

Dear Editor,

*We express our gratitude to the editor for their invaluable comments, Comments are reproduced below, followed by our responses in italics.*

L85: Reanalysis models -> reanalyses

*We have modified the text accordingly.*

L92 and 93: process -> processes

*We have modified the text accordingly.*

L94: Which reanalysis are you referring to here? Related on L97: how many reanalyses contribute to the stated range?

*The statement in line L94 related to Hu et al. (2016) refers to two reanalyses (MERRA and ERA-Interim).*

*The statement in line L97 related to Tegtmeier et al. (2020a) refers to five reanalyses (JRA-25, JRA-55, MERRA, MERRA-2, and CFSR).*

*We have added the number of data sets on both cases.*

L160: Student's t-test?

*Yes, Student's t-test. We have added the information.*

L242: Are you able to speculate on the drivers here? Any indications from literature?

*We have added the following text to the document.*

*The here found anticorrelations of the trend patterns resemble previously observed links between tropospheric and lower-stratospheric temperature anomalies, which have several possible theoretical explanations. On the one hand, cooling of the tropopause has been suggested to result either from convective overshooting of the level of neutral buoyancy (Kuang and Bretherton 2004) or the formation of convective cold tops via hydrostatic adjustment above tropospheric convective heating (Holloway and Neelin, 2007). Alternatively, theoretical evidence has suggested that tropospheric thermal forcing and thus generated tropopause geopotential anomalies can modulate stratospheric upwelling and temperature (Lin and Emanuel, 2024).*

L271: How would vertical resolution limitations cause shifted seasonality of trends?

*We find that the seasonal cycle of the water vapor trends shifts with altitude (see Figure 9b and d) and might therefore be impacted by the vertical resolution of the measurements and satellite instrument averaging kernels.*