

Tropical tropopause evolution and its influence on surface temperatures in a 1D RCE model

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There are discrepancies between models regarding tropopause evolution under climate change, with many different factors playing a role in this region. We use a 1D clear-sky radiative-convective equilibrium model to quantify how some of these factors affect the tropical tropopause layer (TTL) and whether changes in the TTL could influence surface climate. Shifting the ozone profile upwards leads to a strong cooling of the TTL, and produces a slight cooling at the surface, mostly through water vapour changes. Similarly, an increase in upwelling velocity of the Brewer-Dobson circulation produces a strong cooling at the TTL and reduces surface temperature. Changes in upwelling and ozone distribution can not be ignored when studying tropopause evolution and may also impact high cloud feedbacks and surface temperature.