

Interactive comment on “Winter sea ice export from the Laptev Sea preconditions the local summer sea ice cover” by Polona Itkin and Thomas Krumpfen

Anonymous Referee #1

Received and published: 24 April 2017

This paper discusses how late winter export/import anomalies lead to low/high ice concentration and thickness in the Laptev Sea. The discussion is very clear, the figures are good, and the English is quite readable. There is some redundant text that could be cut. I recommend for publication with minor revision.

Figure 1: The caption should explain what AL, WNS, NE, and T are. The black and grey lines are quite short and a bit difficult to see against the colors. Also, perhaps you can change this to a 2-panel presentation, with panel 1 = 2008 model ice thickness + 2008 EM observations, and panel 2 = 2012 model ice thickness + 2012 EM obs?

Line 14, Page 3: “time lags of 3 days” What does this mean?

C1

Line 31, Page 3: So, the HEM does not provide ice thickness, but snow + ice thickness. Thus it cannot be directly compared to model ice thickness, correct?

Also: You use SMOS ice thickness in this work, so you should discuss SMOS data in your Data section.

I will comment that your data section is very good in describing the data that you use, including error estimates.

The model section should probably provide some information here about its validation in the Laptev Sea of the parameters of interest, ie ice concentration (compare to SSM/I), ice thickness (compare to SMOS) and ice motion (compare to CERSAT).

Figure 3: Color scale should use “regular” intervals, eg 120, 140, 160. . .

Line 1, Page 5: “. . . contributed to the low. . .” ie eliminate the “a”

Line 4, Page 5: zero, or 15%?

Figure 4: Is “ice concentration” an average over the domain? Is the domain bounded by the coast, the western islands, and the N and E sections? Also, I suggest you mark the years 2008 and 2012 since these are discussed in the text. Also, I suggest you eliminate the minus signs on the ice concentration, since to me, they seem to suggest a concentration anomaly. Also, in the caption, you should explicitly note the different vertical scales of area ice flux in the 2 panels. Also, in the final sentence of the caption: “. . . data are. . .” not “data is” referring to “correlations” which is plural.

Line 6, Page 6: “. . . variability is controlled by wind velocities.” Probably (I have not read Krumpfen et al. 2013) the sea ice variability was found to be controlled by surface wind which was calculated via sea level pressure and thus geostrophic wind. But of course the ice moves owing to surface wind. So just say “wind” and you are ok.

Line 7, Page 6: “. . . is associated to an increasing drift speed due to a thinning ice cover.” You should prove this, or refer to Krumpfen 2013 if this is shown in that work.

C2

Line 8, Page 6: "...statistically not significantly different from no trend at 95% confidence ($p = 0.0888$).” ie it is significant if you relax your standard to 91% confidence.

Lines 9-10, Page 6: "...as well as for the summer sea ice concentration.” You find that the correlation is exactly 0.73 for both export and concentration? This is hard to believe.

Lines 13-14, Page 6: It is “more than double” for export, but not for concentration.

Figure 5: The symbols are far too small to read. It seems impossible to make them large enough to read but small enough to fit on these busy graphs. Perhaps you should simply not try to distinguish these individual years within the 3 colors. Also: I cannot see the gray symbols and lines at all on a hard copy. Also: what does “above” or “below” mean, if gray means $\pm 25\%$? IE does above mean $> + 25\%$ of the mean? Also, what is the “average volume sea ice export?” IE please provide this number here.

Line 4, Page 9: Is it particularly surprising that there is no year-to-year memory in the thin ice of the Laptev Sea?

The first 2 paragraphs of the Discussion are somewhat redundant with previous text and could be cut substantially, I think.

Line 25, Page 9: "...may be a consequence...” I do not understand this sentence.

Page 10, first full paragraph starting, “Our model...” Is this paragraph really necessary?

Page 10, material on fast ice: It seems to me that this material should go into a dedicated section in your results, i.e. before the discussion section.

Line 26, Page 10: What does “linked” mean? This is not a scientific term. Do you mean that it is correlated (at zero lag)?

Line 27, Page 10: "...below a certain extent...” What “certain” extent?

Line 30, Page 10: How is the SE Laptev Sea defined? Please show this on Figure 1.

C3

Also, change the word “were” to “where”

Line 34, Page 10: "...and ice export is higher...” ie “higher” not “high” 0.63 is not really too high.

Figure 7 caption: The red line, not the blue line.

Interactive comment on The Cryosphere Discuss., doi:10.5194/tc-2017-28, 2017.

C4