

16 July 2002 Mission Report

Summary:

A relatively isolated convection system and its persistent anvil were sampled extensively on this flight. This case should be useful for modeling studies. Sea-breeze convection kicked off on the east peninsula around 1600Z and developed a fast-moving anvil that traversed west rapidly over the western ground site by around 1830Z. Afternoon isolated Cbs in south central Florida began around 1930Z. A cirrus deck developed and moved west, and was sampled extensively by the WB-57F and Citation. The P-3 made measurements of the same line as the other planes on the south side of the convective activity.

Forecast:

Convection should develop mid-afternoon along a synoptic-scale band of enhanced low-level moisture convergence extending southwestward from the disturbance in the Atlantic and across Florida. This convergence band is evident in a plethora of cumulus lines and has been a persistent feature of the regional situation since very early yesterday morning. Thus, like yesterday, there should be a tendency for cells to develop parallel to this band, and propagate southwestward across the southern Florida peninsula. Overall, however, the lower atmosphere is wetter than yesterday, so multiple lines from southeast to northwest are expected to develop, as opposed to the single line of yesterday.

Aircraft Reports:

Twin Otter

The flight was shortened due to the oil door on the left engine opening in-flight. Take-off occurred at 1752Z. The aircraft flew at 5 kft to Everglades, descended to 100 ft, vertical and spiraled up to 10 kft. It then descended below the cloud base and flew to the western ground site before the problem with oil door occurred. At that point, the Twin Otter returned to KWNAF, and landed at 2008Z.

WB-57F

The aircraft took off around 1810Z, flew out west of the peninsula, and then performed a west-to-east transect across the south Florida peninsula. On take-off, the pilot had difficulty achieving the desired altitude rapidly because they were behind Proteus (which cannot ascend as quickly as the WB-57F). The aircraft got to 51 kft by the time they reached the easternmost point; the pilot and backseater reported seeing no clouds on the way out. They performed a spiral descent to approximately 49 kft and began to see clouds. They continued the descent to 40 kft and saw cirrus, below which they sampled at 39 kft. The pilot and backseater saw the aircraft's own contrail throughout this leg. There was pretty thick cirrus throughout flight between 39 kft and 44 kft. The flight crew

described flying through multiple cloud layers. They performed a spiral ascent west of the Florida peninsula up to 51 kft, popped out of the clouds at 50.5 kft, and landed KWNAF at about 2258Z.

The aircraft flew through high total-water contents in relatively low cirrus, with some instruments experiencing difficulty as a result. The CAPS instrument showed symmetries in number and volume concentrations flying in and out of clouds at different altitudes, implying vertical homogeneity in sampled clouds. High ice-water content and number density were observed.

Proteus

The aircraft returned to base early because of a failure getting power to the FIRSC instrument. A concern about potential damage to the unheated instrument prompted an early return in order to prevent freezing the instrument.

ER-2

The aircraft flew a more-or-less east-west line over the peninsula between the ground sites at 65 kft. The first sonde was dropped east of the peninsula; the remaining three sondes were dropped later west of the peninsula. The pilot noted that clouds were observed to slope upwards rapidly from low levels over Miami to approximately 50 kft feet further west.

Citation

The aircraft launched at 1837Z and headed toward the western ground site. An orphan anvil base was visible at 27 kft. The flight crew performed a Lagrangian spiral up southwest of the western ground site to 33 kft through the anvil, down to 27 kft, and then back up to 34.5 kft. They estimated the cloud tops to be at 49 kft. They then flew a more-or-less W-E line along the winds carrying the anvils, sampling at various levels. The CPI and 2DC instruments retrieved a lot of good crystal imagery. The aircraft returned to KWNAF at 2253Z.

P-3

The aircraft took off at 1500Z, and flew roughly the same line under anvils on the south side of the convection as the WB-57F and Citation. The flight level was 5 kft. The flight crew tried moving to the north side of the convection, but they were blocked by ATC. Convection was observed with ELDORA to about 17 km. At 2050Z, the aircraft moved off to the west coast and underflew an anvil system. At 2300Z, they flew to a storm system north of Ft. Myers. Cloud tops were observed to 17+ km. The aircraft made two passes under the anvil, and by then the storm had dissipated. The aircraft returned to base around 0048Z.