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Interactive comment on "Atmospheric teleconnections between the Arctic and the Baltic Sea regions" *by* Liisi Jakobson et al.

Anonymous Referee #2

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The goal of the manuscript "Atmospheric teleconnections between the greater Arctic and the Baltic Sea regions" by Jakobson and colleagues, is to explore atmospheric teleconnections between the Baltic Sea region and the greater Arctic since the late 1970s. The authors use simple statistical techniques (i.e., linear correlation analyses) of several climatic variables including air temperature, wind speeds, specific humidity, and sea level pressure. Several recognized teleconnection indices including AO, NAO, PDO, SCA, EA, and EA/WR are used in their analyses.

The scope of the work is suitable for publication in Earth System Dynamics. Additional work, however, ought to be completed before the manuscript is ready for publication. The paragraphs below include the key areas of concern as well as other minor suggestions for overall improvement of presentation.

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Discussion paper

General Comments:

1. The thrust of the paper implies that the presence of statistical correlation implies causation, which is not the case. It is important for the authors to further explore the identified relationships by placing them in a climatological context and examining various potential atmospheric processes that may help explain the correlation results.

2. The authors present a great amount of results that need to be better interpreted, synthesized and placed into a climatological/atmospheric context supported by existing literature.

3. The authors use simple linear correlation analyses to explore atmospheric teleconnections. I assume that they are speaking of the Pearson Correlation Coefficient. I have some concerns about this given that the areas of concern are in middle-to-high latitudes where teleconnections are known to be of non-linear nature. Also, the correlation method is applied to climate parameters such as wind and specific humidity that may not be normally distributed and significantly influence the results.

4. The entire Baltic Sea region is represented by one single station located in southern Estonia (TP). The authors claim that the information provided in Figure 1 (i.e., Correlations between air temperature at this location with locations across the greater Baltic Sea region during various season) shows that TP's climate represents the climate of the greater region very well. This may be the case for surface temperature, but I strongly doubt that same would hold true for the other variables such as wind characteristics. This can be seen in Figure 2 for JJA, for instance.

5. For their analyses, the authors chose four atmospheric variables including air temperature, specific humidity, wind speed, and sea level pressure. Why did they choose these variables and not just sea level pressure, or the more typical 700 hPa geopotential heights for exploring atmospheric teleconnections?

6. What methods were used to remove the trends from the data?

7. What methods were used to assess statistical significance?

8. The overall manuscript is clearly written baring some oddities in grammar and general use of the English language. I would recommend a more careful proof-reading of the revised manuscript. Some (not all) recommendations are included below.

Specific Comments:

Line 90: The authors mention several atmospheric teleconnections including the AO, NAO, PDO, SCA, EA, and EA/WR but do not explain what each of these are and on what basis they were included in the conversation. They also do not explain why most these were discounted up front and not addressed again even in the discussion section.

Line 105: The authors mention that they detrended the seasonal time series "to avoid the correlations to be caused by mutual trends in input variables." They also claim that the detrended and original correlation results were very similar. For this reason, they only show correlation results from "regular data". The results surprise me (i.e., similar correlations from original and detrended data), especially given the large recent temporal trends in many of the variables that are explored (i.e., temperature) in the high latitudes of the northern hemisphere. It is also important to note that the conclusions regarding teleconnections that one can reach from the original series versus detrended series may be different. Are the authors exploring the connections that include long-term climatic trends such as global warming, or are they interested in understanding the relationships as they may exist independently of such trends?

Line 191: The authors claim that ". . ., the winter mean temperature is not dependent on weather conditions during the previous seasons." But on line 199 they proceed to make the following claim: "Winter temperature at the TP has a strong negative correlation in the Taimyr region in the previous summer." To me, these statements seem to contradict themselves.

Line 235: The authors state that "To avoid false correlations, only the results that were

present in both the regular and the detrended data were discussed." I am not sure what is meant by "false correlations". Like I mentioned earlier, detrended data for instance, may hold a different story, not a false story.

Line 25: find another word for "disconfirm"

Line 26-27: It is not clear what "both" is referring to in the sentence starting with "They found that from. . .."

Line 33: "Arctic amplification" should be Arctic Amplification

Line 67: It is not customary for sentences to begin with "But"

Line 68: I would suggest replacing "last decades" with most recent?

Line 71: Rework the sentences starting with "Therefore, our aim is to. . ..

Line 123: Replace the word "huge" with large

Line 132: Can the word "distinguished" be replaced with different or distinct?

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