



## **Water and relative humidity in the TTL**

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Total water was measured onboard the Geophysica high-altitude aircraft using the Jülich fluorescence hygrometer FISH at different tropical regions: Over the Indian Ocean during APE-THESEO in February-March 1999, over Southern Brazil during TROCCINOX in January-February 2005, in the Northern Australian region during SCOUT-O3 in November-December 2005, and over West Africa during AMMA in August 2006. Vertical profiles of water from these maritime and continental tropical sites obtained in different seasons are compared.

Below the 420 K isentrope, local phenomena control the water concentration and lead to a highly variable distribution and RH<sub>i</sub>, for a single campaign as well as for the mean profiles of the individual experiments. The cold point temperatures and minimum H<sub>2</sub>O abundances were lowest during SCOUT-O3 and APE-THESEO 1999 with minimum mixing ratios of 1.5 ppmv. During TROCCINOX and SCOUT-O3, deep convection penetrating the tropopause was observed, injecting ice and humidity into the TTL and up to 420 K. Long-range advection of and mixing with extratropical air can be identified in specific events during TROCCINOX and AMMA, resulting in a highly variable H<sub>2</sub>O distribution around the tropopause.

A potential temperature of 415-420 K seems to be the transition from local control to zonally mixed regime, where the tape recorder signal becomes detectable in our data.