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Temperature climatology and trend estimates in the UTLS region as observed over a southern subtropical site, Durban, South Africa

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Abstract. Temperature trends in the UTLS region are under-reported, particularly in the Southern Hemisphere, and yet temperature is one of the most important indicators of changes in dynamical and radiative processes in the atmosphere. Here radiosonde data from Durban, South Africa (30.0° S, 30.9° E) over the period 1980 to 2001 (22 years) between 250 and 20 hPa are used to derive a mean temperature climatology and to determine trends. The seasonal cycle at the 250-hPa level is anti-correlated with the seasonal cycles at the 150-hPa and 100-hPa heights. The 100-hPa level (local tropopause) exhibits a minimum temperature in late summer and a maximum in winter, and closely corresponds to previous results for tropical regions. Based on a Fourier analysis, both the annual cycle (AO) and the semi-annual cycle (SAO) are dominant, although the former is about 4 times stronger. The AO is strongest at the 100-hPa height. A trend analysis reveals a cooling trend at almost all heights in the UTLS region, with a maximum cooling rate of 1.09 ± 0.41 K per decade, at 70-hPa. Cooling rates are in good agreement with other studies and are slightly higher in summer than in winter.

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