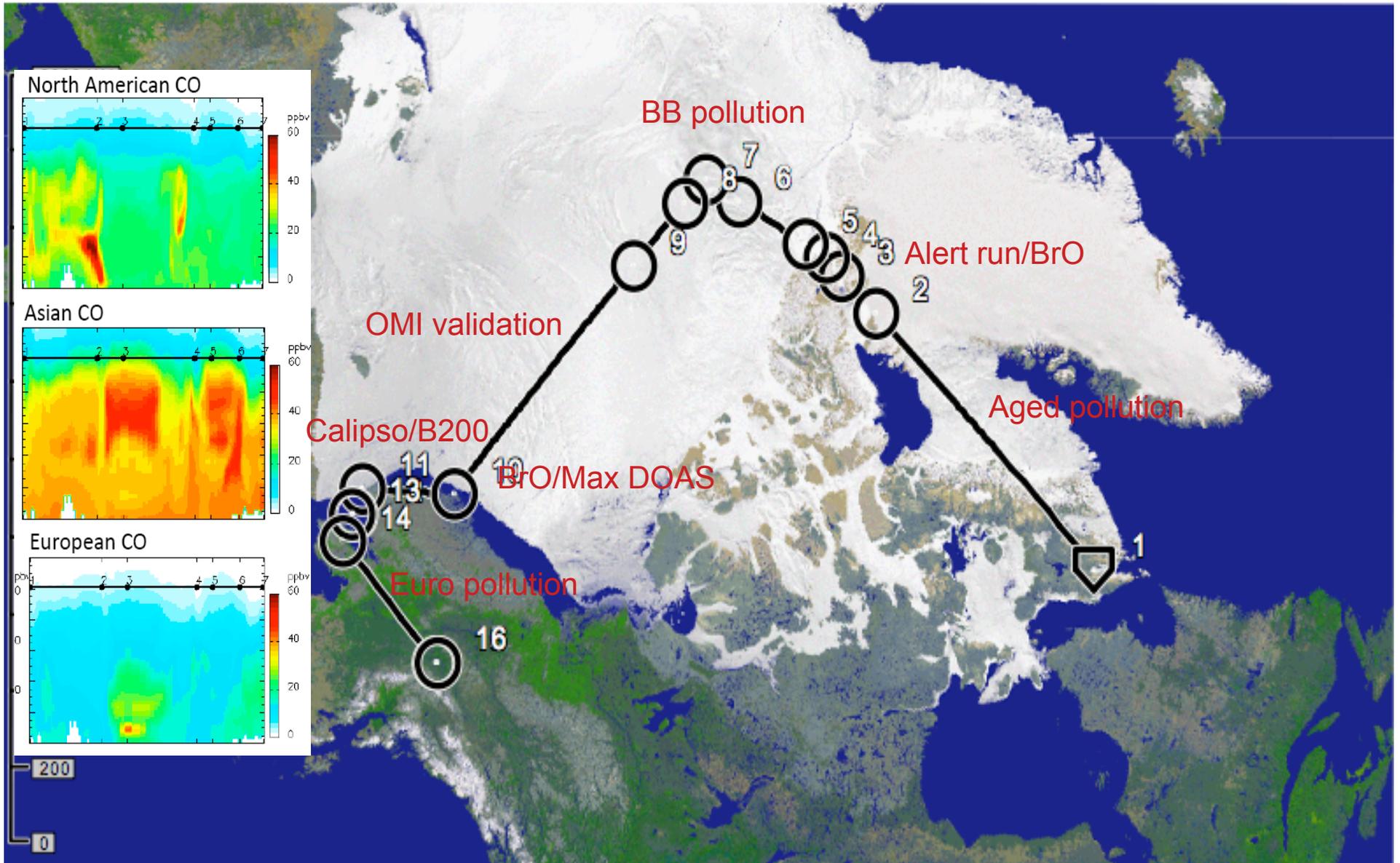


ARCTAS DC-8 Science Flight 7 (April 9, 2008; Wednesday)

This ARCTAS DC-8 science flight originated from Iqaluit, Canada, and ended at Fairbanks, AK. The main objectives were to sample North American and Asian pollution influences along the flight track, investigate boundary-layer halogen and ozone depletion chemistry, validate OMI ozone, and perform CALIPSO validation in coordination with the B-200. The nominal flight tracks and waypoints (WP) are shown in slide 2, but these were modified in-flight to take advantage of specific opportunities and to rendezvous for timed satellite underflights. Take-off time was 1450 UT, and the flight duration was 10.6 hours.

This was a good flight, and we were able to meet all our objectives. Most instruments aboard the DC-8 performed normally and collected data. The flow at all levels was dominated by low pressure over Alaska, strong high pressure near the North Pole, and low pressure southeast of the high in far north Canada. Clouds continued to be minimal. We climbed out of Iqaluit towards Alert (WP 1-3) and encountered both anthropogenic and biomass-burning pollution remnants along the way. The descent at WP 2 was delayed due to ATC restrictions, but we loitered a bit to enter the boundary layer south of Alert as planned. The ozone here was quite high (35-40 ppb), and no Br chemistry could be detected. Continuing along the surface track at 300 ft north of Alert, we did encounter ozone levels that may have been below 5 ppb for very short periods of time. It appeared that real low ozone was still below the DC-8 altitude of 300 ft (slide 3). Slightly elevated soluble bromide and Br₂ were indicated, but no BrO could be detected. We climbed out from north of Alert and headed towards the northern end of the track (WP 7). Along this track, biomass-burning plumes were sampled at around 15 kft. These plumes contained somewhat high levels of CO (190 ppb), PAN (600 ppt), and HCN. Aerosol scattering ratio was in excess of 20. Descent into the boundary layer near the northern end of the track indicated high SO₂ and SO₄, with moderately low ozone (10-15 ppb) and the possibility that still lower ozone was below the 300-ft DC-8 level. From WP 7 to 10, it was possible to validate OMI ozone under cloud-free conditions intersecting some biomass burning plumes (max CO = 350 ppb). Throughout this run, the lower troposphere continued to show moderately high SO₂, SO₄, and H₂SO₄, but little elevation in CO or black carbon. The DC-8 did a successful missed approach at Barrow to sample air at about 50 ft from the ground, with the hope of detecting high BrO as suggested by OMI retrievals and a ground-based Max DOAS. Ozone was moderately high (35-40 ppb), and no BrO was detected by the GT-CIMS onboard the DC-8. In general, there appeared to be little relationship between low ozone and OMI BrO. After this very low run over Barrow, we coordinated activity with the B-200 under the CALIPSO track under near-perfect conditions. The DC-8 did two spirals to provide composition data suitable for CALIPSO validation. Many aerosol layers were sampled along the CALIPSO track, but most of these were ice clouds with occasional aerosol and gas pollution (slide 4). Approaching Fairbanks, we did encounter higher levels of pollution that appeared to have a biomass-burning origin. Along the track, air masses of North American, Asian, and unknown origin were successfully sampled. Methane was frequently elevated in the boundary layer, suggesting possible surface emissions.

ARCTAS DC-8 Flt 7, 9-April 2008 (T. O. 1450 UT; 10.6 h)

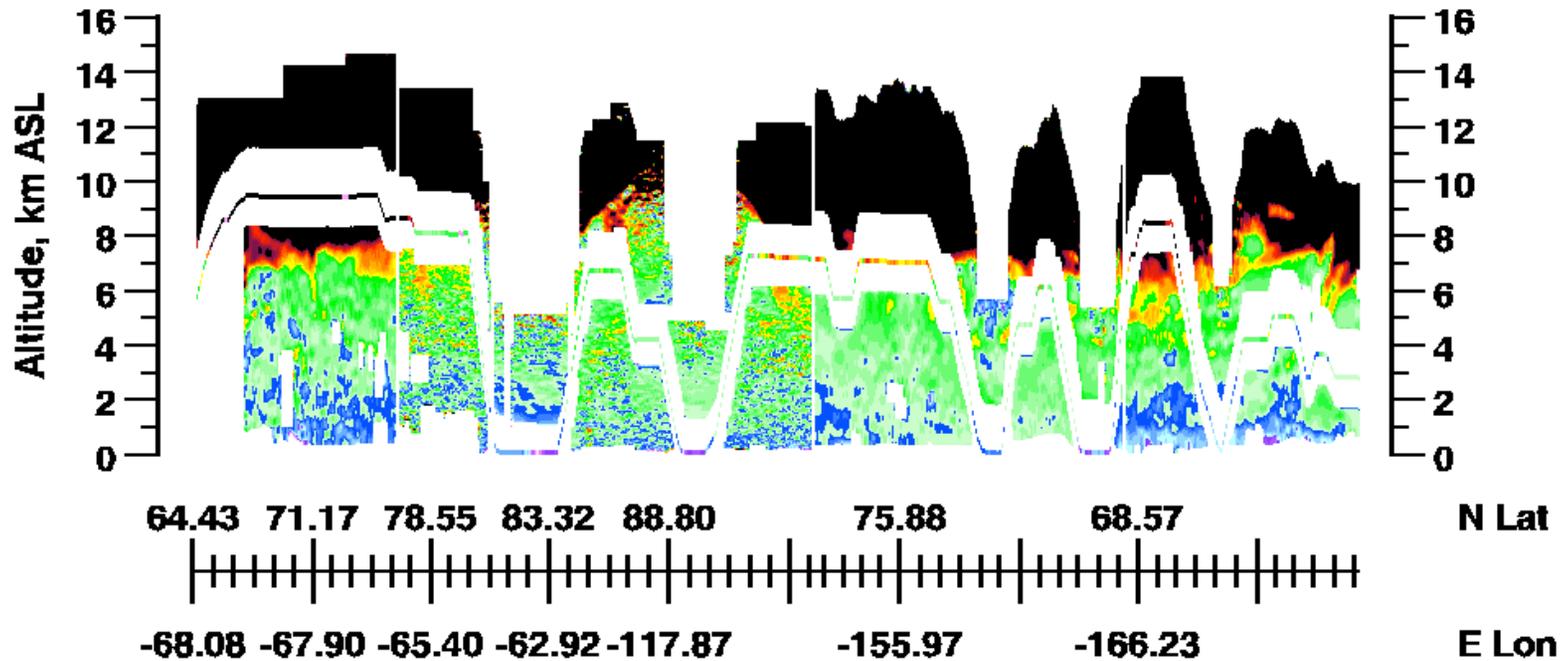
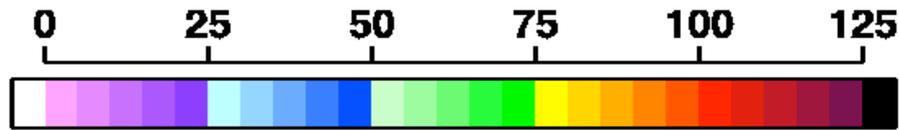


ARCTAS / DIAL Field Data

Iqaluit to Fairbanks
Flight 7

9 Apr 08

Ozone (ppbv)



O₃ values at aircraft altitude are from NCAR NOxyO3 instrument

ARCTAS / DIAL Field Data

Iqaluit to Fairbanks
Flight 7

9 Apr 08

Aerosol Scattering Ratio (1064 nm)

