

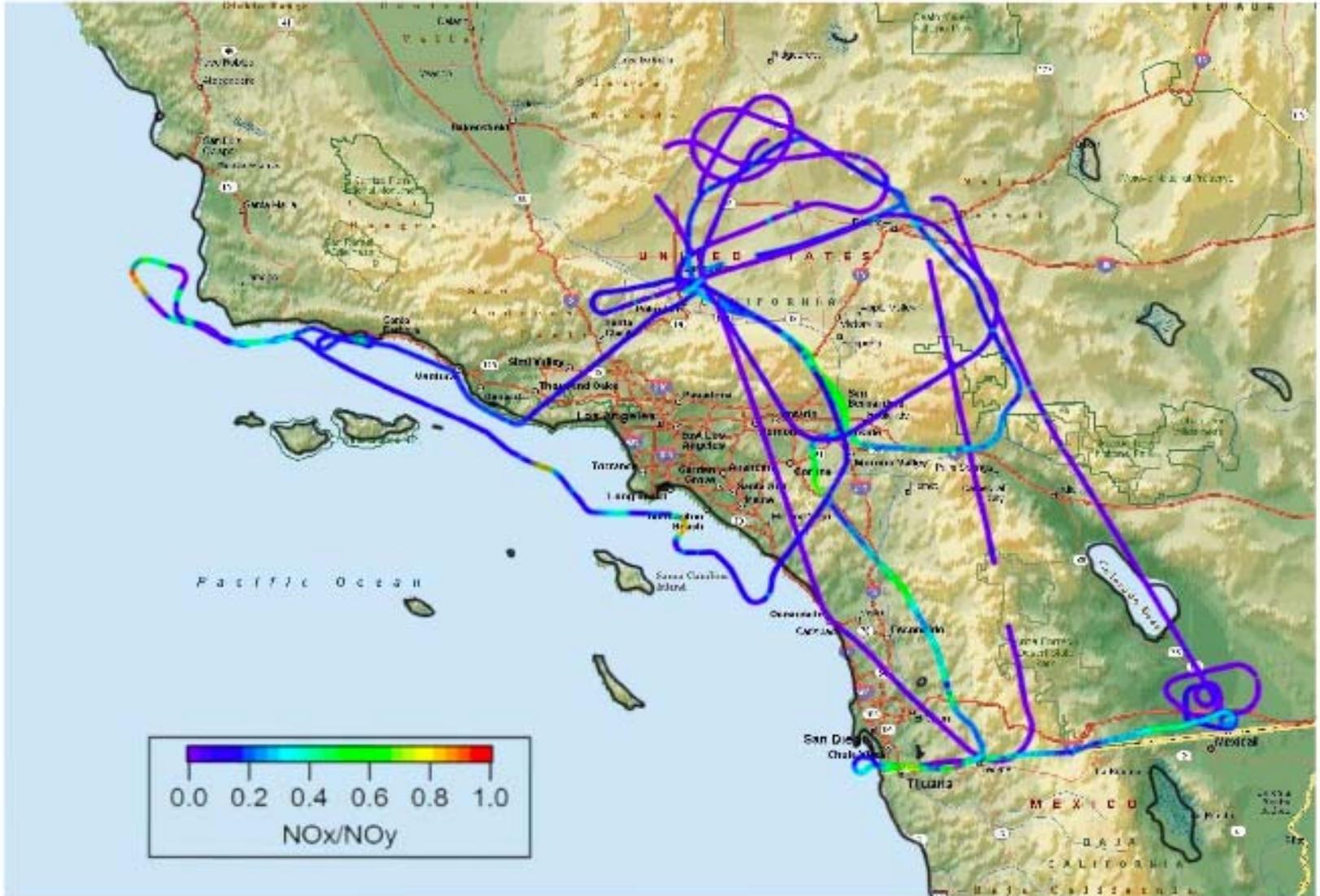
## **ARCTAS/CARB DC-8 Science Flight 15- (June 24, 2008; Tuesday)**

This ARCTAS/CARB DC-8 science flight was the fourth and last sortie from Palmdale. The main objectives were to study the evolution of the boundary layer height and photochemistry over the South Coast Air Basin (SCAB) as the day progressed, investigate the inflow of pollution from the central valley and Mexico to this region, as well study sulfur chemistry and ship emissions over the ship lanes. The flight had to be greatly modified due to extensive fires in Northern California and their influence in the south coast. The DC-8 flight tracks are shown in Slides 2. In this flight several adjustments to the flight plan (slide 3) were necessary to achieve science objectives and comply with ATC requirements. Take off time was 1623 UT and the flight duration was 8.1 hours.

This was an excellent flight and we were able to meet all our objectives. Most instruments aboard the DC-8 performed normally and collected data under essentially cloud free conditions. Winds along the flight track were dominated by the semi-permanent high pressure region off the coast of California and a low pressure trough that was oriented north to south along coastal California. Winds near the surface were mostly light and dominated by mesoscale topographic thermal circulations. At higher altitudes, winds were from the northwest west of the trough line and southwest east of the trough line.

Immediately upon takeoff we encountered extensive pollution greatly influenced by smoke from northern California fires transported from the Central Valley. This situation involving mixing of urban air pollution with smoke from northern California fires was to remain with us through much of this flight. The flight track shown in Slide 2 also shows NO<sub>x</sub>/NO<sub>y</sub> ratio that directly gives an idea of the age of air masses sampled in this flight. The upper level flying provided an ideal opportunity for the Lidar to observe ozone and aerosols over SCAB as shown in slides 4 and 5. Extensive sampling at 1 Kft provided detailed information on the composition in the boundary layer. The southern low level (1 Kft) transect was performed with southerly winds and sampled outflow from Mexicali and Tijuana helping to resolve the issue of pollution transport into the SCAB area from Mexico. Typical ozone levels over SCAB were less than 110 ppb although in one instance a plume containing fire emissions as well as anthropogenic pollution had ozone in excess of 165 ppb. Maximum NO<sub>y</sub>, CO and CO<sub>2</sub> were in excess of 20 ppb, 410 ppm, and 1 ppm respectively. After extensive sampling of the SCAB region the DC-8 was directed to sample offshore marine and ship emissions. This region was simultaneously being sampled by the NASA P-3 flying at even lower levels (200 ft) than the DC-8 (500 ft) to investigate ship plumes. The DC-8 measured high levels of sulfuric acid and also encountered elevated methane that may have bubbled up from the ocean floor. Overall this flight produced a wealth of unique data to address several of CARB goals.

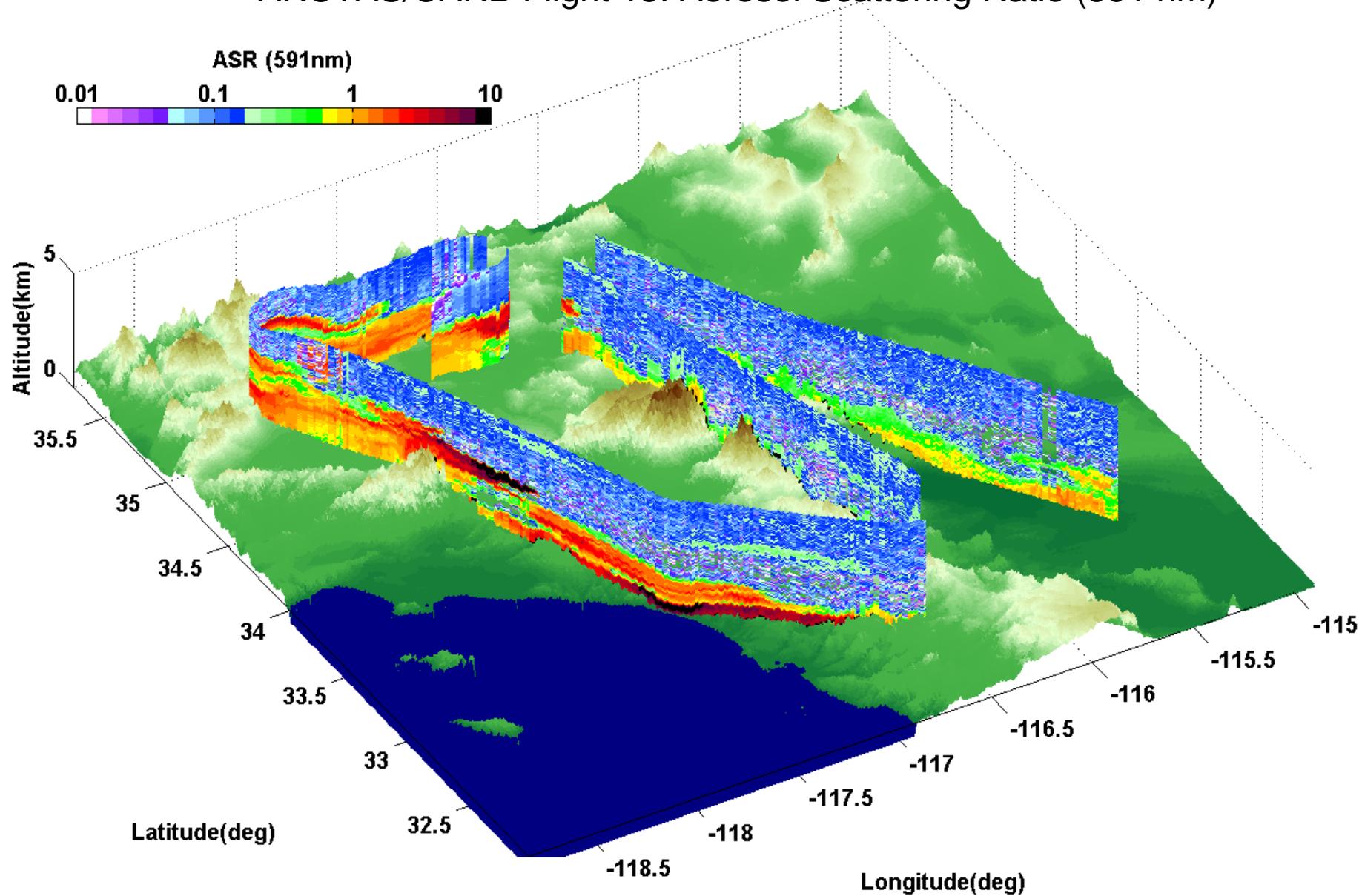
# Flight 15: ARCTAS/CARB DC-8 flight tracks and air mass age



# Flight 15: ARCTAS/CARB Dc-8 flight plan



# ARCTAS/CARB Flight 15: Aerosol Scattering Ratio (591 nm)



# ARCTAS/CARB Flight 15: Ozone

ARCTAS / DIAL Field Data      CARB #4 SoCal & Border Flight 15      24 Jun 08

Ozone (ppbv)

