

Small Scale Motions Observed by Aircraft in the Tropical Tropopause Layer --
Convective and Non-Convective Environments

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Indirect evidence indicates a role for vertical mixing in the Tropical Tropopause Layer (TTL).

In particular, detailed model studies suggest that such vertical mixing may be required to explain the value of the water vapor minimum in the TTL. There have been previous observations

during the STEP Tropical aircraft campaign (1987) of bursts of high frequency activity associated with convectively generated gravity waves in the tropical western Pacific.

Higher frequency, higher quality measurements from NASA high altitude aircraft (ER-2, WB-57, and Global Hawk) have been made available in the last 20 years. These include measurements of

vertical velocity and other meteorological parameters. Most recently, during the ATTREX Global

Hawk aircraft mission (Airborne Tropical Tropopause Experiment), there have been extensive

measurements at all altitudes of the TTL in both convective (winter western Pacific) and

less convective (winter eastern Pacific) regions.

This presentation represents an initial analysis of high frequency small scale (a few km max)

meteorological measurements from the ATTREX dataset. We obtain some basic information about the

distribution and character of high frequency activity in vertical velocity in the TTL.

In particular, we focus on relating the high frequency activity to nearby tropical convection

and to vertical shears associated with gravity and inertia-gravity waves.