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Cloud-resolved simulations of lightning NOx in an observed Hector thunderstorm

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Cloud chemistry simulations are being performed for a "Hector" storm observed on 16 November 2005 during the SCOUT-O3/ACTIVE campaigns based in Darwin, Australia. The primary objective of these simulations is to estimate the average production of NO per lightning flash during the storm. The 3-D WRF-AqChem model is being used for these calculations. This modeling package contains the WRF nonhydrostatic cloud-resolving model, online gas- and aqueous-phase chemistry, and a lightning algorithm (Barth et al., 2007). Early morning soundings of temperature, water vapor and winds are used to initialize the model. Surface heating of the Tiwi Islands is simulated in the model to induce convection. Observations from the Egrett, Falcon, Geophysica, and Dornier aircraft in air undisturbed by the storm are used to construct composite initial condition chemical profiles. Convective transport in the model is tested using tracer species such as CO and O_3. Lightning flashes observed by the LINET network 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 the storm. Resulting NO_x mixing ratios from each simulation are compared with upper tropospheric anvil observations (from the Geophysica and Egrett aircraft) to determine the best fit with the mean NO_x at anvil altitudes, the profile shape, and the frequency distribu-

tion of NO_x values. We will compare the results for lightning NO production from this tropical thunderstorm with similar analyses conducted for several midlatitude and subtropical convective events.