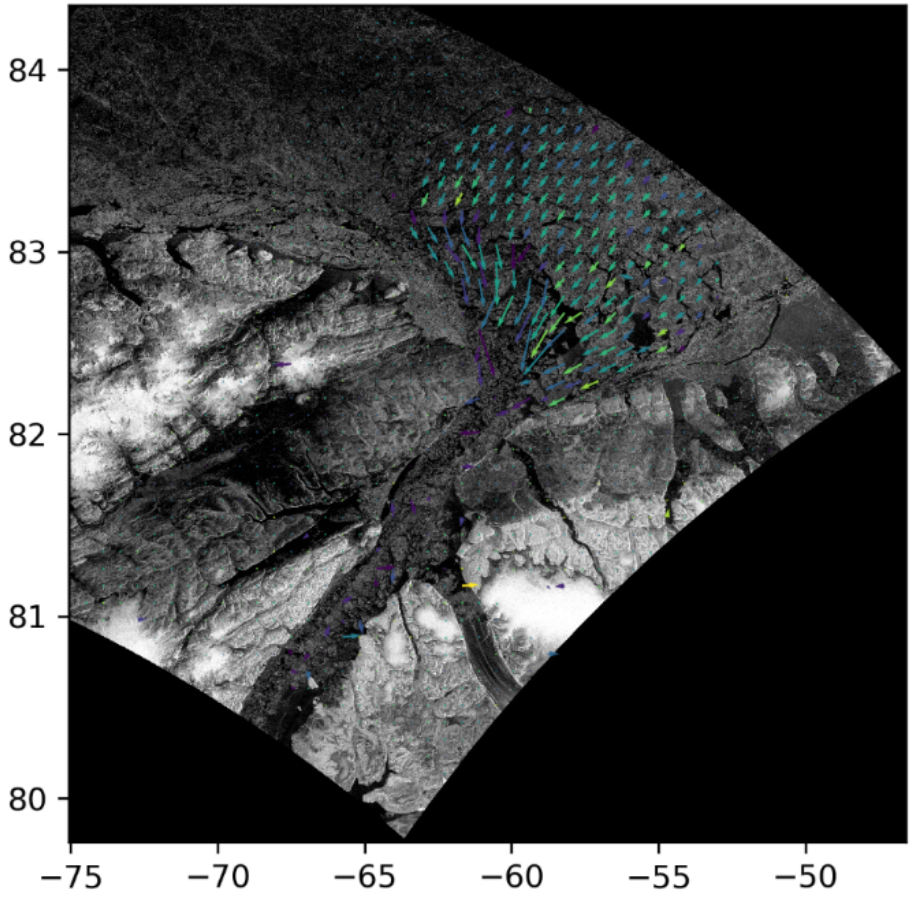

Fig. 1. Ice motion results using feature tracking method.

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