

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

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Dear Anonymous Reviewer #2

Thank you for your review and your constructive suggestions. We hope that you will find our response below satisfying. Most of your suggestions will be applied in a re-submitted version of the paper. We will do our best to both shorten the paper, and use the classical structure with a separate result and discussion section. Some of the correlations can be tabulated, and some of the text can be removed.

We certainly agree that it is important that the reader understand how each of the timeseries (i.e. the 1979-2004-2013) has been constructed. We thought this was clear, but can obviously do a better job at this explanation. This was also noted by

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Reviewer#3. The 1979-2013 time series consist of mSLP-based ice area export prior to 2004, and of observed SAR ice area export onwards from 2004. This will be precisely stated in the new version.

We chose to present the best possible time series, which is clearly SAR based observations for 2004-2013. We will look into the statistics using the mSLP based ice export throughout the whole period as requested. We have already compared the mSLP based ice export from 1979-2003 trend to that of the combined longer 1979-2013 time-series when SAR data is included, and found similar results.

Your suggestion to exclude the modeling part from the paper is something we do not agree with. This is because, as also written in the response to reviewer #1, the model results support the observed relationship between spring Fram Strait ice area export and September sea ice extent. With a limited number of years with mSLP and SAR observations the 3600 year long model simulations greatly increases our confidence in the physically plausible relationship. The simulations also supports the conclusion that the observed increase in Fram Strait ice area export is due to natural variability, and is not anthropogenically forced. We think these results should be included in the paper, because the robust trend in ice export, and its relation to the September Arctic sea ice extent, has not been fully explained prior to this paper. In addition to the above we have also been specifically requested to add model simulations to support the suggested link between spring ice export and the following September ice cover. This was after an initial round of quite positive reviews when the paper was first submitted to Geophysical Research Letters. Adding the requested model results made the paper too long for GRL, and we thus decided to submit this to a more standard journal like the Cryosphere.

In the new re-submitted version we will add a paragraph on the ice export prior to 2000 as requested, and we will address most of the specific comments. The specific comment on the term “sea ice cover” is a bit special – so we mention that here. We use “sea ice cover” when we would like to specify “sea ice thickness, extent and area”.

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If we only mean one of them, we use that term. For example in line 15 on page 4207: “The Arctic seasonal maximum sea ice cover occurs in late February or early March”. This is true for both extent, area and thickness, and instead of listing all three we just use “cover”. We think this is a concise way of writing, and it would make the paper longer if one should specify all three each time.

Best regards Mari H. Halvorsen, Lars H. Smedsrud, Rong Zhang and Kjell Kloster.

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

TCD

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