

Interactive comment on “Fram Strait spring ice export and September Arctic sea ice” by M. H. Halvorsen et al.

Anonymous Referee #1

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General comments: This paper examines the southward ice area export in the Fram Strait over the period 1979–2013. The ice area export from 1979 to 2003 is based on a relationship between observed mean SLP and ice export observations, while the ice export from 2004 to 2013 is based on sea ice drift speed derived from SAR images. The variability of ice area export in spring is then used to explain changes in September Arctic sea ice extent. A coupled GFDL climate model is also used to investigate the relationship between ice area export in Fram Strait and September ice extent in the Arctic. It is valuable to use SAR data to determine the important Fram St. export. It is also interesting and useful to use observations to study the link between summer ice extent and ice area export in an earlier season. However, I am not fully convinced by the results and have questions that, I feel, need to be addressed. I recommend that this manuscript be accepted after significant revisions. The follow-

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ing comments/suggestions are provided for the authors to consider while revising the manuscript.

Specific comments:

(1) The paper shows a positive trend for annual ice area export over 1979–2013. However, Figure 3 appears to show a negative trend (at least a neutral trend) over the period 1979–2003. The figure appears to further show that the positive trend over 1979–2013 is due to a strong increase from 2004 to 2013 when the analysis is shifted to use SAR derived ice speed. Thus the positive trend over the whole period may be caused by a shift in data or analysis, not necessarily real. (2) Results from the coupled climate model is also used to explain how spring ice area export may impact September ice extent. Needless to say, models have uncertainties. However, the model results are vastly different from observations. The modeled annual mean export is almost twice the observations, and the modeled standard deviations is 3 times bigger than observations. This makes me to wonder if it is justified to use the model results. I feel that a careful use of observations would explain things just as well.

Minor comments:

P5, line10: “were” should be “where”, here and in some other places. P6, line5: not sure what “the outer part” is. P8, line 5: not clear what was re-calculated. P9, line 10: positive ice area export trend is attributed to increasing ice speed, but what about ice area that has been decreasing. P10, line1: too coarse. P10, line 5: delete until today. P12, line15: whether, not weather. P24, figure caption: mean speeds, not means speeds. P28, Figure 5, what is the correlation for the linear fit.

Interactive comment on The Cryosphere Discuss., 9, 4205, 2015.