

**Aura Validation Experiment
Science Flight #1 Summary Report
October 29, 2004**

Flight Objective:

Microwave Limb Sounder (MLS) Validation Flight

Flight Summary:

This flight focused on validation of the Aura Microwave Limb Sounder (MLS) instrument. MLS measures a range of trace gases that also are measured on the WB-57F, *e.g.*, ozone, H₂O, HNO₃, HCl, N₂O, and CO.

The aircraft flight track, following the satellite track, was east of Houston and extended from southern Louisiana to Central Missouri (see Figure 1). The flight track included several legs at 58 kft and 37 kft that were connected by rapid ascents and descents, creating a crenellation effect in the flight profile. The WB-57 was at an altitude of 47 kft at the time of the Aura overpass (approximately 1934 UT). Near the northern end of the track, a spiral pattern was used during the ascent. The flight track was flown as planned with good cooperation from air traffic control for the low-altitude track.

Most instruments collected some data on the flight. Data for ozone, H₂O, HNO₃, and HCl will be available along the entire track for comparison to MLS retrievals.

Weather information is available in Figures 2-4.

Flight Profile (see Figure 1)

Takeoff: 11:53 CDT
Landing: 17:10 CDT
Duration: 5.4 hrs

Point A: N29.60° W95.16°
Point B: N32.62° W91.42°
Point C: N35.58° W92.25°
Point D: N38.53° W93.12°

Aircrew: Bill Ehrenstrom, Pilot, and Brian Barnett, Backseater

WB-57 Flight of 2004-10-29

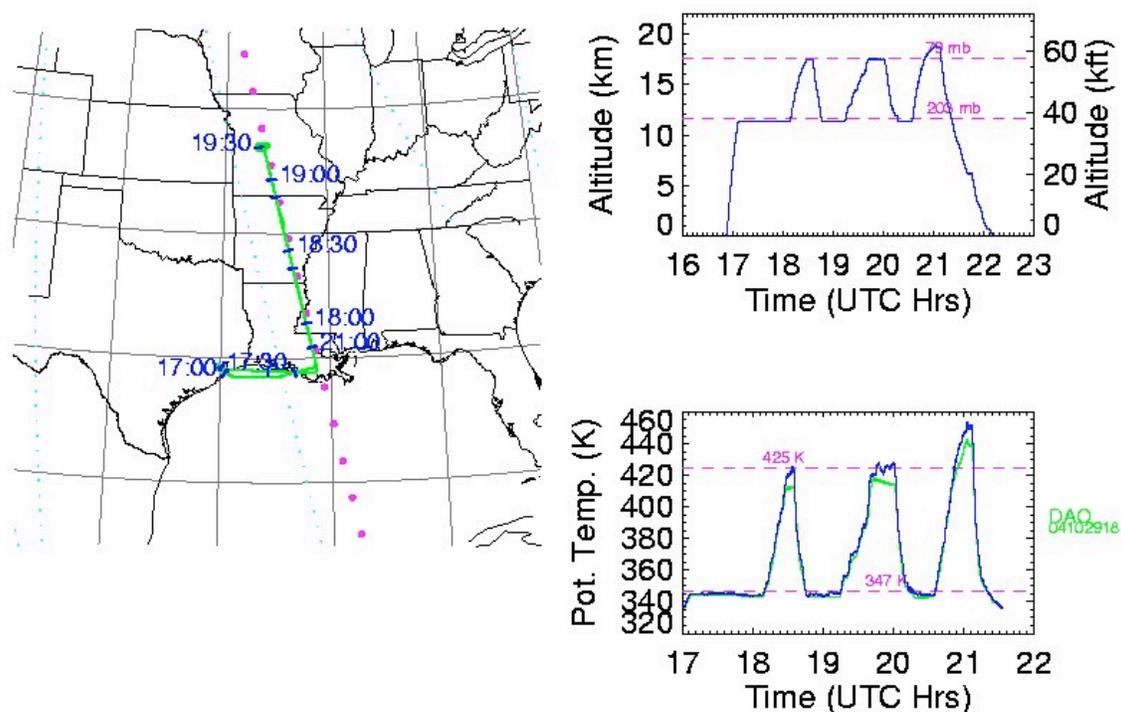


Figure 1 – Flight Profile

(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 29 October, 2004 at 203.0 mb

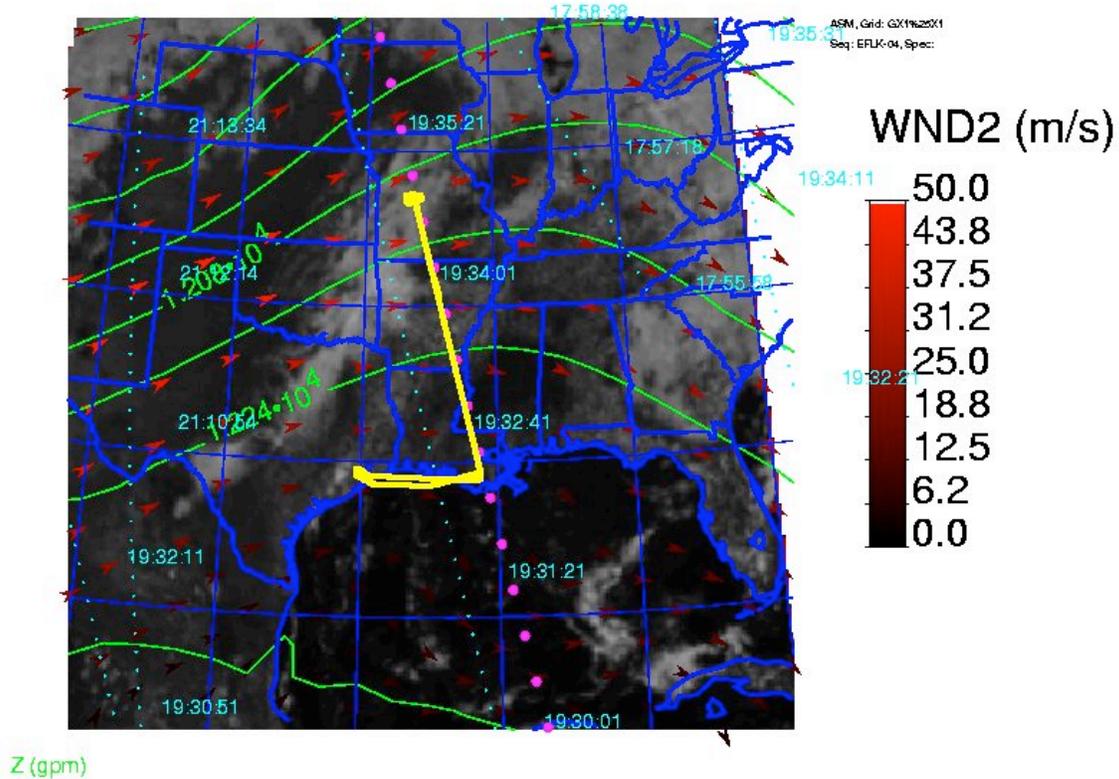


Figure 2 – GOES Visible Image

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 29 October, 2004 at -92.1 Longitude

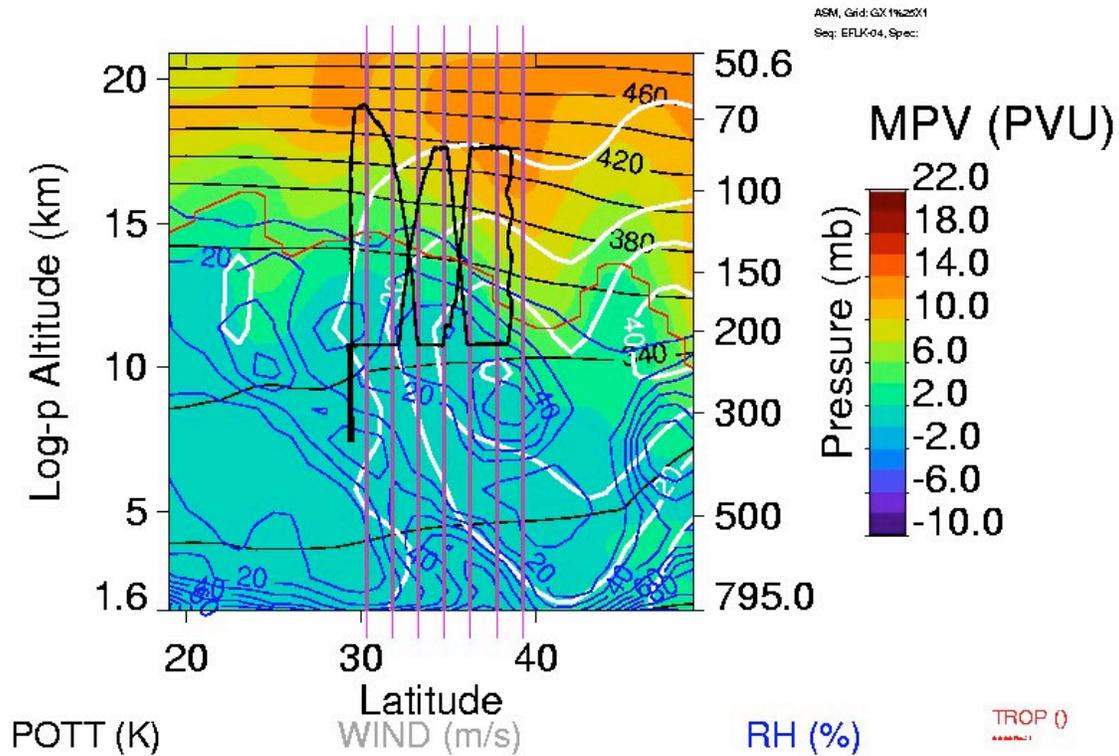


Figure 3 – Latitude Height Cross Section

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.

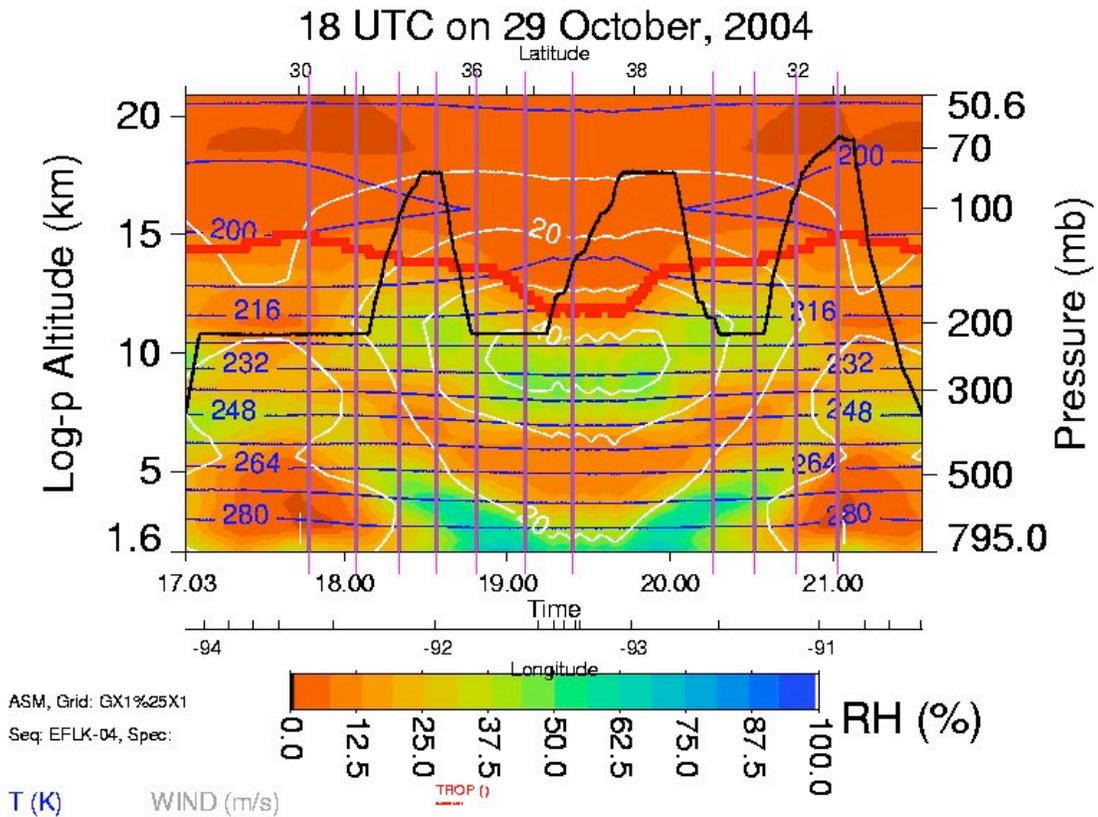


Figure 4 – Curtain Plot

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.