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Earth System Dynamics
Discussions

Interactive comment on "September Arctic Sea Ice minimum prediction – a new skillful statistical approach" *by* Monica Ionita et al.

Anonymous Referee #1

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The authors use a statistical model to skilfully predict the Arctic September sea ice extent and the regional East Siberian Sea ice extent up to 4 months ahead. They combine several oceanic and atmospheric parameters and sea ice extent itself from previous months and perform a multiple linear regression. Variables and regions are selected based on stable teleconnections between the predictors and the predictand.

This study is an important contribution for seasonal Arctic and regional sea ice predictions. The predicted skill is higher compared with previous studies. The identification of relevant regions and parameters is useful for understanding processes and changes in climate models. I reviewed previous versions of this manuscript and I am pleased with the current version. The focus on de-trended time series and the separation into a calibration and validation period increases the robustness of the results. I strongly

recommend publication and would like to make a few minor comments, only.

Minor comments:

1. Section 2.2: Give reference to stability figures and remove sentence about colours.

2. Section 3.1: Would be nice to get some information about the impact of the individual predictors. It is surprising to see that only March ice extent is used for prediction of pan-Arctic sea ice extent based on June and July data. Is there no additional benefit from April, May and June ice extent?

3. Section 3.2: Would recommend to rename header from "Robustness of the methodology" to "Regional September ice prediction". From Table 2, only Lag 0 results are discussed.

4. Conclusion: "Moreover, our statistical model is able to properly reproduce the years with extreme low / high sea ice extent, both at pan-Arctic level as well as at regional scale (e.g., 2007 and 2012 – low SSIE and 1996 – high SSIE; see Figure 4 and Figure 5)." Given that only 2012 is within the validation period, it is questionable how robust this statement is.

5. Figure 5: Use same legend for all sub-figures.

6. Missing reference: Petty et al. 2017, https://agupubs.onlinelibrary.wiley.com/doi/full/10.1002/2016EF000495

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