

Interactive comment on “Interannual sea ice thickness variability in the Bay of Bothnia” by Iina Ronkainen et al.

Anonymous Referee #1

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The paper presents ice thickness data from EM measurements and drillings in the framework of level ice thickness indications in Baltic ice charts. The data are new and valuable and deserves publication.

However, the paper needs to be cleaned up. The language is often unclear (or poor English) and important information for the reader less familiar with the Bay of Bothnia is missing or hard to find.

There is a lack of discussion of uncertainty/error sources such as the sampling strategy. Not the same areas are sampled by the HEM each year but this is hardly discussed in the paper. This should feature more prominently in the discussion/conclusion sections.

Specific comments:

C1

P1L14: in a pure -> in pure P1L16-30: A map with the place names that are referred to in the paper would be very helpful. Perhaps figure 1 could be used. P2L2 and L15. These statements say almost the same but still are slightly contradictory. Does all ice grow thermodynamically in the fast ice zone, or is this only the case in more sheltered areas. A follow up question is if the areas where the drillings and EM measurements are carried out can be considered 'more sheltered'? P3L4: What does 'the entire time series' mean. Please give start and end years. P3L8: This statement seems to be contradicted by the conclusions section. Perhaps it is more the interannual variability of ice extent that is related to NAO, and not the thickness. The term 'ice conditions' normally refers to ice extent AND thickness etc. I suggest to change ice conditions to ice extent here. P3L30: It depends ... (what depends?) Paragraph should be rewritten. P3L31: We are now using ... (since when?) Do you mean 'In this study we use ...'? P3L32-33: from fast ice zone -> from the fast ice zone P4L1: Here I guess by conditions you mean thickness? P4L15: Refer to figures 1-3 for an outline of the area of interest. P4L26: satellite images and observations. Which observations?? P4L28: upturning -> turning P5L5: of degree -> of a degree P6L4: of approximately for HEM bird -> ?? Section 2.2, 2.2.1 and 2.2.2: There is some redundancy in the 3 EM sections. Perhaps these could be combined. P7L20: solve -> investigate P7L29: have been -> were P8L5: not represent -> not fully represent P8L2-5: Note that there is a cyclic feedback between FDD and ice extent (and thickness) in the sense that lots of FDDs leads to more and thicker ice, but also that lots of ice shelters the warm ocean from the atmosphere and thus leads to more FDDs. P8L8: The results ... (results of what??, this is a bad way to start a sentence) P8L23: three fourths -> use percentage instead (e.g. 75% although from figure 4 it seems to be less than 75%) P9L1: The growth before this is linear. This may be true in the average sense, but most likely not in the individual years, so please be more specific. P9L11: data -> datasets P9L18: Histograms of ... A specification of the area of interest is needed here. (and perhaps a discussion of the sampling of this area each of the years) P9L18 (and fig 7): I notice negative ice thicknesses in the histograms. This needs a comment/explanation.

C2

P10L1: drift ice area west of hailuoto – show on a map (f.ex. figure 6) P10L12: have been -> were P10L13: there is a lot -> there was a lot P10L17: That is clearly -> This is clearly P10L30-31: I suggest to rephrase to: severe winter 2003 where the EM data has its highest values and there was much (or a large fraction of) ridged ice. P11L5-6: for the first time so that it has been reliably recorded ??? P11L6: that winter -> the 2015 winter P11L11-12: maximum ice thickness in the fast ice zone in years 2003-2016 was over 0.8. So the max in each year was above 0.8m or in just one of the 14 years?? P12L17-18: In a similar way - Please rewrite sentence to make more sense. P12L23: but the reality is much more severe – Please rewrite. The level ice thickness given in the charts is also a part of the reality.

Note that the above specific language corrections are not the only ones needed for the paper to become acceptable.

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