

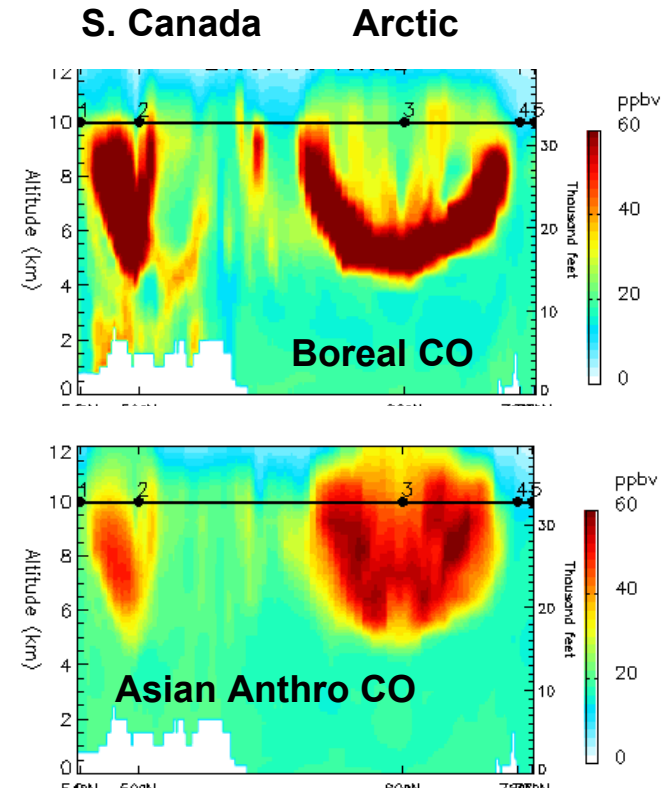
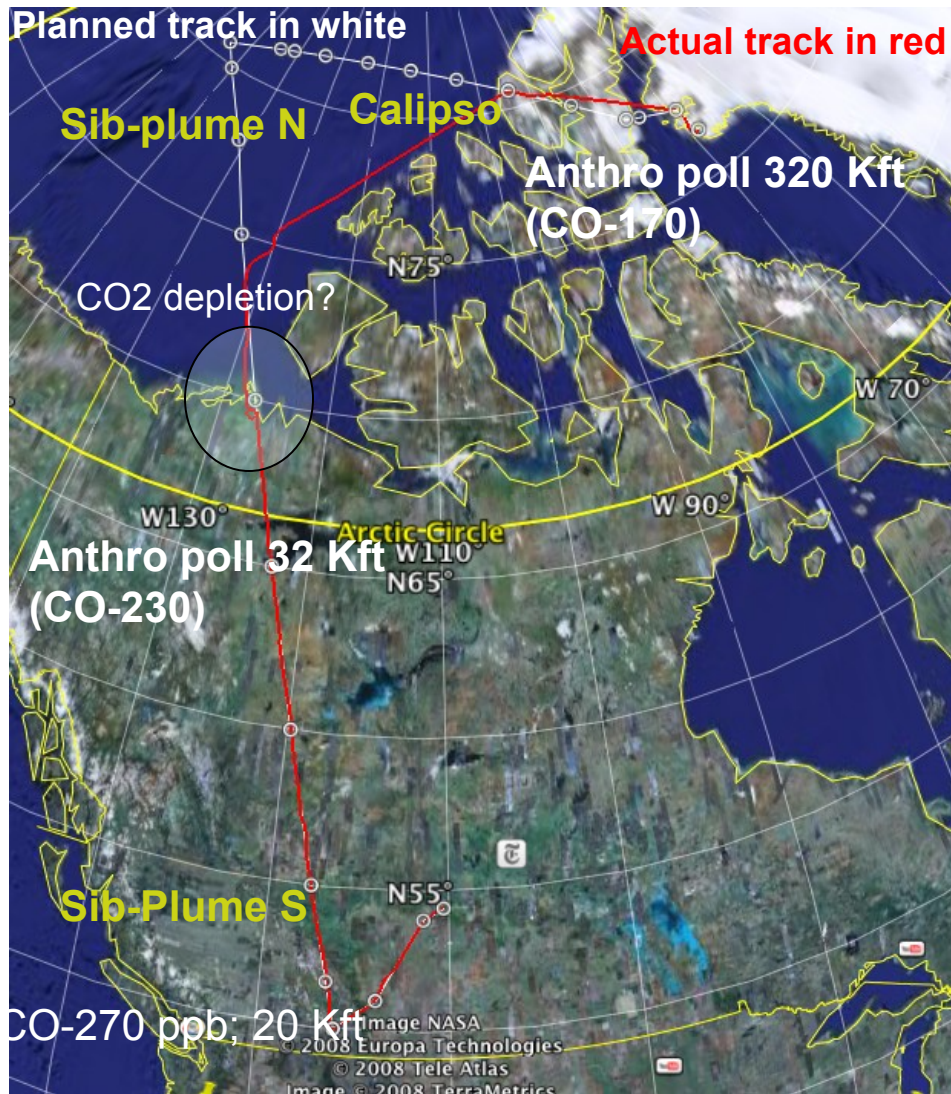
## **ARCTAS DC-8 Science Flight 21- (July 8, 2008; Tuesday)**

This was the fifth ARCTAS DC-8 science flight that originated from Cold Lake and terminated in Thule, Greenland. The main objectives were to intercept and investigate the composition of Siberian/Asian smoke plumes and anthropogenic pollution over southern Canada and near the north pole and under fly the CALIPSO satellite track (slide 2). The flight plan had to be modified substantially (slide 2) due to unexpected fuel shortage. Take off time was 0900 UT and the flight duration was 7.9 hours.

Most instruments aboard the DC-8 performed normally and collected data. The transit from Cold Lake to Thule was dominated by surface low pressure centers over the Gulf of Alaska and the Canadian Maritime Provinces. Surface cold core high pressure was located over central Canada. In the middle and upper troposphere, closed low pressure centers were over the coast of British Columbia, Saskatchewan, and the Canadian Maritimes. This combination of the three lows, and the absence of strong high pressure, created a very complex flow pattern over the flight track, i.e., winds from many different directions were encountered. Much of the flight track had clouds at multiple levels.

At takeoff we climbed to 20 Kft and headed in the south westerly direction initially sampling relatively clean air mixed with stratospheric ozone. Approaching the southern tip of the track the DC-8 encountered aged smoke (CO-250 ppb) with oxidized organics. We subsequently climbed to 30 Kft sampling high levels of pollution (CO-450 ppb) and other constituents (high CH<sub>4</sub>, N<sub>2</sub>O) that indicated anthropogenic sources. The DC-8 profiled along the northerly track encountering pollution from fires and anthropogenic sources between 15-30 Kft with CO rarely exceeding 230 ppb. We spiraled down from 32 Kft to 1 Kft AGL just before the land water interface to sample the air column and look for potential CO<sub>2</sub> sinks at the land-water-ice boundaries. Transecting this region at 1 Kft AGL showed no decline in CO<sub>2</sub> levels and no large sink activity. Heading on the northerly track the DC-8 experienced unexpected fuel shortage and the flight plan had to be curtailed and polar end aborted. The DC-8 headed east to the CALIPSO track at high altitude and towards Thule with little flexibility for altitude changes. Lidar curtains (slide 3) and in-situ- observations showed the presence of both smoke and anthropogenic pollution but we were unable to sample the region of expected maximum smoke influences in the north. Overall this was a partially successful flight as the objectives related to the northern end of the flight track (slide 2) had to be aborted due to fuel shortage. A Thule sortie (Flight 22) was subsequently added to address the northern flight track objectives.

# Flt 21 July 8, 2008 Cold Lake-Thule



GEOS5 forecasted flight curtain

# Cold Lake to Thule / DC8 Flight 21 / 8 July 2008

