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*Supplement of*

## **Quantifying contributions to the recent temperature variability in the tropical tropopause layer**

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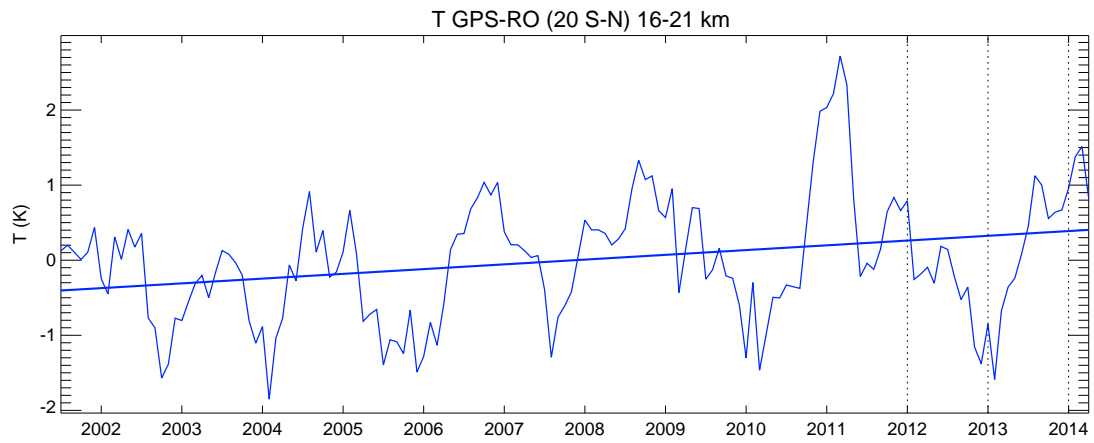


Figure S1: Deseasonalized time series of temperature anomalies from observations (GPS-RO data), averaged between  $20^{\circ}S$  and  $20^{\circ}N$  latitude and between 16 and 21 *km* height. This figure shows large interannual temperature fluctuations. From this time series alone, the future development of temperatures in the TTL is not clear (see also Fig. S3 for a longer time series. Vertical lines indicate different end dates for the trend estimates in Fig. S2.

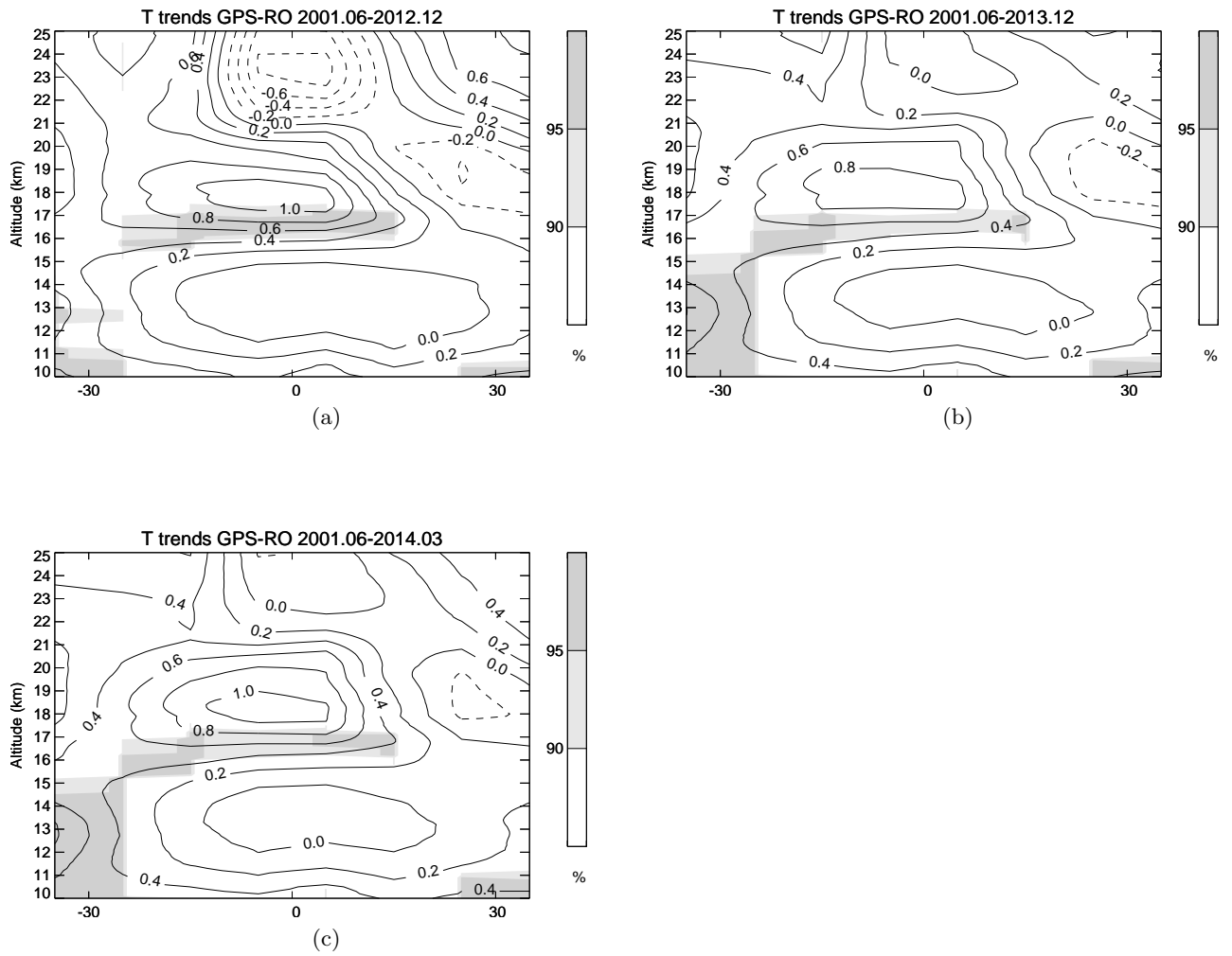


Figure S2: Same as in Fig. 2, but with different ending dates: (a) 31 December 2012; (b) 31 December 2013 and (c) 31 March 2014 (most recent data available). The trend calculations are sensitive to the ending date of the time series.

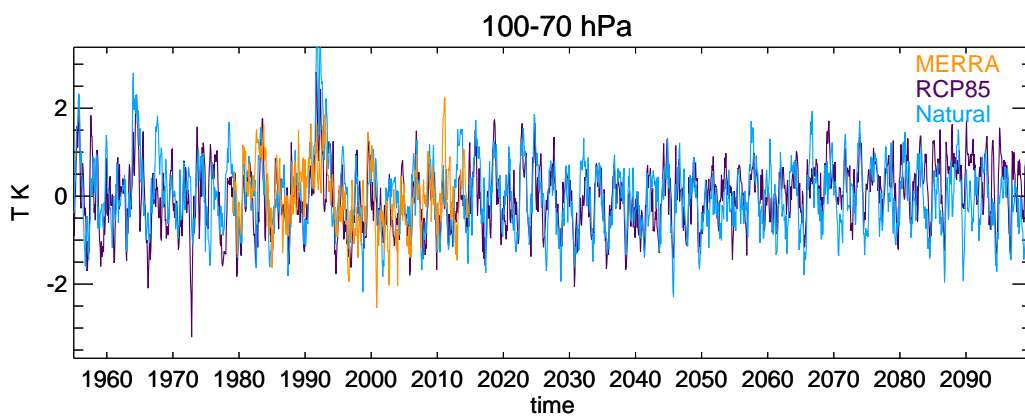


Figure S3: Deseasonalized time series of temperature anomalies from the Natural and RCP85 runs as well as the MERRA reanalysis data, averaged between  $20^{\circ}S$  and  $20^{\circ}N$  in latitude and between 100 and 70 *hPa*. Also over a longer time period than shown in Fig. S1, the TTL temperatures show large interannual variability from both model simulations and reanalysis data. The long-term temperature time series from the model simulations show a clear decadal to multidecadal signal.