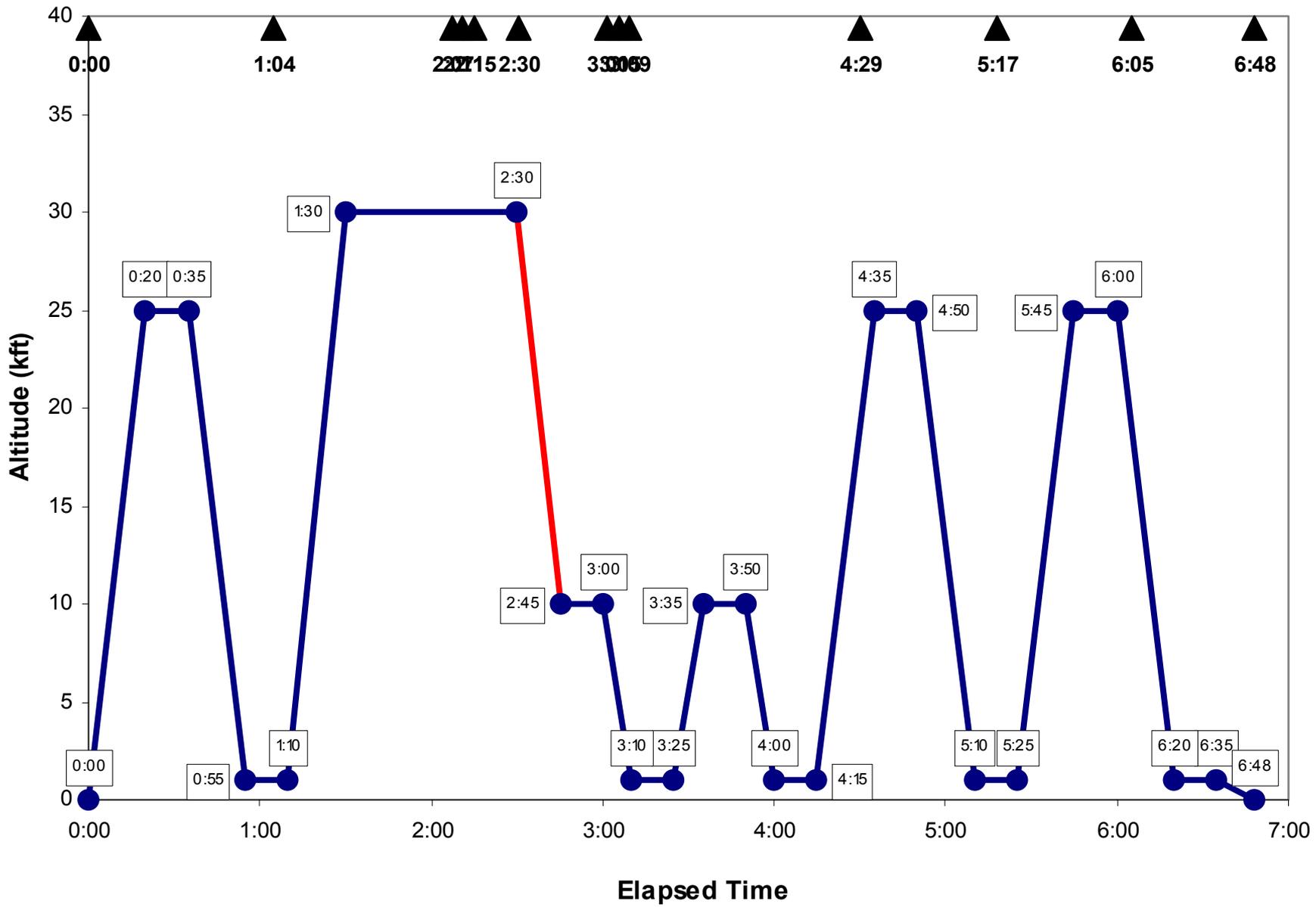


INTEX-B: Flight 5 (Science Flight; March 11, 2006; Saturday)

This was the third INTEX-B science flight conducted from Houston. The objectives for this flight were to sample the aged Mexico City plume previously sampled by the C-130 near Mexico City on 3/10, and to sample the Mexico City boundary layer both remotely (DIAL) and in situ as initial conditions for a C-130 flight in Mexico City outflow Sunday. The nominal flight tracks and profiles are shown in the slides below but these were modified in-flight to take advantage of specific opportunities. Takeoff time was 11 am (LT) and the flight duration was 7.5 hours.

All of the instruments aboard the DC-8 performed normally throughout the flight. The GT-LIF instrument is still not operating well but progress is being reported. Major tropospheric flow features for Flight 5 include a broad high pressure ridge along the East Coast of the U.S. and a broad low pressure trough over the West Coast. This pattern produced southerly or southwesterly winds over most of the Gulf of Mexico. At the surface, strong onshore flow was occurring over the Texas Coastal Plains, while there was weak offshore flow over eastern Mexico. Along the Mexican coast, the collision of the offshore flow with southerly flow over the water produced an area low level convergence. Widespread cirrus blanketed much of the flight area. The cirrus was due to the combination of the subtropical jet stream transporting Pacific moisture over the area, combined with the advancing trough to the west. Except for the Texas coastal area, there were few low or mid level clouds. Winds over Mexico City were less than 10 kts, mostly from the southwest. The surface heating and light winds most likely produced mesoscale upslope flow along the mountains surrounding the city. These upslope circulations typically are confined to below or slightly above the mountains.

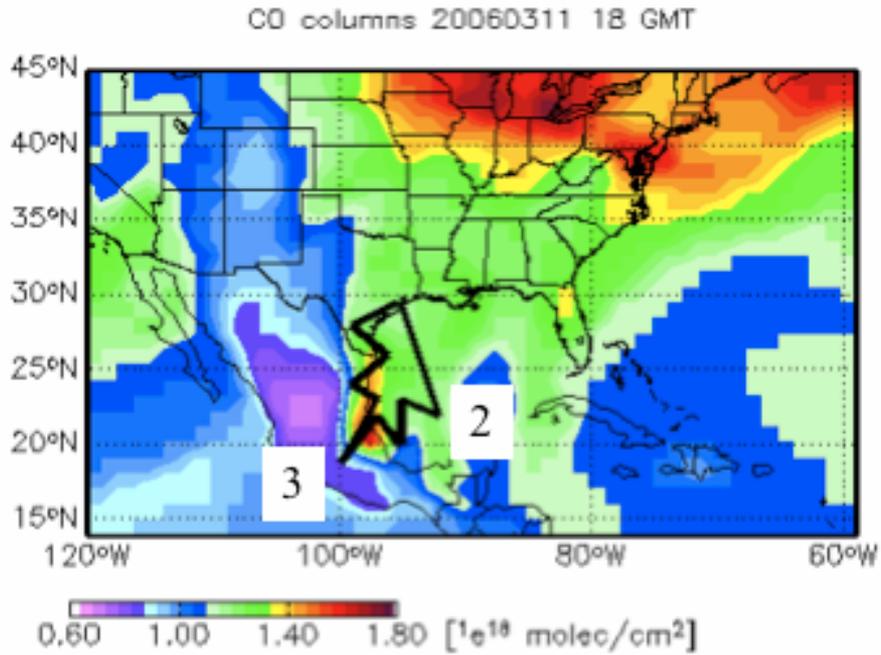
All objectives were met. Skies were mainly clear, offering excellent conditions for DIAL observations. On our track from Houston to the Gulf of Mexico (26N, 93W) we encountered pollution layers centered at 14 Kft (CO up to 260 ppb, ozone up to 100 ppb) and 8 Kft (170 ppb CO, 70 ppb ozone). There was little pollution below 5 Kft. The pollution sampled at 5-10 Kft appeared to be a mixture of urban and biomass burning influences. Flying into Mexico City across the coast and over the mountains we reached clean air at 10 Kft and did a 40 min leg at 30 Kft to observe the Mexico City Basin N-S with DIAL. We flew over the T2-T1-T0 sites and south to 18N, 99W. We found the Mexico City pollution spread out over the basin below 7 Kft altitude but with a strong core centered right over Mexico City below 3K. Air above 7K was very clean. We spiraled down at (18N, 99W) well south of the city and flew on a northerly track at 99W and 1-2 Kft AGL across the city over T0-T1-T2 and continuing NE over the mountains and to the coast. As we approached the city upwind from the south we sampled a strong gradient from 120 ppb CO, 40 ppb ozone at 18.5N to 300 ppb CO, 75 ppb ozone at 19.25N. As we flew into the city (T0-airport) the concentrations shot up dramatically with 1500 ppb CO, 150 ppb ozone, over 20 ppb NO₂, 15 ppb HCHO, etc. The visibility remained very good, presumably because it was so dry (RH less than 10%). Winds were less than 5 mph and variable. Pollution levels decreased rapidly as we flew over T1 (210 ppb CO, 75 ppb ozone) and T2 (140 ppb CO, 50 ppb ozone). As we flew over the mountains and to the coast on a NE track at about 2 Kft AGL we sampled CO levels typically in the range 170-220 ppb, with ozone in the range 60-80 ppb. This appeared to be mostly Mexican pollution but also with some biomass burning influence brought by S winds. Heading back north to Houston along the coast we criss-crossed and profiled a Mexican pollution plume centered at 7 Kft and containing about 150 ppb CO, 70 ppb ozone. The air was clean above 10 Kft and below 4 Kft. Heading back toward Houston, DIAL saw a stratospheric intrusion above us with elevated ozone levels extending down and southward to 15 Kft; we could have sampled some of that stratospherically influenced air on our 15 Kft leg. We approached Houston on a boundary layer track across SE Texas and NO₂ levels there were typically 1-2 ppb.



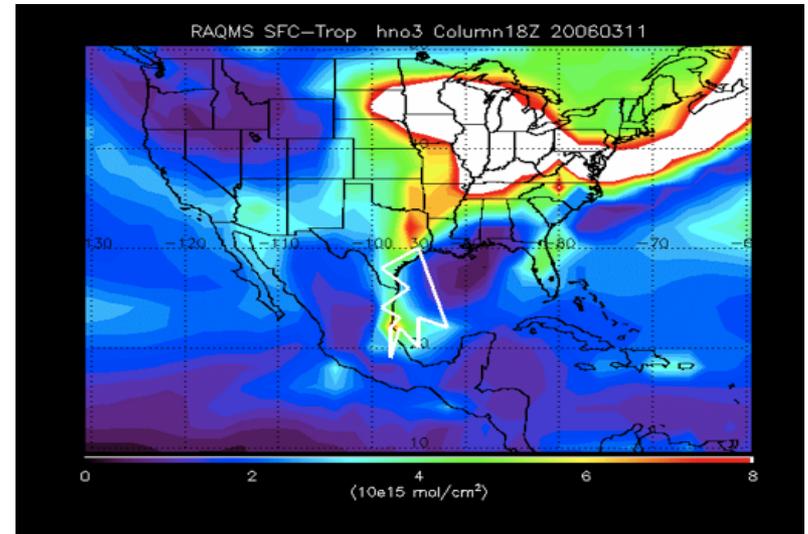
Note: In-Progress profiling in **Blue**; Spirals in **Red**; Way points annotated with triangles (?).

Model forecasts for 3/11/06 - 18Z

GMAO Total column CO



RAQMS HNO3



DC-8 Flight Plans

- **Friday (3/10):** C-130 mission-near source characterization of Mexico City pollution
- **Saturday (3/11):** DC-8 mission
 - Outflow from MC in the north easterly direction
 - Near source (boundary layer) sampling of MC
- **Sunday (3/12):** DC-8 mission
 - MC outflow
 - Satellite validation (TES/OMI)
 - C-130 Inter-comparison (?)
- **Things to do (remaining 2 Houston local flights; 3/13-3/18)**
 - Inter-comparison with C-130
 - Source characterization/MC missed approach