



Simulating the Past, Present and Future of the Upper Troposphere and Lower Stratosphere

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A comprehensive assessment of coupled chemistry climate model (CCM) performance in the upper troposphere and lower stratosphere has been conducted with 18 models. Both qualitative and quantitative comparisons of model representation of UTLS dynamical, radiative and chemical structure have been conducted, using a collection of quantitative grading techniques. The models are able to reproduce the observed climatology of dynamical, radiative and chemical structure in the tropical and extratropical UTLS, despite relatively coarse vertical and horizontal resolution. Diagnostics of the Tropical Tropopause Layer (TTL), Tropopause Inversion Layer (TIL) and Extratropical Transition Layer (ExTL) are analyzed. The results provide new insight into the key processes that govern the dynamics and transport in the tropics and extra-tropics. The presentation will explain how models are able to reproduce key features of the UTLS, what features they do not reproduce, and why. Model trends over the historical period are also assessed and interannual variability is included in the metrics. Finally, key trends in the UTLS for the future with a given halogen and greenhouse gas scenario are presented, indicating significant changes in tropopause height and temperature, as well as UTLS ozone concentrations in the 21st century due to climate change and ozone recovery.