

## ***Interactive comment on “Multi-timescale variations of modelled stratospheric water vapor derived from three modern reanalysis products” by Mengchu Tao et al.***

### **Anonymous Referee #3**

Received and published: 18 March 2019

The paper presents an intercomparison of stratospheric water vapor as produced by the lagrangian transport model CLaMS driven by meteorological winds and temperature from three modern reanalyses. The results are compared with SWOOSH and MLS observations. In addition to comparing the magnitude of the entry values, which are dependent on the tropical tropopause temperature in each reanalysis, the annual cycle, QBO, ENSO and volcanic signals are compared, as well as the linear trends. The results are accurately presented and the paper is well written. I recommend publication after the following minor issues are corrected.

- Page 1 Line 15: cloud effect

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- Page 6 Line 19: here and in other parts of the paper: the QBO is not a periodic signal, please correct 'periodic' by 'quasi-periodic'.

- Section 2.3: The authors are confusing the SAO signal, which is present in the upper stratosphere, with a semi-annual harmonic component of the annual cycle. The terminology 'SAO' should only refer to the former.

- Page 7 Line 7: 'variation' should be 'variance'

- Page 11 Line 8: 'tropical tropopause temperatures': are these Lagrangian cold point temperatures? Please specify.

- Page 12 Line 17: In addition to tropical upwelling, Glanville and Birner (2017, ACP) argue that mixing effects could be important for the tape recorder. This relevant information could be included here, as it implies that not all differences in the tape recorder signal should be attributed to tropical upwelling.

- Page 14 Line 12: 'Although we use different methods to estimate the AC amplitude': Why are different methods used and which method is used here?

- Page 15 Line 5-6: can you point to specific 'small-scale processes that must be parameterized in the model'?

- Figures 8 and 10: I do not understand the meaning of the arrows, please explain more clearly.

- Page 16 Line 9: quasi-periodic

- Section 5 (Figure 10): it would be much easier for the reader if you describe the interpretation of the QBO phase representation in Fig. 10 here, instead of having to go back and look for the information.

- Figure 11 caption: Please remind the reader that these are values at 400 K.

- Page 20 Line 21: Why is the lag for the ENSO signal on H<sub>2</sub>O entry anomalies so

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long? One year seems an excessive time lag, since the signal in tropical upwelling maximizes only after a few months.

- Page 21 Line 5: since this result is not shown in Table I, I recommend adding '(not shown)'

- Page 25 Line 33: remove 'relatively'

- Page 27 Line 8: typo 'n ext'

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