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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Adding value to Extended-range Forecasts in Northern Europe by Statistical Post-processing Using Stratospheric Observations" *by* Natalia Korhonen et al.

Anonymous Referee #1

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The authors present a genuinely interesting analysis that contains new methods to improve extended-range forecasts. The great improvement in forecast skill must be useful work. I found the manuscript interesting and believe others would as well, but I have several questions and comments in the current form.

Major comments 1. The authors used 'minimum daily AO index' but it seems that there is no clear justification for the use of 'minimum'. Use of the minimum AO index might have more uncertainty because the value fluctuates with a day. The uncertainty would be reduced if the authors use weekly mean value rather than the 'minimum'. It would be helpful to isolate the significant skill increase from sampling issues. Additionally,

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the post-processing revises weekly mean temperature. This is an additional reason to justify why we need 'minimum' AO index rather than weekly mean.

2. I am not sure the how the QBO can modulate AO index at weekly time scale. The QBO has an average period of ∼28 month. The QBO phase tends to prevail for the entire season so how can we connect dynamics between weekly variation of the AO and QBO?

3. The authors suggested that great improvement in forecast skill associated with QBO-polar vortex connection. The past studies suggested that the EQBO could modulate polar vortex, which in turn lead the AO. However, EQBO and polar vortex is not much coincided (Fig. 2). The number of EQBO (u wind <10m/s) is 34 and week vortex (ZMZW <3.8m/s) is 9. Sum of them is 43 but the number of SWIneg cases are 41, which means the events satisfying both condition is only 2. This implies that there should be relationship between EQBO and AO, which is independent to polar vortex. The authors should elaborate introduction and discussion for the prediction skill source for the statistical post-processing.

Minor comments The annotation "Fig. 2 EQBO and vortex ZMZW < 3.8m/s" (green) does not correspond to decision tree in Figure. 3. Please revise it for the better understanding.

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