

**Aura Validation Experiment
Science Flight #2 Summary Report
October 31, 2004**

Flight Objective:

Provide remote sensing observations over TES “step & stare” observational points, in a latitudinal profile from the Yucatan peninsula to U.S. over the Gulf. TES observational points are 5x8 km fields of view that are spaced every 31 km directly along flight track.

Flight Summary:

This flight focused on validation of the Thermal Emission Spectrometer (TES) instrument. TES measures tropospheric ozone and a number of ozone precursors such as CO, CH₄, and HNO₃ that are measured on the WB-57F.

The aircraft took off just after 11:00 am CST (17:04 UTC), heading east to intercept the Aura ground track (near the Louisiana-Mississippi border), and then south (at 59 kft) across the Gulf of Mexico. At the time of the Aura overpass at 19:18 UTC, the plane was headed back north after turning near the Yucatan Peninsula at 19:00. Following the Aura overpass, the aircraft executed both a spiral down (to 25 kft) and a spiral up. The maximum altitude for the flight, 61 kft, was reached at 19:06 UTC. The aircraft returned to Ellington Field at 22:22 UTC.

The weather over the flight track was very close to that predicted, with large cloud-free areas and some areas of low (below 5 kft) scattered clouds (see Figures 2-4). Preliminary analyses indicate that all instruments worked for most of the flight. Accordingly, we expect that this flight will result in valuable comparisons between TES, OMI, and the aircraft instruments.

Weather information is available in Figures 2-4.

Flight Profile (see Figure 1)

Takeoff: 11:04 CST
Landing: 16:11 CST
Duration: 5.4 hrs

Point A: N29° 51.6' W89° 15.0'
Point B: N22° 01.8' W87° 19.2'
Point C: N25° 02.4' W88° 02.4'

Aircrew: Andrew Roberts, Pilot, and Brian Barnett, Backseater

WB-57 Flight of 2004-10-31

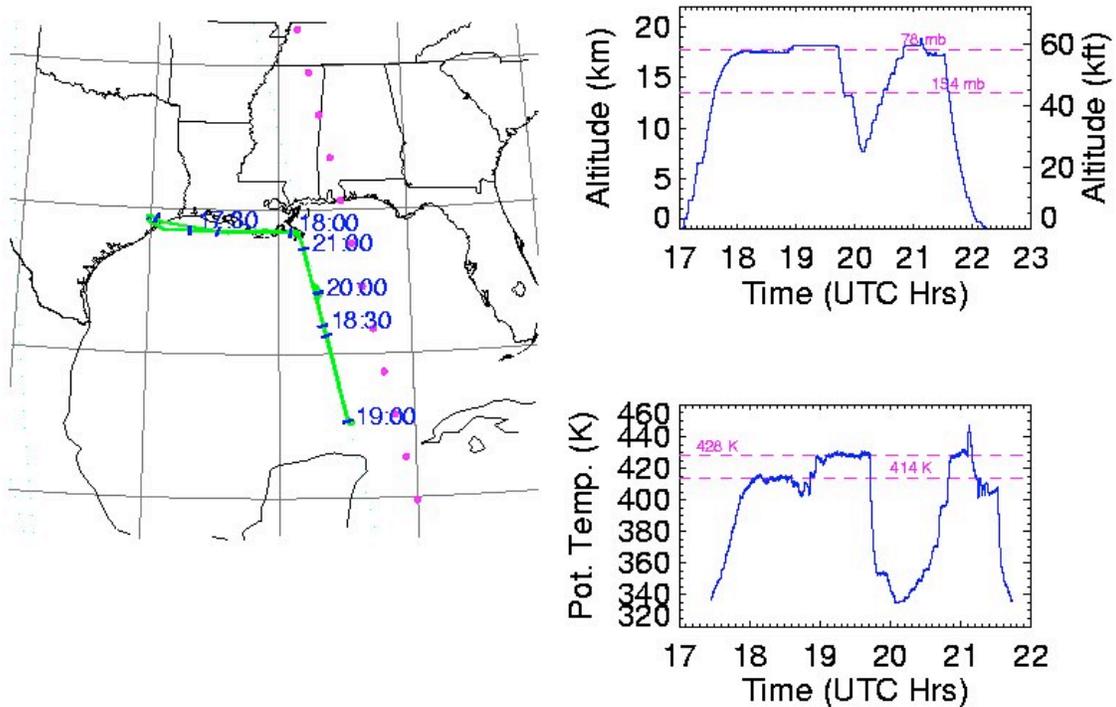


Figure 1 – Flight Profile

(Left) Map of WB-57F flight track (in green) with every half-hour marked. Aura nadir (faint cyan points) and MLS tracks (magenta points) are indicated.

(Upper Right) Plot of pressure altitude vs. time with the principal pressure levels of the flight marked.

(Lower Right) Plot of potential temperature vs. time with the principal theta levels of the flight marked.

18 UTC on 31 October, 2004 at 154.0 mb

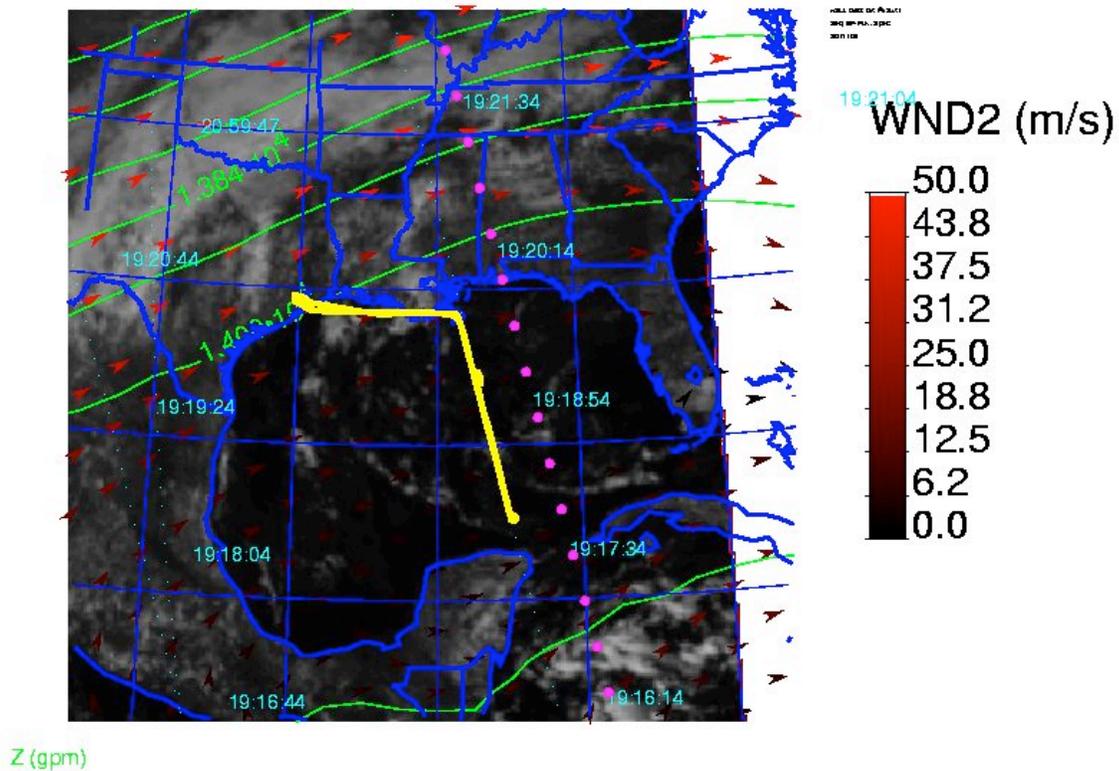


Figure 2 – GOES Visible Image

Flight track (yellow line) superimposed on meteorological fields. The grayscale image is the GOES-12 visible channel satellite image. The red arrows and green lines are the winds (WND2) and the geopotential heights (Z) at the principal pressure level at which the aircraft spent the most time. Values are from the GSFC GMAO assimilation analyses. The Aura nadir (cyan) and MLS tracks (magenta) are shown, with times along the ground track indicated.

18 UTC on 31 October, 2004 at -89.3 Longitude

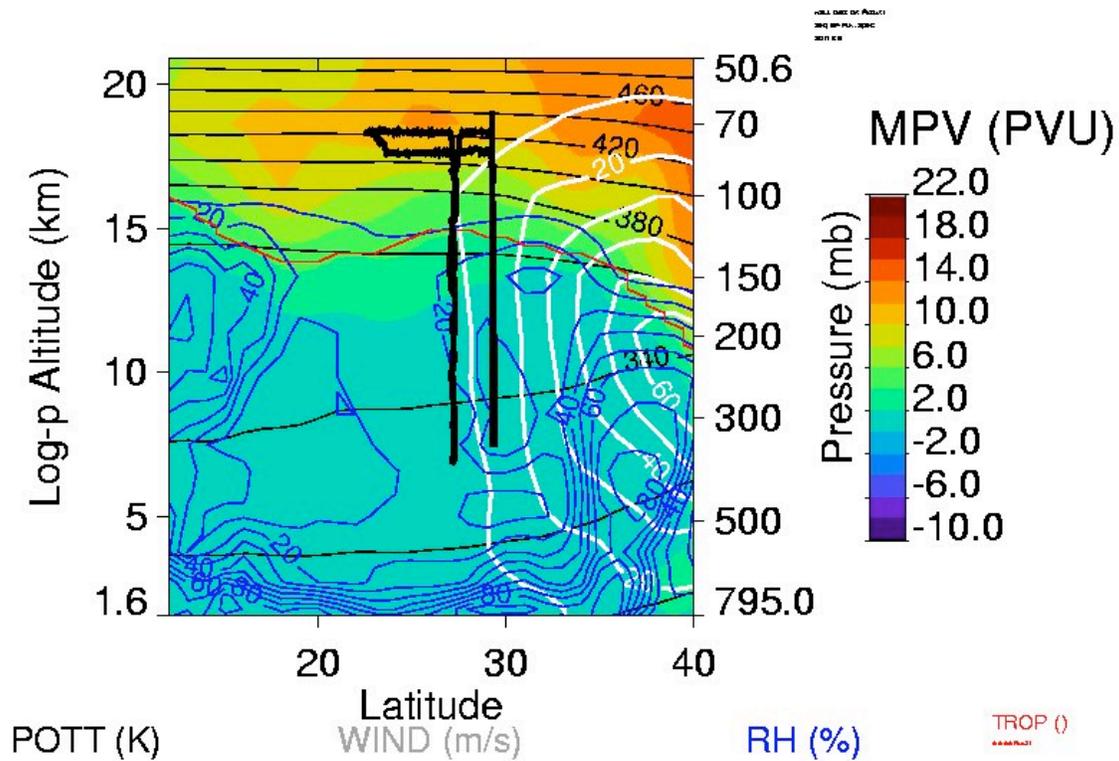


Figure 3 – Latitude Height Cross Section

Latitude-pressure cross-section of meteorological fields during the flight. The colored image represents modified potential vorticity (MPV); also shown are potential temperature (POTT) (thin black lines), wind speed (WIND) (white lines), relative humidity (RH) (blue lines), and the PV tropopause (TROP) (red line). The thick black lines mark the aircraft position and the vertical lines mark the positions of nearby MLS profiles.

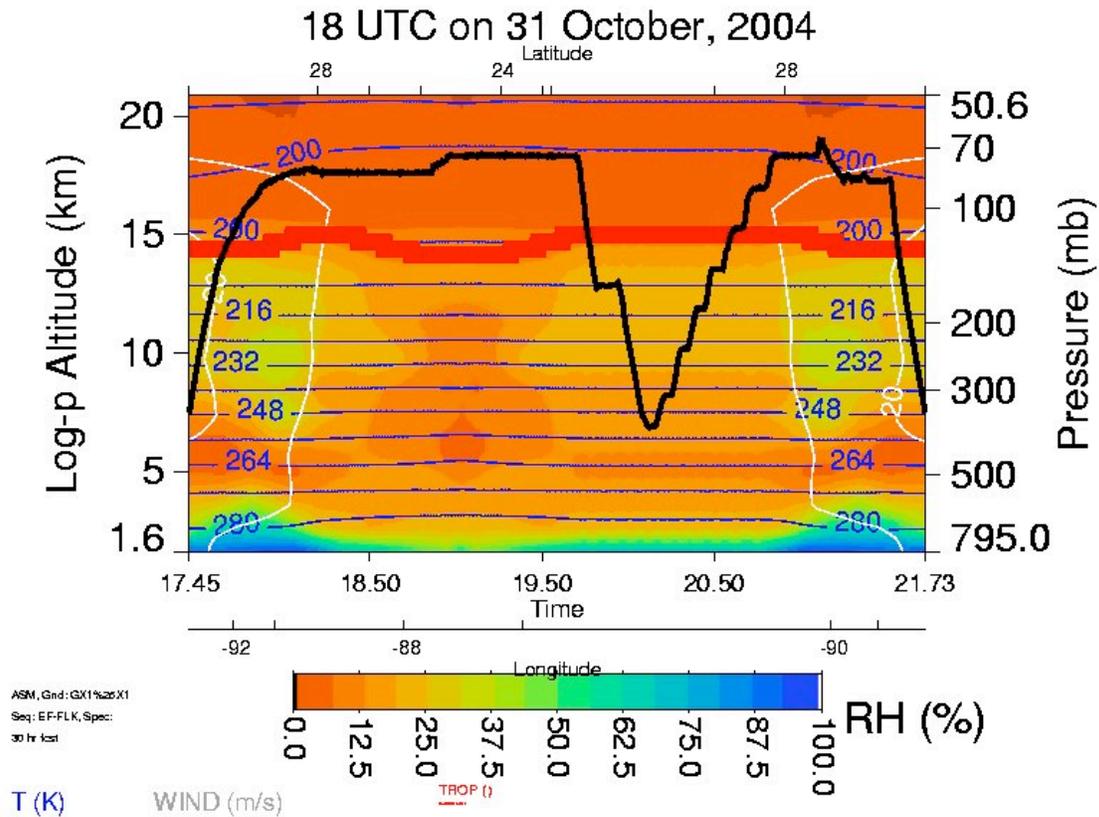


Figure 4 – Curtain Plot

Time-pressure "curtain" plot of meteorological vertical profiles along the flight track. The colored image represents relative humidity; also shown are temperature (T) (blue lines), wind speed (WIND) (white lines), and the PV tropopause (TROP) (red line). The thick black lines mark the aircraft position and the vertical lines mark the positions of nearby MLS profiles.