

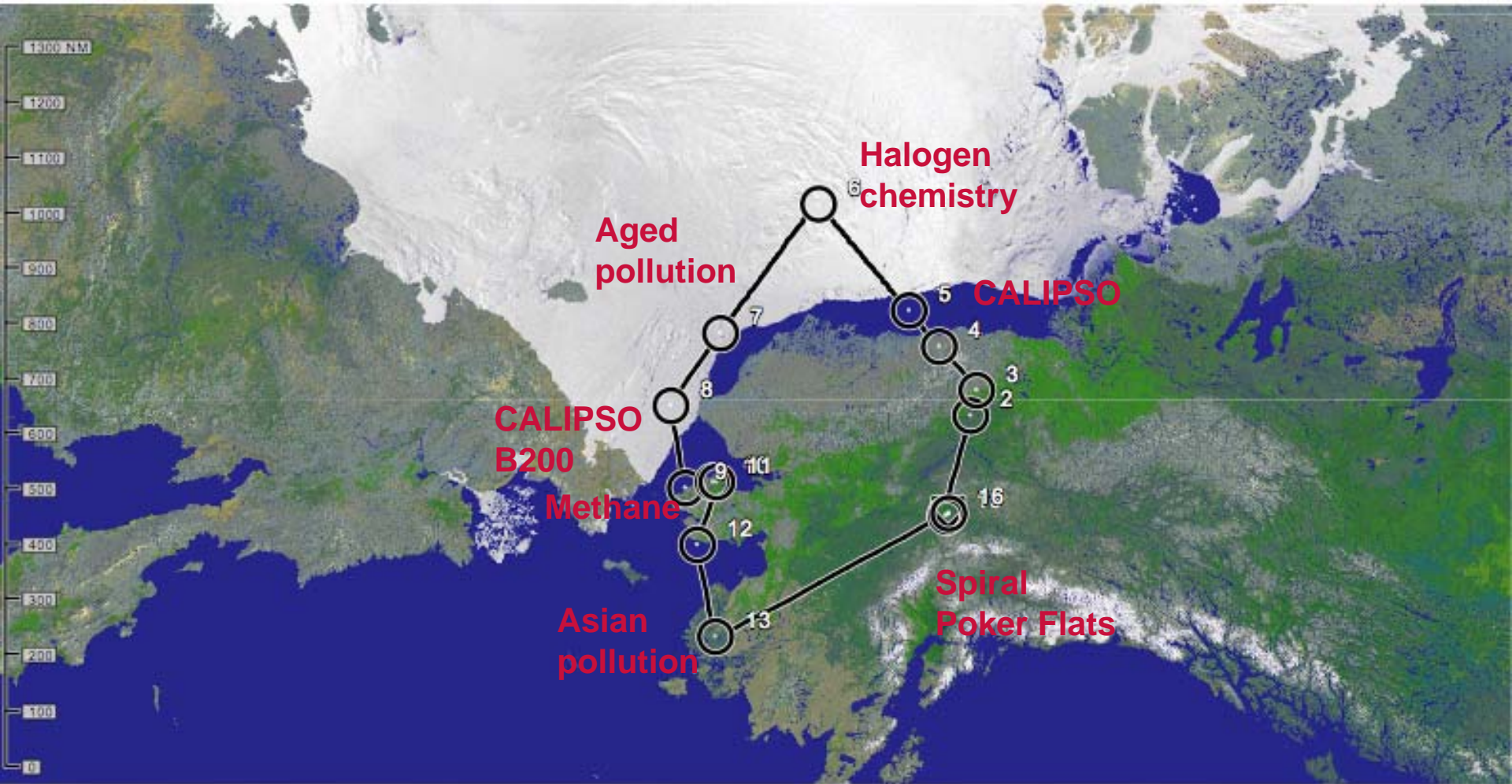
ARCTAS DC-8 Science Flight 9 (April 16, 2008; Wednesday)

This ARCTAS DC-8 science flight was a Fairbanks to Fairbanks sortie. The main objectives were to sample air masses along two CALIPSO tracks (2155 and 2331 UT) under clean and polluted conditions, and to sample major Asian biomass burning plumes and arctic haze in the troposphere, as well as ozone depletion chemistry in the boundary layer. The flight was coordinated with B-200 during CALIPSO validation and with a ground based lidar station at Poker Flats. An exploratory boundary layer run over the Seward Peninsula was planned to investigate surface methane emissions. The nominal flight tracks and Way Points (WP) are shown in slide 2 but these were modified in-flight to take advantage of specific opportunities and to rendezvous for timed satellite under-flights. Take off time was 1953 UT and the flight duration was 6.6 hours.

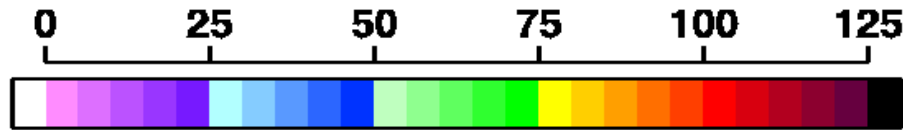
The flow pattern was dominated by two intense low pressure systems centered just east of the Alaska-Canada border and over northern Greenland. These cyclones were a factor in providing Asian and European flow towards Alaska. The northern most part of our CALIPSO track was mostly clear, except for isolated cirrus and stratus. At the second CALIPSO underpass, conditions were more hazy, and there were more scattered clouds. The southwest corner of the pentagon had the most clouds, ranging from low level stratus to high altitude cirrus.

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. Patchy cirrus clouds and low level stratus continued to persist through much of the flight track. The DC-8 climbed off from Fairbanks to 25K ft into the lower stratosphere descending to 18 K ft at WP2 and turning north along the CALIPSO track. This track was generally clean with occasional indications of biomass burning pollution (high HCN). After crossings the Brooks mountains we descended to the surface (300 ft) in search of low ozone and bromine activation. Little BrO was evident although the O₃ did decline to nearly 5 ppb. Outflow from Prudhoe Bay was also sampled here with NO_y levels exceeding 3 ppb and NO exceeding 1 ppb. After WP3 we climbed to a high altitude (20 K ft) sampling some pollution of biomass burning origin (elevated HCN, PAN, black carbon) and then descended to the boundary layer. Here both O₃ depletion (2 ppb) and Br chemistry was evident. BrO and Br₂ were detected at about 2 ppt levels and soluble bromine was also observed. Climbing through several pollution layers we arrived at WP4 (2311) to start the CALIPSO track. As we headed south on the westerly track, we had communication from the B200, which was moving north along the same CALIPSO track, and provided us with guidance on pollution layers to sample. We first descended to the boundary layer (300 ft) over the Seward Peninsula to investigate the methane bubbling phenomena. Some methane elevation was observed but more careful analysis is required to determine if it was a surface or a long distance source. Along this easterly track we sampled intense Asian pollution (NO_y-5 ppb, PAN-1 ppb, HCN-1.2 ppb, high black carbon) with strong biomass burning content. Heading east on the southerly track (WP8-9) we encountered biomass burning pollution (high organic aerosol-low sulfate) in the free troposphere and anthropogenic pollution (mostly sulfate with low organic aerosol) in the boundary layer. A spiral over the Poker Flats lidar station (25 Kft to surface) under light cirrus completed this flight prior to landing at Fairbanks.

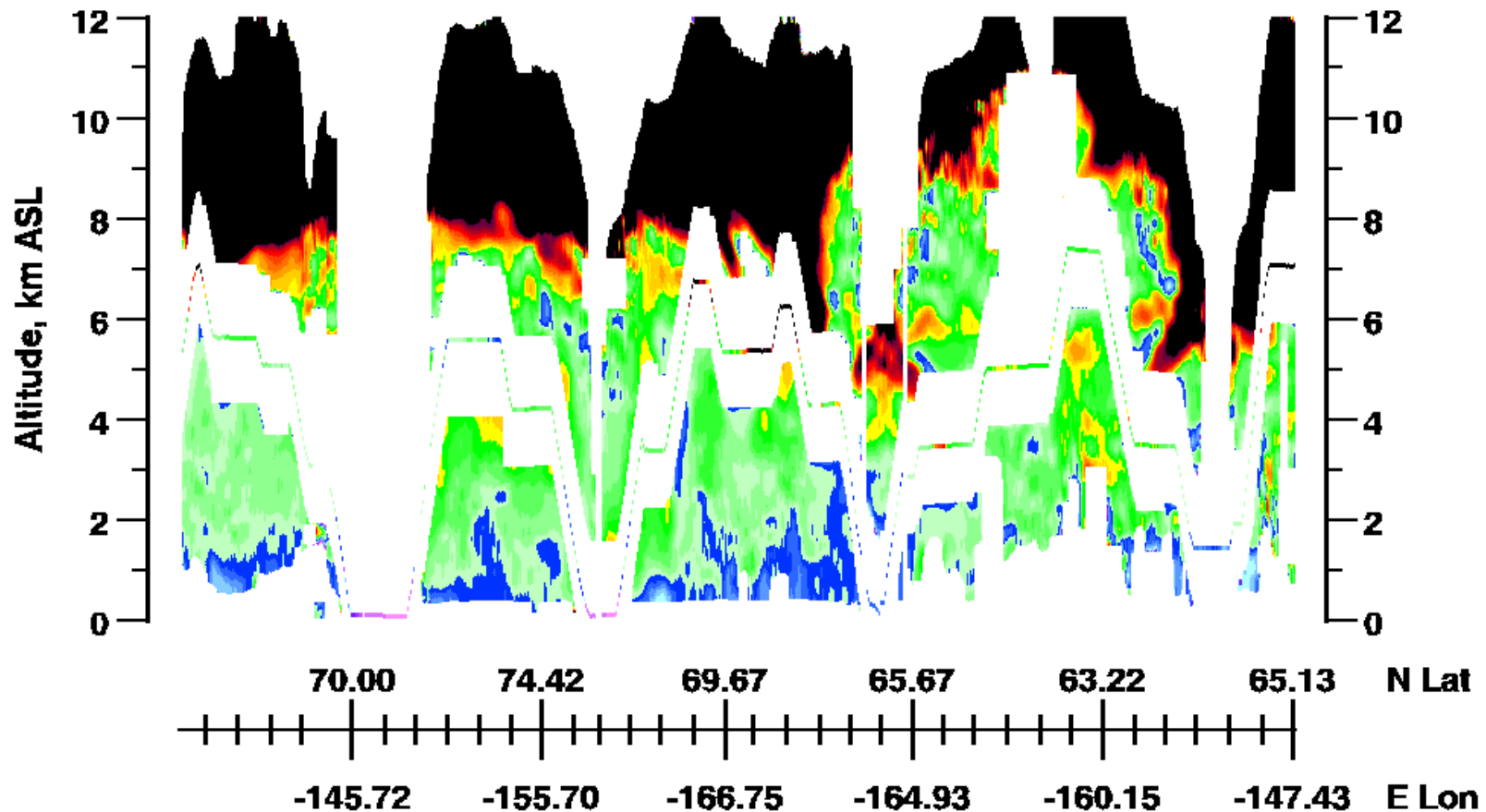
Flight 9 Flight track (16 July, 2008)



Ozone (ppbv)



21:00 22:00 23:00 0:00 1:00 2:00 UT



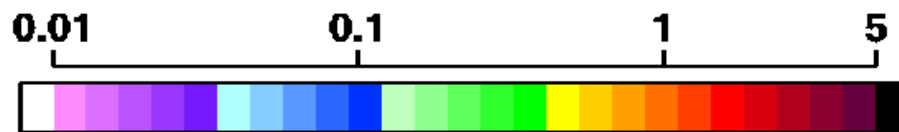
O3 values at aircraft altitude are from NCAR NOxyO3 instrument

ARCTAS / DIAL Field Data

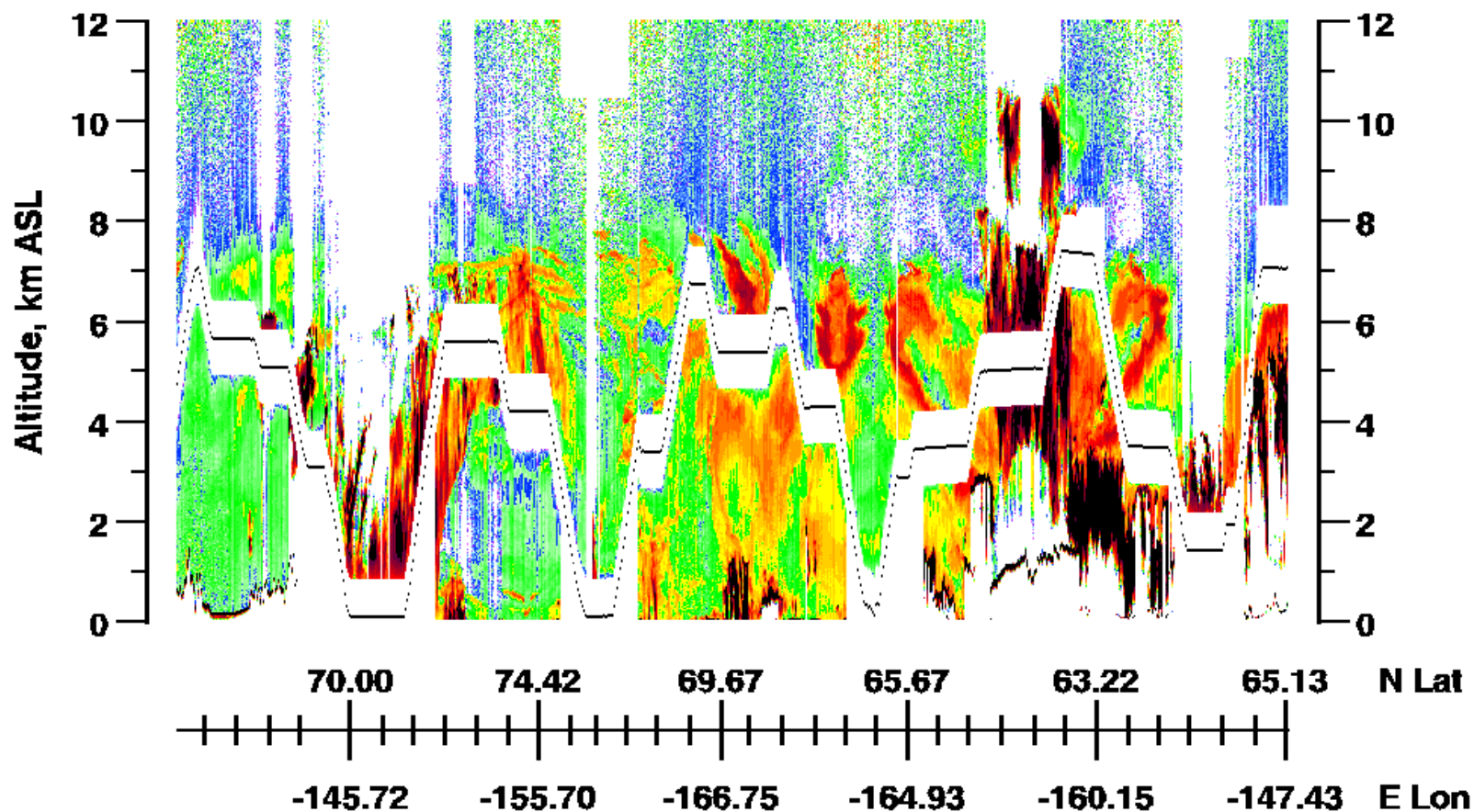
Fairbanks Local #2
Flight 9

16 Apr 08

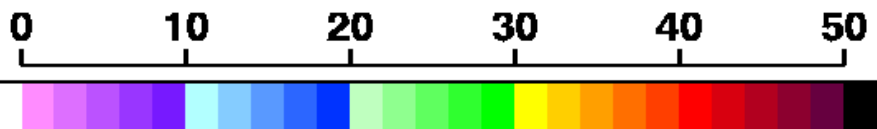
Aerosol Scattering Ratio (591 nm)



21:00 22:00 23:00 0:00 1:00 2:00 UT



Total Depolarization %



21:00 22:00 23:00 0:00 1:00 2:00 UT

