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Comment on acp-2021-719

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Community comment on "Long Range Prediction and the Stratosphere" by Adam A. Scaife et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2021-719-CC1>, 2021

I would think that any long range prediction of the stratosphere would begin with the QBO, and even though the paper says "*... its regularity means that it can be predicted from simple composites of earlier cycles*", there remains no consensus on a first principles understanding of the underlying QBO synchronization mechanism. After the QBO disturbance of 2016 died down, it appears that the regularity of the previous cycles returned, indicating that the synchronization is externally applied and not a natural resonance (in the latter case, a phase shift would occur). So much like a storm surge will only generate a transient in a tidal analysis, the QBO is also likely synchronized to an external tidal forcing, only transiently perturbed by ENSO disturbances.

In the attached figure, the power spectrum of the QBO 30 hPa time series is shown. Spectral peaks are identified as below, aliased against a strong seasonal modulation.

- 1 = monthly Draconic tide
- 2 = monthly Tropical (18.6y modulation of Draconic)
- 3 = fortnightly Draconic (harmonic of #1)
- 4 = annual cycle
- 5 = semi-annual
- 6 = strong aliased harmonic of #1

#1 and #6 rising above the background is a strong substantiation. The basis of the underlying theory is described in the following cite:

Pukite, P., Coyne, D., & Challou, D. (2019). *Mathematical Geoenergy: Discovery, Depletion, and Renewal* (Vol. 241). John Wiley & Sons.