

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 #2

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1. Summary

The manuscript introduces the relationship between winter sea-ice dynamics and ice retreat in summer over the Laptev Sea shelf. A number of relevant processes are discussed in order to explain the linkage between the preceding late winter sea-ice thickness and the following summer sea-ice extent. This manuscript is intended to further results by Krumpfen (2013), also using numerical simulations. Data from this region are of general interest and should be published, but the framework for developing ideas by Krumpfen (2013) is not entirely appropriate and adds very little value to already published results. As the results highlighted are mainly linked to those already published by Krumpfen (2013) I find that the manuscript is not appropriate for publication in its

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present form.

2. General comments

As I see, the major problem with this manuscript is novelty. In lines 20-23, page 1 the authors pointed out that “...the recent study of Krumpfen et al. (2013) showed a high statistical connection of the late winter (Feb-May) sea ice export through the northern and eastern boundary to the summer sea ice concentration. Years of high ice export in late winter have a thinning effect on the ice cover, which in turn preconditions the occurrence of negative sea ice extent anomalies in summer, and vice versa. “. This is exactly the same as the authors represented in abstract in lines 3-4, page 1: “...we show that years of offshore directed sea ice transport have a thinning effect on the late winter sea ice cover, and vice versa.”. What is the difference between the results reported by Krumpfen et al. (2013) and those presented in this manuscript? I would like the authors to describe how this manuscript develops the findings by Krumpfen (2013) and what is really new here comparing to already published results. The sensitivity study using numerical simulation is good and important, but seems to be not sufficient alone to get this manuscript publishable in its present form.

3. Specific comments

Page 4, line 15: I suggest to explain term “polynya”.

Page 4, line 24: Reference to Figure 4 appears before reference to Figure 3.

Page 4, line 26: There is one more maxima at ~ 0.5 m.

Page 6, lines 6-7: How do you know that the positive trend in ice export is associated to an increasing drift speed due to a thinning ice cover?

Page 7, lines 8-9: I would like to see one more graph showing simulated ice export for 1992-2014. Page 9, line 10: Change “is determined” to “are determined”.

Page 10, lines 17-19: This is primarily applicable only to the outflowing Arctic shelves

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with a strong sea-ice export like the Laptev Sea where the Transpolar Arctic Drift is originated. Please be more specific here.

Page 10, lines 26-28: I didn't understand this sentence.

Page 10, lines 34-35: I would like to know the physical mechanism behind this statistical relationship.

Page 11, lines 1-3: This suggestion is very speculative. During years of high ice export and early melt of thin ice zones, shallow water heats up quickly, but this heat is available to favor bottom melt of fast ice only in a case of the on-shore water transport toward the area covered with landfast ice. In contrast, this area is mainly affected by the off-shore transport of the riverine water.

Page 11, lines 7: This conclusion can hardly be extended to the adjacent Siberian shelf seas. It may work only for the areas with coastal polynyas developed during late winter and spring.

Page 11, lines 17-18: This conclusion wasn't properly justified.

4. Figures

Page 11, Figure 7: I don't think that this figure is necessary. Moreover, there is no blue line as introduced in figure caption.

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