

## Using ATTREX Data to Improve the Representation of TTL Cirrus in CAM5

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We use data from the Airborne Tropical Tropopause Experiment (ATTREX) to improve the representation of cirrus clouds in the tropical tropopause layer (TTL) in the Community Atmosphere Model version 5 (CAM5). We simulate all of the ATTREX flights and compare the results along the flight paths to the observations of temperature (MMS), water vapor (NOAA Water and DLH), ice water content (NOAA Water, FCDP, and Hawkeye), ice particle size distributions (FCDP and Hawkeye), and cloud fraction (NOAA Water, FCDP, Hawkeye, and CPL). We find important differences between the model and the observations in temperature, relative humidity, cloud fraction, cloud ice water content and cloud ice particle number density. Some of these differences are due to model parameterizations, and some are due to biases in the temperature fields used to drive the model. We will show how adjustments to correct the temperature biases and changes to the cloud parameterizations in CAM5 result in improved comparisons with the data and affect the simulated TTL cirrus and their heating rates.