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# Cloud-resolved simulations of lightning NOx in observed tropical thunderstorms

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Cloud chemistry simulations are being performed for convective storms observed during the TROCCINOX campaign in Brazil and the SCOUT-O3/ACTIVE campaigns in Darwin, Australia. Convective cells from the 4 February 2005 TROCCINOX "golden" tropical event have been simulated. November 2005 Hector events observed during SCOUT-O3/ACTIVE are also included in the analysis. The primary objective of these simulations is to estimate the average production of NO per lightning flash during the storms. The 2-D version of the Goddard Cumulus Ensemble model and the 3-D WRF-AqChem model are being used for these calculations. Observed soundings of temperature, water vapor and winds are used to initialize the models. Aircraft observations in air undisturbed by the storm are used to construct initial condition chemical profiles. Convective transport in the model is tested using tracer species such as CO and $O_3$. Lightning flashes observed by surface networks are input to the model and a lightning placement scheme is used to inject the resulting NO into the simulated cloud. Various scenarios of NO production per flash are used for cloud-to-ground and intracloud flashes in a series of simulations for each storm. Resulting $NO_x$ mixing ratios from each simulation are compared with anvil observations (from the Falcon, Geophysica, and Egrett aircraft) to determine the best fit with the mean $NO_x$ at anvil altitudes, the profile shape, and the frequency distribution of $NO_x$ values. We will compare the results for lightning NO production from these tropical thunderstorms with similar analyses conducted for several midlatitude and subtropical convective events.