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Influence of the stratospheric shrinkage on the detected CCM1 simulation trends

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There is a well-established observational evidence that the tropopause is shifting upward. More generally, warming of the troposphere is directly connected with a positive trend of geopotential of pressure levels in the troposphere, which reaches its maximum around the tropopause. In the stratosphere, the geopotential height trends are affected by the stratospheric cooling resulting in a gradual reduction of the upward shift and even its reversal in the upper stratosphere. That leads to a decreasing trend of the stratospheric thickness - a so-called stratospheric shrinkage. In GCMs, shrinkage is one of the strongest and most robust fingerprints of the changing climate. In this study, we investigate the question whether the shrinkage presents additional dynamical feedback influencing other detected trends in the middle atmosphere (besides the influence of vertical shift). Analyzing set of CCM1 models, we compute inter-model correlations of shrinkage with trends of various variables to separate the possible shrinkage effect, which is otherwise a non-local function of the temperature.