

Microphysical Properties of TTL Cirrus

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Cirrus systems near the Tropical Tropopause Layer (TTL) were sampled during NASA Global Hawk flights from California to the tropics in 2011, 2013, and 2015, and from Guam in the western Pacific in 2014 during the Airborne Tropical TRopopause Experiment (ATTREX). In situ aircraft measurements made by a Fast Cloud Droplet Probe (FCDP) and Hawkeye probe onboard the aircraft provide particle concentrations and sizing between 1 and 1280 μm as well as particle images for ice habit identification. The Hawkeye is a combination cloud droplet probe, 2-D stereo optical array probe with 10 μm resolution channels, and a high-resolution cloud particle imager. The FCDP was present in the first three years, and the Hawkeye was a new addition to the flights in 2014 and 2015. We present the variability in ice concentrations, particle size distributions and in particle habit as a function of temperature, supersaturation with respect to ice, and cirrus type. Supporting measurements made by a NOAA instrument onboard the aircraft, which measures both water vapor and total water, as well as pressure and temperature measurements made by MMS, are used to derive estimates of the supersaturation with respect to ice, which demonstrates good correlation with cloud particle observations made by the FCDP and Hawkeye.