

## Comment on acp-2021-688

Anonymous Referee #1

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Referee 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-RC1>, 2021

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This article analyzes the relationship of the long-term variabilities of stratospheric polar vortex and of the Atlantic circulation and explore the potential ocean-atmospheric interaction mechanisms for multiple-timescales.

I read this article with great interests and appreciate this work from following two reasons: 1) this work is quite complete, which not only points out the statistically significant correlations but also try to find out the possible mechanisms; 2) the statistical analysis is sufficiently convincing, in particular the use of wavelet analysis technique to explore the non-stationary variability. The organization of such a complicated and long article is not easy but the authors did very well. I recommend this article to publish only after addressing a few minor corrections.

- 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.
- 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'.
- Figure 4 caption, the second line: add "(green)" after NAO index and add "black" after "ocean-atmosphere heat flux".
- 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)".
- Figure 7: "yellow contours" should be "blue contours".
- 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: ~20 yrs ) as well as AMOC-Pacific deep convection(OLR)-QBO-NAM (time scale: ~90 yrs).