

Atmos. Chem. Phys. Discuss., author comment AC1  
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## Reply on RC1

Oscar Dimdore-Miles et al.

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Author comment on "Interactions between the stratospheric polar vortex and Atlantic circulation on seasonal to multi-decadal timescales" by Oscar Dimdore-Miles et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2021-688-AC1>, 2022

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### Response to Reviewer Comments

"Interactions between the stratospheric polar vortex and Atlantic circulation on seasonal to multi-decadal timescales" by Oscar Dimdore-Miles et al.

We thank all the reviewers for providing their set of comments on our analysis. Their suggestions have helped us clear up technical points that more clearly demonstrate the proposed physical pathways in various interactions. Below is a summary of the relevant changes made to the manuscript.

For many places throughout the article, for example P12 L332 and L334, 15-20 years are suggested as the lag-time. But from the Figure 3 and 5, it shows the significance response from 10-25 years or approx. 10-23 yrs, of course strongest response is between 15-20 yrs. Maybe the authors could make the statements more accurate.

**We have amended the text to clarify that, while significant AMOC responses are evident between 10- and 23-year lags, the largest anomalies appear between lags of 15 and 20 years.**

Figure 3: I suggest reversing the order of the three rows, corresponding to the flow of description. In the caption, "black dots" should be corrected as 'blue dots'.

**Both the order and figure caption have been changed.**

Figure 4 caption, the second line: add "(green)" after NAO index and add "black" after "ocean-atmosphere heat flux".

**This has been changed.**

Figure 5: the label of sub-figures and their statement in caption are wrong. Please correct them accordingly. The label of third subfigure should be "c)".

**This has been rectified.**

Figure 7: "yellow contours" should be "blue contours".

**This has been changed.**

Besides the specific comments and technique corrections above, one suggestion to the authors which might improve the paper: to add one schematic diagram at the conclusion section to summarize the mechanisms: the relationship between NAM-NAO-AMOC (time scale:  $\sim 20$  yrs ) as well as AMOC-Pacific deep convection(OLR)-QBO-NAM (time scale:  $\sim 90$  yrs).

**While we appreciate that this may aid in showing the pathways involved, the majority of the mechanisms proposed in the paper are well known and comprehensively studied (e.g. the HT link as well as the vortex-NAO connection) so providing a diagram showing them may be superfluous given their coverage in previous literature. Perhaps more importantly, the timescales involved in this study (mainly 30-, 50- and 90-year periods) may be model dependant and other studies utilising different model data may see variability on different characteristic timescales. As a result, labelling a schematic with the three timescales found here may also be misleading.**