

Contributions of different forcings to changes in stratospheric temperature and composition

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In this study we examine a new set of transient simulations over 1960-2100 with the Canadian Middle atmosphere Model (CMAM) for which the surface forcings of greenhouse gases (GHGs) and ozone depleting substances (ODSs) were applied separately. We considered the individual contributions of CO₂, CH₄, N₂O, and ODSs as a whole, and focus on analysis of past and future changes in stratospheric temperature and composition. While the contributions from CO₂ and ODS on temperature and ozone are known to be dominant, the impacts of increasing CH₄ and N₂O have important local or second-order effects. Comparison of these new results with attribution estimates achieved from Multiple Linear Regression (MLR) analysis of simulations including all forcings simultaneously enables us to evaluate the intrinsic limitations of MLR analysis for stratospheric attribution, estimate uncertainties and examine non-linear effects.