



Measurements within the Anvil Outflow from Tropical Convection

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The EMERALD-2 airborne measurement campaign was conducted from Darwin Australia to observe the influence of tropical convection on the composition and dynamics of the upper troposphere. Two aircraft were involved. The Egrett provided in situ sampling of clouds, water vapour, dynamics, and ozone. A King Air flew directly below with an upward viewing lidar to map the cloud structure and guide the Egrett. Results will be presented that show the microphysical structure of the outflow cirrus and the distribution of humidity and ozone. It was found that the outflow originating from the core of the convection contained air that was extremely supersaturated with respect to ice and yet there were mainly only ice crystals larger than 100 microns in length. This is interpreted as a result of there being very few aerosol particles available for heterogeneous or homogeneous nucleation in the direct storm outflow. It was also found that this air contained ozone concentrations of greater than 60 ppb and up to 120 ppb, while in the surrounding region the ozone concentration was around 30 ppb. The enhanced ozone was distributed continuously throughout the outflow and did not occur in spikes that have previously been attributed to inlet charging effects. This result may indicate that lightning is a direct and substantial source of ozone in the upper troposphere.