

07/13/02

FC:

Report: Winds aloft – NE; Surface winds – SW
Convection not deep
Take-off to work maritime convection coming onto peninsula
Expect new convection to develop along seabreeze front convergence ~ 3-4pm

Summary: The models predict unusually cold tropopause conditions in the FL region, with temperatures below 197 K. These conditions are conducive to *in situ* formation of thin cirrus near the tropopause. Trajectory analysis suggests that air injected near the tropopause by deep convective systems near Miami on the previous day should be in the region W to NW of Key West. The lower-mid troposphere is relatively dry, suggesting suppressed convection.

Aircraft: P3, WB-57F, ER-2, Proteus, Twin Otter

Take-off/Land: ER-2 1300 1915
 Proteus 1220 1930
 WB-57F 1300 1830
 Twin Otter 1230 1700

Log:

1600: Take-off
1610: Convective line between 26 24N 82 30W (Oscar) and 26 40N 81 51W (Pappa)
1628: Stuff at point P – have visual of well defined line
 Move Oscar further north
1640: Second leg
 Very well defined line
 Getting to far from convection
 Will work the line of the coast
1651: Come closer to convection this time
1656: Nice line 10km from aft
1659: Get some nice BWER
 Tops ~ 10-11km
1705: Strange vortex at cloud top
1706: Turn around and head east on line
1709: Turn completed
 This line much further from convection and much weaker
1716: Line looks quite a bit weaker at this stage
 Convection is shallow and more diffuse
 Shows some significant cores
 Upper anvils barely detectable
 Looks more like a shallow squall line
1722: Has occasional deep cells
 Western end of line defined the best
1729: ELDORA down
1734: ELDORA up
1735: ELDORA down
1737: ELDORA up
 Turn at 26 5N 82W
1739: Climb to 10kft
 Extend leg further west where the stronger convection is

1758: Stronger convection at western edge of line
 Break out of westward leg
 Turn around
 Not much deep stuff anywhere in line
 In line at 26 22N 83 16W
 1800: Back on leg
 1816: Turn around at 26 52N 81 9W
 1823: Called Jay – not much going on in south Florida yet
 Line over ocean weakened and became quite shallow
 1832: Got out of area to avoid dropsonde
 Dropsonde released close to us
 1835: Back on track
 1840: Strong convective line ~ 30-40km long at 26 4N 82 8W
 We will work on that for a bit
 1842: Lined up to work short line
 1848: Turn around to redo line
 1852: Back on track
 1900: Turn around – end of leg
 1902: Back on return heading - 50°
 Convection weakened already
 Tops ~ 7km
 1910: Going into turn
 1915: Back on leg
 Heading – 230°
 Reflectivity ~ 30dBZ
 Only one cell on western edge looks like anything
 1922: Turn around
 1925: Back on track
 See lightning
 Tops ~ 9km
 1930: We have killed all convection
 Try to go up central peninsula at low level to see if we can see the seabreeze front
 Strong SW low-level winds
 Multiple lines from heading – 210° to 030°
 2020: Abandon the idea of low-level flights – didn't see anything on radar
 Land

Mission Reports:

Report: The ER-2 and WB-57F took off as scheduled and met west of Key West to set up the formation flight leg. They flew wingtip-to-wingtip NW for about 15 minutes at 50 kft to compare water vapor, temperature, and radiation measurements. Next, they headed off to the east, with the ER-2 above the WB-57F and the WB-57F just above the tropopause. Over the next few hours, diffuse cirrus was sampled by the WB-57F from the temperature minimum at about 50 kft down to as low as 46 kft. The ER-2 flew along the same path the WB-57F for most of the flight. The Cloud Physics Lidar (CPL) on the ER-2 indicated that thin cirrus was present in the top 1 to 2 km of the troposphere throughout the flight (see image). Occasionally, optically thicker cirrus was present just below the thin layer at the tropopause. The Proteus flew along the same track as the ER-2. The Twin Otter flew under the ER-2/WB-57F track at 11.5 kft for part of its flight, and the thin cirrus was apparent in the zenith radiative flux measurements. At one point, the WB-57F made its dog-bone turn and flew in its own contrail for 20 minutes (the contrail age was as old as 40 minutes). This leg should provide an excellent case study for persistent contrail microphysical evolution. The persistent contrail was readily apparent to the pilots of the WB-57F, Proteus, and Twin Otter. In addition to making radiation measurements under the thin cirrus, the Twin Otter also penetrated

three small cumulus clouds near the western ground site. The P-3 sampled the southern edge of a maritime convective system streaming onshore north of Fort Meyers, but no significant convection/anvil systems sprung up over the southern peninsula.

Summary: Today's flights provided extensive samples of thin cirrus near the cold tropical tropopause in the southern FL region. Optically thin cirrus was present within a few thousand feet of the tropopause throughout the flight. The Twin Otter flew below the ER-2 flight track to make radiation measurements underneath the thin cirrus. Forecast outflow from convection on 12 July was sampled over the Gulf. At the beginning of their flights, the ER-2 and WB-57F flew in a wingtip-to-wingtip formation at 50 kft to compare water vapor, temperature, and radiation measurements. The WB-57F flew through its own persistent contrail at the tropopause for about 20 minutes. The P-3 made measurements along the edge of maritime convection north of Naples. No significant Cb-anvil systems formed over southern FL.

Flight Path & Focus: 154208 202450, rf04

No lines