Cloud field early in the flight prior to the cross-band pattern

Deeper clouds penetrated during the 6000-8000 ft leg

Cloud line penetrated during the cross band penetrations
**General cloud characteristics:**

The clouds early in the flight were all shallow (see 1425 UTC SPOL image). On the climb out and over Barbuda, the clouds initially were all small, all under 4000 ft. However, by the time the circle was completed, deeper clouds began developing at a number of locations (see 1647 UTC image), including along a line northeast to due east of SPOL (see 1735 UTC image). Except for the line, most of the deeper clouds lasted about an hour to two hours. The line lasted longer and was the target of the cross-line sampling strategy. Soon after the sampling of the line was complete, the line also dissipated, leaving only shallow cumuli. These even weakened during the final hour of the flight.
General Comments:

The flight patterns during the cloud penetrations satisfied several RICO objectives. The early cloud penetrations were useful for studying rain spectra in the taller clouds and the associated updraft structure. The cross-line pattern satisfied the objective of studying cloud age and entrainment, and processing of air by bands. The shallow cloud penetrations continued the development of the database for these small clouds.
Overview of C-130 Flight Pattern:

1420 – 1429 UTC Ferry to circle location
1429 – 1620 UTC 15000 ft, 300 ft and 1500 ft circles
1620 – 1707 UTC Random sampling of deeper clouds at 6000 and 8000 ft altitude
1707 – 1831 UTC Jensen cross line pattern
1831 – 1948 UTC Random cloud sampling at 2500, 3000, and 4000 ft
1948 – 2159 UTC 1500 ft, 300 ft and 15000 ft circles

C-130 Flight notes: UTC time is used

1402 Takeoff
1405 Very tiny scud cumulus at takeoff, Bases 1500 ft to 2000 ft
1406 We are above all visible clouds at 2500 ft
1422 From 15000 ft I see a field of small cumulus with some stratiform clouds at the trade wind inversion.
1429 First circle at 15000 ft
1433 Looks like some linear features may be present toward Barbuda, mostly small clouds in the area, lines look like rolls.
1446 Cells appear to be developing more in this region, I can see quite a few cells NE of Barbuda that are more developed.
1459 End of 15000 ft circle
1503 Stratiform at top of inversion in some locations, cumulus popping up in other locations, no obvious linear features.
1508 Hitting a few wispy clouds, stratiform at about 5000 ft
1513 Second circle begins clockwise
1513 Low-level winds 14 m/s lots of whitecaps and rough seas
1519 Small clouds, no rainshafts visible anywhere
1543 Second circle completed
1546 3rd circle will be at 1500 ft
1547 Estimate cloud base at 2000-2200 ft
1550 3rd circle starts at 1500 ft
1555 Clouds continue to be small – no precipitation anywhere in sight, have not seen a precipitation shaft on either circle.
1608 Little shower off our left wing
1609 Clouds appear quite sheared today
1611 Entered a cloud with a much lower base, Rain on the windshield
1612 Rain on the windshield for a minute
1620 3rd circle ends
1625 Ascended to 6000 ft, flying through clouds, Rain on the windshield and hard bumps on all passes
1633 Rain on the windshield all passes
1640 Clouds appear to be going up to 8000 ft visually
1642 Rain on the windshield fuzzy clouds
1644 Going up to 8000 ft to hit the tops of the clouds we have been penetrating at 6000 ft
1646 Now at 8000 ft
1647 Data system is being rebooted. We lost some data.
1648 Rain on the windshield at 8000 ft
1649 Cloud tops near 8000 ft
1649 Data system is being rebooted again, some data loss.
1650 Rain on the windshield at 8000 ft
1652 Towers emerging from broader cumulus clusters at lower attitudes
1653-1707 Hitting the tops of convective towers, very turbulent. We hit one bump that caused everyone to become airborne. I flew out of my seat about 6 inches at least.
1707 Identified a linear cloud band with sufficient clear area on either side that we decided to attempt the cross line pattern. We are going to descend to 300 ft to line up for pattern.
1719 At 300 ft. Lining up for the Jensen cross band pattern
1722 Continuing pattern at 300 ft
1723 Rain on the windshield as we cross band
1726 Performing 90-270 turn while climbing to 2500 ft
1733 Rain on the windshield as we cross band at 2500 ft
1735 Nice clear region on the east side of band
1738 Climb in 90-270 turn to 4000 ft and return to band
1741 Heading toward band
1748 Rain on the windshield crossing the band
1751 90-270 turn and up to 6000 ft
1754 Passed through a cell on the 90-270 turn
1757 Passed band at 6000 ft
1800 Heading out into clear air on east side
1805 Heading toward band at 8000 ft
1806 Missed cloud, but passed through cloud detrainment area based on the level of turbulence as we passed by cloud
1809 90-270 Turn climbing to 10000 ft
1819 Crossing over band
1824 Finished SABL pass over the band. Doing a descent sounding in the clear region east of the band.
1828 Still descending toward 300 ft
1831 Descent completed between 10000 ft and 300 ft without hitting a cloud
1833 Decided to sample small clouds at 2500 ft
1853 Continuing to sample small clouds at 2500 ft
1900 Going up to 3000 ft to sample small clouds
1920 Going up to 4000 ft to sample larger clouds
1929 Rain on the windshield
1930 Rain on the windshield
1932 Rain on the windshield
1935 Rain on the windshield
1940 Down to 2500 ft to sample smaller clouds for 20 minutes. Can’t find any more clouds that are extending to 4000 ft.
1942 At 2500 ft
1948 Breaking off cloud work – heading off to do 1500 ft circle
2008 1500 ft circle starts Counterclockwise
2028 Very few clouds and all small ones as we do 1500 ft circle
2038 End 1500 ft circle. Going to 300 ft. No rain observed during circle – just little clouds
2045 300 ft circle commencing, a few wispy clouds visible during circle
2115 Circle completed at 300 ft. Going to 15000 ft.
2129 Beginning 15000 ft circle. Field of small clouds visible from 15000 ft.
2159 Circle complete
2220 Touchdown at V.C. Bird airport
RICO, Flight #rf11

01/07/2005, 13:54:04-22:25:00

Flight track for RF011
RF07 Flight profile: Note data gap beginning at 1646 during the 8000 ft (~2600 m) pass
RF07 Cloud Penetrations
RF11 Dropsonde soundings

[Graph showing temperature and wind speed profiles over different heights for RF11 on January 7, 2005.]