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Interactive comment on “Upper tropospheric water vapour variability at high latitudes – Part 1: Influence of the annular modes” by C. E. Sioris et al.

Anonymous Referee #1

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This manuscript examines the linkages between the annular mode variability and the variability of the water vapor in the upper troposphere and lower stratosphere (UTLS) high latitude. The results are based on satellite measurements from MAESTRO and ACE-FTS over the period 2004–2013.

In general, I found it difficult to follow the authors’ presentation, and I am not convinced of proposed mechanisms on the above linkages. I think the paper needs substantial improvements on the presentation before considered to be published. Publication in its current form is not acceptable.

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-The paper offers too many details on the satellite retrieval methodology (section 2.1 and 2.2). The description on the seasonal cycle of water vapor is also too long winded. The reader could easily lose track of what points matter and what don't. It is unclear to me what new insights are gained from these analyses.

-The authors tried to use the existing two mechanisms to explain the anti-correlation between water vapor at UTLS high latitudes and the AO/AO. But I found it hard time to follow the authors' argument based on Figs. 11 and 12. Also, no attempt is made to discuss the implication of the findings. The manuscript ends abruptly by pointing out that "longer datasets and further analysis would be helpful to understand the contribution by each proposed mechanism. "

-Many of the formulation of analysis method are too subjective and thus need to be further justification 1) P22300 Line10-15 I am not convinced of removing single particular month from calculating the climatology just because of the results of regression is improved by doing so.

2) P22301 line 10-15 I don't understand why an index plus a constant is needed for the regression analysis

3) P22301 line 20-25 What's the meaning of the correlation between averaged sample latitudes in the high latitudes and corresponding annular index?

4) P22308 section 4.1 I think ~ 10 years of data is too short to discuss the decadal trend.

5) The authors repeatedly emphasize the linear correlation is somewhat larger on seasonal time scale than that on monthly time scale. Since the degree of freedom is reduced based on the seasonal-mean data, how important or meaningful by comparing these two correlation coefficients?

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