

TC⁴ DC-8 Science Flight
22 July 2007
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Takeoff: 13:00:16 UT
Landing: 21:01:01 UT

Shortly after takeoff, we headed southwest into the Pacific and descended into the boundary layer for aerosols and chemistry sampling. An ITCZ convective system was sampled, and a box pattern was set up for sampling the outflow cirrus. The long sides of the rectangle were oriented approximately across the mean wind direction. This strategy allowed us to sample many distinct outflows from individual convective cells. We porpoised through the outflow cirrus (in and out of cloud) between about 7.6 and 10.6 km in close coordination with the ER-2.

When the outflow cirrus appeared to be dissipating, we did several penetrations through small, developing convective turrets at temperatures ranging from 200 to 255 K before heading west to Panama to sample cirrus generated by Panama Bight convection earlier in the day. The along-wind track took the DC-8 through two separate anvil outflows that were streaming southwestward from dissipating convective sources. We did two legs, coordinated with the ER-2 profiling enroute through the cirrus between about 7.6 and 11.6 km. Crystals as large as 3 mm and ice water contents as large as 0.3 g/m³ were detected over the Panama Bight.

Next, we headed north along the CloudSat/CALIPSO track, flying through optically thin cirrus at about 12 to 12.5 km. This cirrus contained pristine ice crystals (bullet rosettes were noted on the CPI) and patches with substantial supersaturation with respect to ice. CloudSat and CALIPSO passed overhead as the DC-8 approached its most northerly point on the several-hundred-km leg. At that point, we turned back south along the satellite track and, after an ATC delay, we spiraled down into the boundary layer to sample Saharan dust below 4 km indicated by the DC-8 lidars. After stepping up to about 2 and 3 km, we returned to base.

The flight was extremely successful. Profiles of aerosols, tracers, and chemical species were collected from the boundary layer to the upper troposphere both in the Pacific and Caribbean, and a variety of types of anvil outflow cirrus were sampled *in situ*. The leg flown in conjunction with the CloudSat/CALIPSO overpass will be an extremely valuable source of information, since the cirrus layer existed above a mostly cloud-free ocean surface. This characteristic is critical for validation of cloud property retrieval algorithms applied to the active and passive satellite measurements. The graphic below shows the data collected by CloudSat along the DC-8 flight track.

