

PAN Measurements Across the Tropopause

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PANTHER (PAN and other Trace Hydrohalocarbons ExpeRiment) is an airborne 6-channel Gas Chromatograph that measures approximately 20 important atmospheric trace gases whose changing burdens impact air quality, climate change and stratospheric-tropospheric ozone. We have acquired data in the tropics, the mid-latitudes, the high-latitudes and the isolated northern vortex. Our current scientific goals include the validation of trace gases measurements by the Aura satellite and the use of tracer data to diagnose key atmospheric transport processes such as the dynamical couplings between the lower stratosphere (LS), the upper troposphere (UT) and the Tropical Tropopause Layer (TTL). Of particular interest are some of the recently added molecules that include CH₃Br, CH₃I, CH₃Cl, COS, CS₂ and HFC-134a measured by the mass spectrometer channel, and peroxyacetyl nitrate (PAN) that is measured by an electron capture detector. Many of these molecules have tropospheric gradients that are sensitive to convective transport and have the ability to distinguish between land and marine source and sink regions. PAN may represent a missing source of nitrogen for the NO_x chemical cycle in the UT and LS. PAN may also be a unique tracer for convective transport studies because of its rapidly changing lifetime with altitude and a relatively large, if not stable, boundary layer value. PAN levels of 10's of ppt were measured in the UT/LS regions. Potential instrumentation loss and contamination at these low levels is under current investigation.

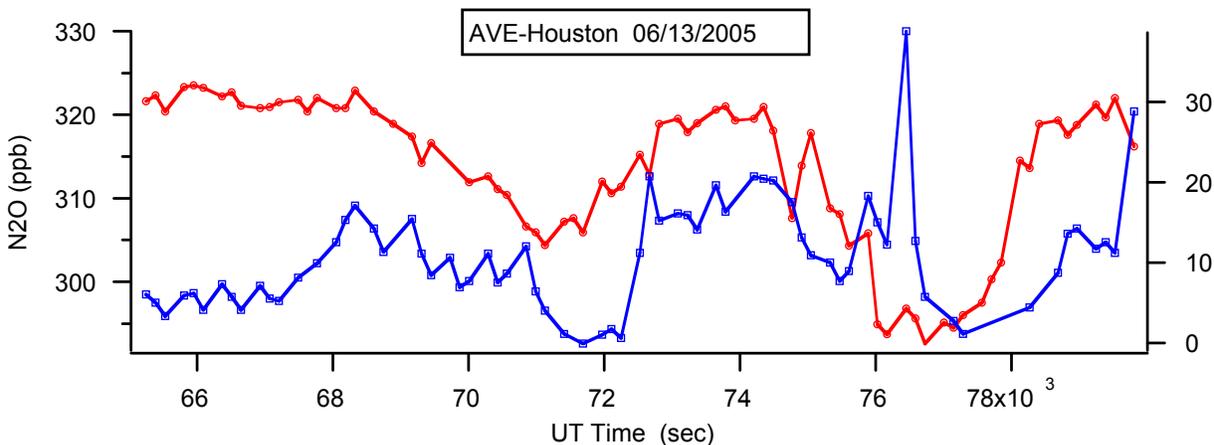


Figure 1. In this flight over the continental US, PAN data in blue is shown to increase slightly on ascent through the tropopause and then approach zero as the WB-57 aircraft climbs to a maximum altitude of 18 km. N₂O values below 320 ppb indicate stratospheric air.