

## ***Interactive comment on “Sea ice export through the Fram Strait derived from a combined model and satellite data set” by Chao Min et al.***

### **Anonymous Referee #2**

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#### General comments:

This paper extended the estimations of sea ice export through the Fram Strait to the melting seasons using the combined model and satellite thickness (CMST) data set, which assimilates CryoSat-2 and SMOS thickness products, as well as sea ice concentration data. The paper is well written and easy to follow. The CMST data and methods to calculate sea ice export are already published in previous studies. The novelty of this paper might be the sea ice export during the melt season. I expect more elaborate analysis and discussion about the uncertainties of the input data during the melt season, and their impact on the estimation of sea ice export. I suggest to consider this manuscript for further publication after more analysis and comparisons are presented in the revised version.

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## Specific comments:

P5 L126-128: What kind of interpolation method is used here? Section 3.1 validation of CMST data: Validation of sea ice drift: Since sea ice drift is the essential parameter in the calculation of sea ice flux, more comparison and analysis should be carried out about the uncertainty of CMST sea ice drift product, especially during the melt season where the uncertainty of sea ice drift is greatest. From fig. 1b, it is difficult to figure out how well CMST sea ice drift data fits to the NSIDC data along the gates. Why do you use NSIDC here for the comparison, not OSI SAF? P6L160-161 please add a short description about the domain (is it the Fram Strait gate?), time period used, etc. P6L155: what do you mean with “within the current understanding”? P7 L204: “moderate decline” during the 6 years? P7 L212-213: Please define the relative frequency used here. Fig. 8 and 9: It might be helpful to add the mean ice thickness/ice drift of each season in the figures. P7 L214-218: Could you explain why ice thickness is thickest in summer and ice drift is slowest in summer? P8 L224-225: better to mention this earlier in section 2.6. Section 3.3 Sea ice volume export through the Fram Strait: It might be interesting to analyze the respective contributions of ice drift and ice thickness to the seasonal variation of sea ice export. How many percent of sea ice export variation can be explained by ice drift/ice thickness? More discussions could be made about the causes of the variations of ice drift, ice thickness and ice export during the melt season, e.g. what is the reason of the extreme low ice export in August 2015? Authors could also do some additional comparisons with atmospheric circulation variability, e.g. the Arctic Oscillation indices. P8 L243:  $1503 \pm 158 \text{ km}^3$  minus sign is missing. P10 L286: the values should have minus signs? P11 L315-316 and L319-320 are the same sentences

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