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Summary of the chemistry transport in deep convection cloud modelingworkshop intercomparison

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The cloud chemistry case of the 6th International Cloud Modeling Workshop investigated transport of ozone (O3), carbon monoxide (CO), NOx, nitric acid (HNO3), hydrogen peroxide (H2O2), and formaldehyde (CH2O) in deep convection as simulated by several cloud-scale chemistry models. The purpose of the intercomparison was to assess the capability of each model to transport chemical species from the boundary layer to the upper troposphere including the entrainment of free tropospheric air. Parameterizations of lightning-produced NOx and effects of microphysics on soluble species were investigated.

Seven models simulated the 10 July 1996 STERAO storm, which was observed in northeastern Colorado. Observations of CO, O3, and NOx in the anvil were compared to modeled mixing ratios of these species. Generally, the model results were in good agreement with each other and with the observations for CO and O3. Models that included the production of NOx by lightning were able to produce NOx mixing ratios of similar magnitude as observed values. Flux densities of air mass and CO calculated from the model results replicate analyzed fluxes from the observations to about $\pm$30% for air and $\pm$25% for CO.

A similar analysis is being performed on the soluble species, HNO3, H2O2, and CH2O. As part of documenting the variability among cloud-scale chemistry models, characteristics of the model results, including cloud area, cloud top, mass fluxes into the storm, into the upper troposphere, and onto the ground, and scavenging fraction of soluble species, are being archived.