

7 July 2002 Mission Report

Summary:

This was a successful cirrus-anvil-sampling flight. All aircraft took off as planned, but the P-3 had to return to base due to a landing-gear-indicator problem. As the aircraft approached the western ground site, strong Cbs started popping up progressively in the center and west of the FL peninsula. The ER-2 and Proteus flew over both convective cores and cirrus anvils. The team at the N-POL radar did an excellent job of directing the WB-57F and Citation into outflow anvils along and off the west coast. On their first flight, the Twin Otter sampled the lower atmosphere environment as well as small cumulus clouds. On their second flight,, they flew under anvils along the west coast.

Forecast:

The wind pattern is expected to shift, giving us light, northeasterly winds aloft at 10 to 15 knts over the peninsula. Surface winds should be southeasterly. Forecasts call for mid-afternoon convection along the west coast and interior. The local conditions at KW should be improved (compared to the intense 6 July thunderstorms) if the disturbance moves south. Tropopause at ~47 kft. The 0900 UT PARSL sonde confirms easterly winds aloft at 10 to 15 knts.

Plan:

Begin with ER-2 and Proteus doing a racetrack pattern parallel to the west coast, with the western leg over the western ground site. As anvils develop and advect to the west, shift the racetrack legs downwind to map out the anvil. The WB-57F will fly an s-pattern, with cross-wind legs moving from the outer edge of the anvil toward the convection as far as safety permits. This pattern will be repeated at multiple height levels. The Citation will sample lower levels in the anvil using crosswind legs below the WB-57F. The Twin Otter will sample the boundary layer and lower troposphere in the center of FL, and will sample small cumulus on its first flight. It will fly along the ER-2 legs under the anvils on the second flight.

Flight times:

	Takeoff	Landing
ER-2	1200	1830
Proteus	1130	1800
WB-57F	1300	1800
Citation	1400	1745
Twin Otter	0830, 1300	1200, 1645

Report:

All six aircraft took off roughly on schedule, but the P-3 was forced to return after about 45 minutes due to a landing-gear-indicator failure.

Early in the afternoon, strong Cbs started popping up, first just east of central FL, and then along the west coast. These convective systems generated anvils that spread to the west and, eventually, off the coast. As the afternoon wore on, these anvils merged into a large cirrus shield extending about 100 km off the coast, from north of Naples to the southern tip of the peninsula. Cloud tops ranged from about 30 kft to 48 kft. Intermittent embedded convection persisted, with tops over 51 kft.

The Proteus and ER-2 initially flew a racetrack pattern, with the western leg over the western ground site as planned. Then they were directed to shift 14 miles downwind such that their eastern leg was over the western ground site. As the anvils advected off the coast, they shifted downwind twice more. At the end of its flight, the ER-2 flew over the western ground site and then flew a southwest leg over the anvil. The ER-2 dropped its first sonde off the west coast before beginning the racetrack pattern, then dropped the remaining five through the anvils off the west coast.

The WB-57F flew a very complicated pattern in the cirrus off the west coast, with legs in multiple directions and altitudes ranging from 37 to 52 kft. The pilots reported spending roughly half of their time on-station in the cirrus anvils; much of the cirrus was optically thick. The WB-57F measurements should provide considerable information about the anvil microphysical properties.

The Citation flew legs in the anvils off the west coast at heights ranging from 27 to 35 kft, and spiraled through the cirrus over the water. Ice-water contents were very high. Their options for choosing flight paths and flight levels were severely limited by ATC due to heavy air traffic. Extremely large ice-water contents were measured in the anvils.

The Twin Otter flew the first flight as planned, including a spiral west of the western ground site, and E-W legs across the peninsula west of Naples at multiple levels. They refueled at Naples, and then flew legs at 11.5 kft off the west coast under the ER-2 flight track for radiation measurements.