9 July 2002 Mission Report

Summary:

The high-fliers were sent on a mission to the south to sample the tropical tropopause layer. The ER-2, WB-57F, and Citation coordinated with the Terra overpass at 1228, flying along the satellite ground track for about 20 minutes. Then the high-fliers headed south to just east of Nicaragua (about 12.5˚N). Along the way, the WB-57F flew through thin cirrus near the temperature minimum at about 49 to 53 kft. They also spent about 30 minutes in the tops of the thick cirrus just below the tropopause (at about 47 to 48 kft). The ER-2 stayed along the same flight track above the WB-57F, with no more than a few minutes' time separation. These flights should provide unique information about the microphysical, radiative, and structural properties of thin cirrus near the tropopause and the tops of high cirrus anvils, as well as tracer measurements in the tropopause layer.

Meanwhile, back in south FL, the Citation was dispatched to sample mid-level clouds and cirrus over the ground sites. Flight legs at 17 to 21 kft were flown in layered clouds over the eastern site, and then both mixed-phase clouds at 15 to 21 kft and cirrus at 31 to 36 kft were sampled over the western site. The Proteus joined the Citation for coordinated legs over the western site. This data should be very useful for validation of the ground-based remote-sensing data.

Forecast:

Tropopause altitudes range from about 47 kft at Key West to 51 kft at around 10˚N. The winds at the WB-57F flight level south of Cuba are primarily westerly, so there is potential for cirrus blow-off or outflow from convection over Central America. The lowest tropopause temperatures expected are about 198 K.

Back in the southern FL region, there is considerable maritime convection all around the peninsula. Cirrus over one or both of the ground sites is likely, but the location and timing are unknown. Winds aloft are westerly to northwesterly.

Approximate flight times:

	Takeoff	Landing
ER-2	1115	1745
Proteus	1050	1800
WB-57F	1130	1730
Citation	1400	1745
Twin Otter	0830, 1300	1200, 1645

Report:

All five aircraft took off roughly on schedule, and the high-fliers did the Terra underflight leg nearly simultaneously. Then the ER-2 and the WB-57F continued south along identical tracks, with no more than a few minutes' temporal separation.

The WB-57F stayed within about 2 kft of the tropopause on the way south. They overflew an extensive cirrus shield with an optically thin layer above the cirrus deck. They attempted to porpoise within this thin cirrus layer near the tropopause and, at times, they appeared to be flying in diffuse, patchy cirrus.

Near the south end of the track, the WB-57F ascended to 58 kft. After turning around, they descended to within the tops of the optically thick cirrus deck and sampled the cloud-top region for about 30 min. For the remainder of the trip back north, they slowly ascended and descended within the tropopause layer.

Meanwhile, back in south FL, the Citation sampled mid-level clouds and cirrus over the ground sites. Flight legs at 17 to 21 kft were flown in layered clouds over the eastern site, and then both mixed-phase clouds at 15 to 21 kft and cirrus at 31 to 36 kft were sampled over the western site. The Proteus joined the Citation for coordinated legs over the western site. This data should be very useful for validation and calibration of the ground-based and airborne remote sensing data.