Flight Report, ARCTAS # 14, CARB # 3, 22 June

This flight was designed to provide upwind boundary conditions for the CARB regional air quality model. Plan called for a missed approach at LAX and a short BL loop just offshore and over Long Beach harbor. A long south to north leg well offshore, including 2 spirals and enroute vertical profiling was designed to sample air moving toward California, with minimal North American influence. All CTM forecasts expected the DC-8 would encounter Asian outflow throughout the mid and upper troposphere, with stronger Asian influence further north along the track. The return leg included a transect through the northern end of the central valley to assess how much of the Asian pollution arriving at the coast in free troposphere was mixing downward to the surface, then a long low-level transect just off the coast targeting on-shore flow and possibly ship emissions. The plan also included a late afternoon missed approach at LAX/harbor circuit to contrast to the morning pass. Nearly all objectives were met. Ga Tech CIMS was off the entire flight and the Cal Tech "single" CIMS had problems most of the flight. All other instruments reported good performance and great data throughout the flight.

Vectoring by ATC to make the missed approach at LAX was more involved than we had experienced during Flight 12. We did eventually make the approach, but were delayed for 45 minutes. Enhancements at lowest point over the airport were not as large as those on 18 June, but sulfur species over the coastal region and harbor were similar to the earlier flight (very high). From Long Beach we headed west in the MBL at 500 feet, then began slow porpoising between 500 and 1500 to characterize vertical structure. Enroute ascent allowed us to begin the boundary condition leg at 25 kft. DIAL saw enhanced scattering at about 5 kft, so we descended for a short level leg there and found enhanced sulfate (Asian?). Subsequent short BL leg brought us to first spiral, upward from 500 to 30 kft.. After spiral we returned to the BL rapidly in order to step up through the forecasted Asian outflow on the way to our northern turn point (and second 30 kft spiral). DIAL observed multiple layers of enhanced scattering and O_3 overhead, in-situ sampling targeted several of these layers through 5 minute level legs at 8, 11, 14, 26 and 30 kft. Rapid enroute descent to the MBL was followed by porpoising between 500 and 1500, heading eastward to Trinidad Head where our third spiral (up to 20 kft) was coordinated with launch of an ozone sonde.

At the top of the spiral the DC-8 flew inland toward Reading. As the coast range was crossed several wild fires were spotted, then more and more fires were seen in all directions. We descended into the valley as planned, but chose to fly south in the smoke filled valley rather than continuing eastward to Mt Lassen. Visibility was severely impaired, and all biomass burning tracers were greatly elevated. Southern edge of the smoke was reached before we got to our planned track back to the coast, so we rejoined the track and returned to the MBL just offshore, heading southward along the coast. At the mouth of San Francisco Bay a triangle was flown over shipping channels, but no obvious ship plumes were encountered. Near Big Sur the 4th spiral of the flight was conducted, up from the MBL to 20 kft. This location was selected to be approximately downwind of spiral # 2 at the north west corner of the track. In the coast range very near to Big Sur we observed 4 large wild fires in close proximity to each other, active

suppression efforts were intensified to include airborne water tankers while we were continuing to spiral off Big Sur. On-shore winds blew the thick smoke plumes away from us and into the central valley.

Continuing southward, we tried to rapidly return to MBL, but were held at 20 kft for nearly 20 minutes. At the request of Jim Pedersen, we doubled back to the north during descent and then resumed southward track at 500 foot level We remained low over the ocean through the Santa Barbara channel and all the way to Long Beach. Slow porpoising revealed strong vertical stratification, including a dry layer with greatly enhanced H_2SO_4 just above 1000 feet. After crossing Long Beach harbor we passed into the LA basin and made another missed approach at LAX. Unlike Flt 12, levels of most pollution tracers just above the runaway in the afternoon were only a little lower than we had observed in the morning.

Delays (at LAX in the morning, and after the spiral at Big Sur) caused fuel supply to be a concern after the missed approach, so the final circuit over the coastal region and harbor was cancelled and we returned to Palmdale, crossing over the eastern side of LA basin at low altitude enroute.