

Model calculations of the contribution of tropospheric SO₂ and DMS (dimethyl sulfide) to the stratospheric sulfur budget

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The tropospheric chemistry of SO₂ and DMS (dimethyl sulfide) and their transport to the stratosphere are investigated by running a chemical box model along trajectories ascending from the boundary layer to the tropopause. The trajectory model is based on the ATLAS model and is driven by ECMWF ERA-Interim data. Convective transport is simulated by a new scheme that randomly displaces air parcels vertically. The probability of displacement is derived from ERA-Interim convective entrainment rates, mass fluxes and detrainment rates. The chemistry model includes the gas phase reactions SO₂+OH and DMS+OH and the liquid phase reactions SO₂+H₂O₂ and SO₂+O₃ and uses background fields of OH, O₃ and H₂O₂ obtained from a GEOS-Chem CTM run.

Key words: Lagrangian model, sulfur dioxide, dimethyl sulfide, chemistry, convective transport