



## **Airborne observations of methane, ozone, water vapour and temperature over tropical Central America in early 2004**

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High resolution (1 Hz at true air speeds near  $200 \text{ m s}^{-1}$ ) observations of methane, ozone, water vapour and temperature taken between the surface and 18 km from the WB57F aircraft near San Jose, Costa Rica ( $10^{\circ}\text{N}$ ,  $84^{\circ}\text{W}$ ) are used to examine processes influencing the maintenance of the profiles. There was a clearly defined thermal tropopause on each of the eight profiles, marked by structure on methane-ozone scatter plots. There was a well-defined decrease in methane mixing ratio between 13 and 15 km in each profile, well beneath the thermal tropopause, correlated with sharp changes in water vapour and equivalent potential temperature. The water vapour was never saturated at its minimum value, although apparent supersaturation with respect to ice was observed in vertically extensive layers with tops some 200 - 300 metres below on all profiles, with two profiles also exhibiting apparent supersaturation above, near 18 km. We examine dehydration, appearing to be a 4-stage process in which water vapour was lowered from 10 ppmv to 3 ppmv, consider the role of solar evaporation of ice particles and correlate features separating near-adiabatic layers above 150 hPa pressure altitude with local sea surface temperatures.