

ARCTAS/CARB DC-8 Science Flight 17- (June 29, 2008; Sunday)

This ARCTAS/CARB science flight was the first DC-8 sortie from Cold Lake. The main objectives were to investigate fire emissions and pyro-convection events at several places in Saskatchewan and Yukon areas, inter-compare with the P-3, and under fly the CALIPSO satellite track in coordination with the B-200. The flight plan (side 2) had to be greatly modified (slide 3) due to extensive cloud cover at designated locations. Take off time was 1450 UT and the flight duration was 8.6 hours.

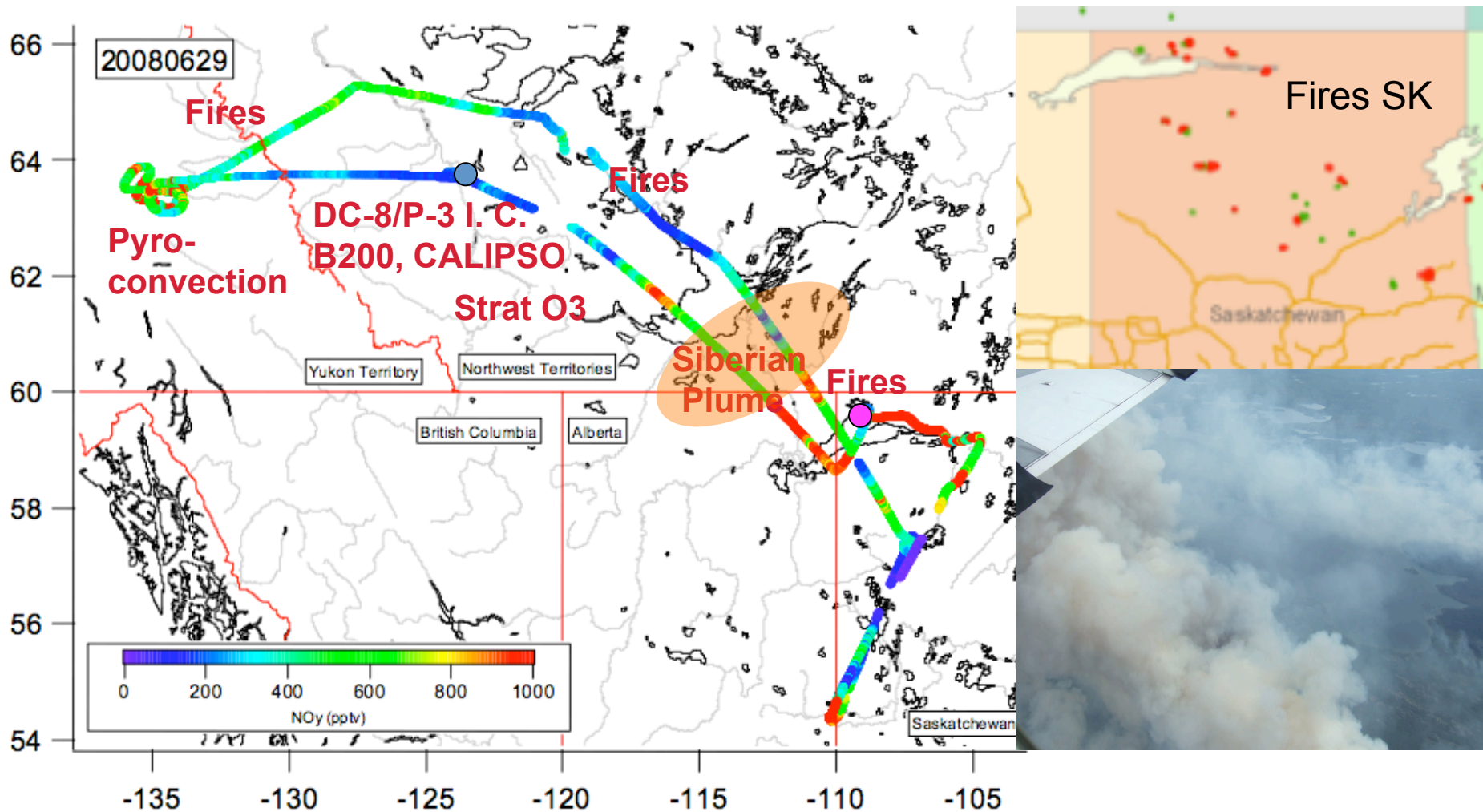
This was a challenging flight due to lack of morning fires as well as excessive cloudiness but we were able to meet our main objectives by making several in flight adjustments. Most instruments aboard the DC-8 performed normally and collected data. The major circulation feature affecting the flight track was a middle latitude cyclone located over the central Northwest Territories. This cyclone produced southwest to westerly winds over the southern 75% of the flight track. North of the low, along the northernmost segment of the track, easterly winds predominated. Clouds were widespread and dominated the northern third of the track.

Immediately upon take off we headed towards an area of fires (WP 2) based on previous day satellite observations (see slide 3 top right). Unfortunately there was little in the way of active fires probably due to early morning rainfall. A few smoke plumes were visible but were capped well below the minimum DC-8 altitude capability (1 Kft). In the absence of active fires we climbed to 20 Kft towards WP 3 and immediately intercepted the Siberian fire plume transported to the region at 5-8 km altitude. This was extensively sampled and contained a variety of fire tracers (e. g. HCN, OC) as well as moderately high CO (220 ppb) and O₃ (90 ppb). Coordinates were provided by ground to sample remnants of the previous night's pyro-convection at about 25 Kft south of WP 4. This convected plume was intercepted somewhat west of predicted coordinates and sampled at several levels between 22 and 28 Kft and contained moderately high mixing ratios of relatively fresh fire emissions. At this point we headed towards WP 5 to join the P-3 and B-200 in an inter-comparison and CALIPSO validation activity. Upon arrival at WP 5 it was decided that excessive clouds made it unsafe to conduct the inter-comparison and this effort was aborted. Instead of heading to WP 6 we headed south east to Lake Athabasca where fire activity had picked up in the afternoon. Along this track we once again sampled the Siberian plume and flew over isolated but active fires. High concentrations of ozone, mostly stratospheric, were seen on this track (slide 4). Once near Lake Athabasca we could see major active fires and penetrated a fire plume at around 6 K ft. The DC-8 followed this smoke plume for nearly 80 km before returning to base due to fuel limitations. This smoke plume contained large concentrations of gases (CO- 5.5 ppm, CO₂- 550 ppm) and aerosols (Organic aerosol -100 µg/m³) but O₃ levels were modest (50 ppb). Overall this flight produced a wealth of unique data to address key ARCTAS objectives.

DC-8 Local 1 Plan: Take-off 8:30 am; duration 8.0 hrs (Sunday 6/29)



Flight 17: ARCTAS DC-8 actual flight tracks 6/29 Take off: 8:50; Duration: 8.5 hrs



15>O3>550 ppb; CO>5.5 ppm; CO2 >500 ppm; HCHO>50 ppb; NOy>50 ppb; scattering -3000; O-aersol>100 , elevated R-CN, Black C, PAN, OVOC, SO4

Cold Lake Local #1 29-Jun-08: Full flight DIAL images

