



Transport of very short-lived substances into the tropical upper troposphere and lower stratosphere: A modeling study

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The transport of very short-lived substances (VSLS) into the tropical upper troposphere and lower stratosphere (UTLS) is investigated by a three-dimensional chemical transport model using archived convective updraft mass fluxes from the European Centre for Medium-Range Weather Forecast's ERA-Interim reanalysis. Large-scale vertical velocities are calculated from diabatic heating rates. With this approach we explicitly model the large scale subsidence in the tropical troposphere with convection taking place in fast and isolated updraft events. The model calculations agree generally well with observations of bromoform and methyl iodide from aircraft campaigns and with ozone and water vapor from sonde and satellite observations. We furthermore analyze the long-term transport of VSLS into the UTLS and its dependencies on regional emissions and convective activity over the whole ERA-Interim period.