INTEX-B: Flight 16 (AK local 2; May 7, 2006; Sunday)

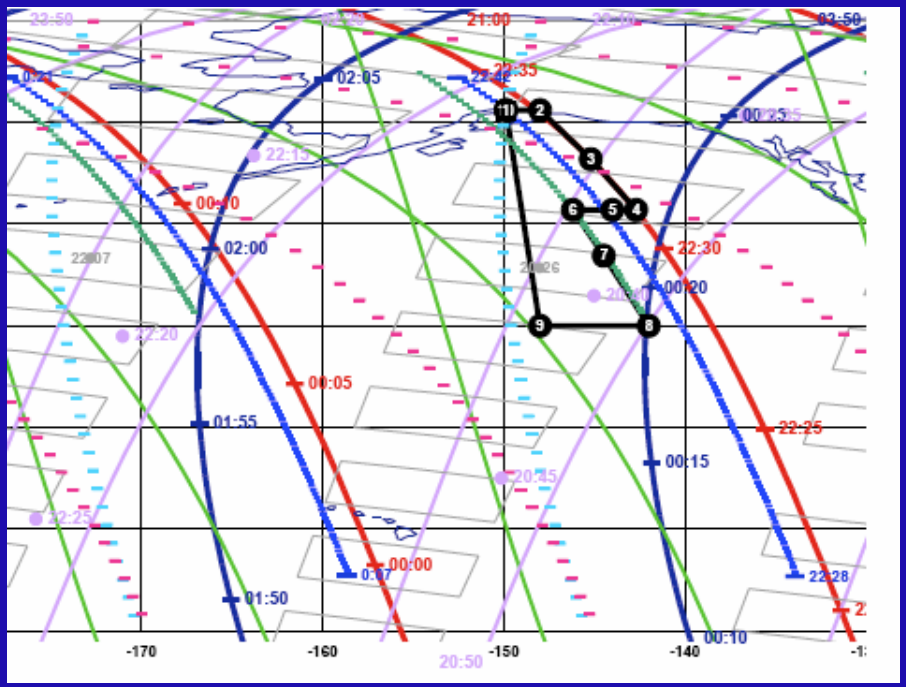
This was the 14th INTEX-B science flight and the second local flight from Anchorage, Alaska. The principal aim of this flight was to provide validation for MLS, TES along the limb track, vertical profiling through Asian plumes, and setting up coordination for C-130 sampling the following day. The nominal flight track for the DC-8 are shown in slide 2 but this was somewhat modified to avoid significant clouds. Takeoff time for the DC-8 was 1225 (AK-LT) and the flight duration was 8.5 hours.

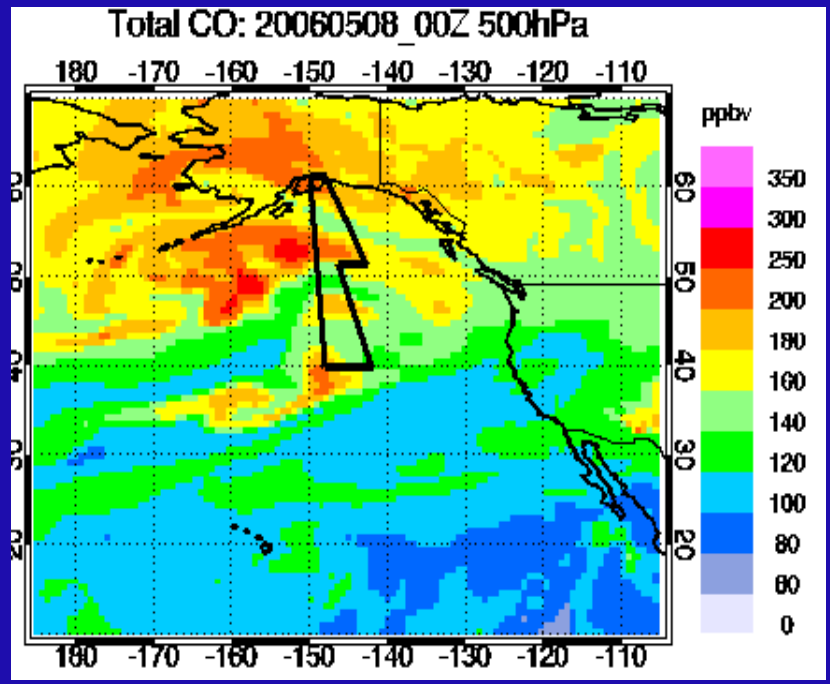
Most of the instruments aboard the DC-8 performed normally throughout the flight. Meteorological conditions during Flight 16 had many similarities to those of previous Flight 15. The MLS and TES segments were behind (west) of a cold front that was along the Alaskan and Canadian coastline. The western leg (heading back to Anchorage) was in advance of the next low and accompanying cloud band. In the middle levels, the flight track was along a ridge axis—with troughs to the east and west. The polar jet stream was located at about 45N where the DC-8 encountered winds as strong as 105 kt from the west. Flow over the flight track continued to be relatively zonal—especially in the southern portions. The tropopause was penetrated during several flight segments. The northern and southern portions of the TES track were the most cloud free. The central portion had increasing clouds, including cirrus, due to advancing frontal system from the west. The southern two-thirds of the track back to Anchorage also had extensive high and middle clouds due to this same advancing system.

This was a successful flight and we were able to meet all our main objectives. We climbed to 33 K ft heading east to Randevouz with the MLS Track with validation focused on HNO_3, CO, H_2O and O_3. The initial segment of this track was near the tropopause with occasional stratospheric excursions showing O_3 of up to 400 ppb. This leg had relatively high HNO_3 mixing ratios (0.6-1 ppb) and was completely cirrus free. Other species such as NO_x, HCHO were present at rather low mixing ratios. DIAL and chemical data suggested that the tropopause had a complicated structure, perhaps including a double structure and folding (slide 3). After this leg we dipped down to 27 K ft proving an opportunity for MLS to sample in a cloud free UT/LS region. The 27 Kft leg encountered both pollution (SO_2-0.4 ppb) and stratospheric influences (O_3: 70-200 ppb) with HNO_3 concentrations remaining in the 0.2-0.6 ppb level. Subsequently we climbed back up to 33 K ft and reached HNO_3 levels of about 1 ppb. As we flew the MLS track, the clouds generally decreased in coverage, and the high clouds became much less frequent. This transect should be an excellent opportunity for MLS validation for HNO_3, CO, and H_2O, and O_3. After the MLS validation we profiled and sampled the troposphere in the westerly direction to meet up with the TES limb track. Dust and pollution layers were found in the middle troposphere with CO exceeding 250 ppb ands PANs approaching 1 ppb.. We climbed up to 33 K ft at the TES-Limb point to find extensive anthropogenic pollution in the UT/LS region as predicted by some of the models. Here high concentrations of pollutants (CO-235 ppb; SO_4-0.4 ppb, PANs-0.6 ppb) coexisted with high O_3 (100 ppb). Subsequently we descended to 15 Kft to provide a truly tropospheric validation for TES with HNO_3 in the range of 75-150 ppt. There were minimal cirrus and generally the atmosphere above was cloud free. We descended down to the surface in relatively clean and uniform marine air. Ascent once again indicated significant midlevel pollution and dust showing high depolarization and total scattering. We profiled the entire troposphere on the northerly leg returning to Anchorage under somewhat cloudy conditions.

ICATS archived data files for INTEX-B are available at: http://www.nasa.gov/centers/dryden/research/AirSci/DC-8/ICATS/FY06/INTEX-B/index.html

Plan for Sunday DC-8 flight 05/07

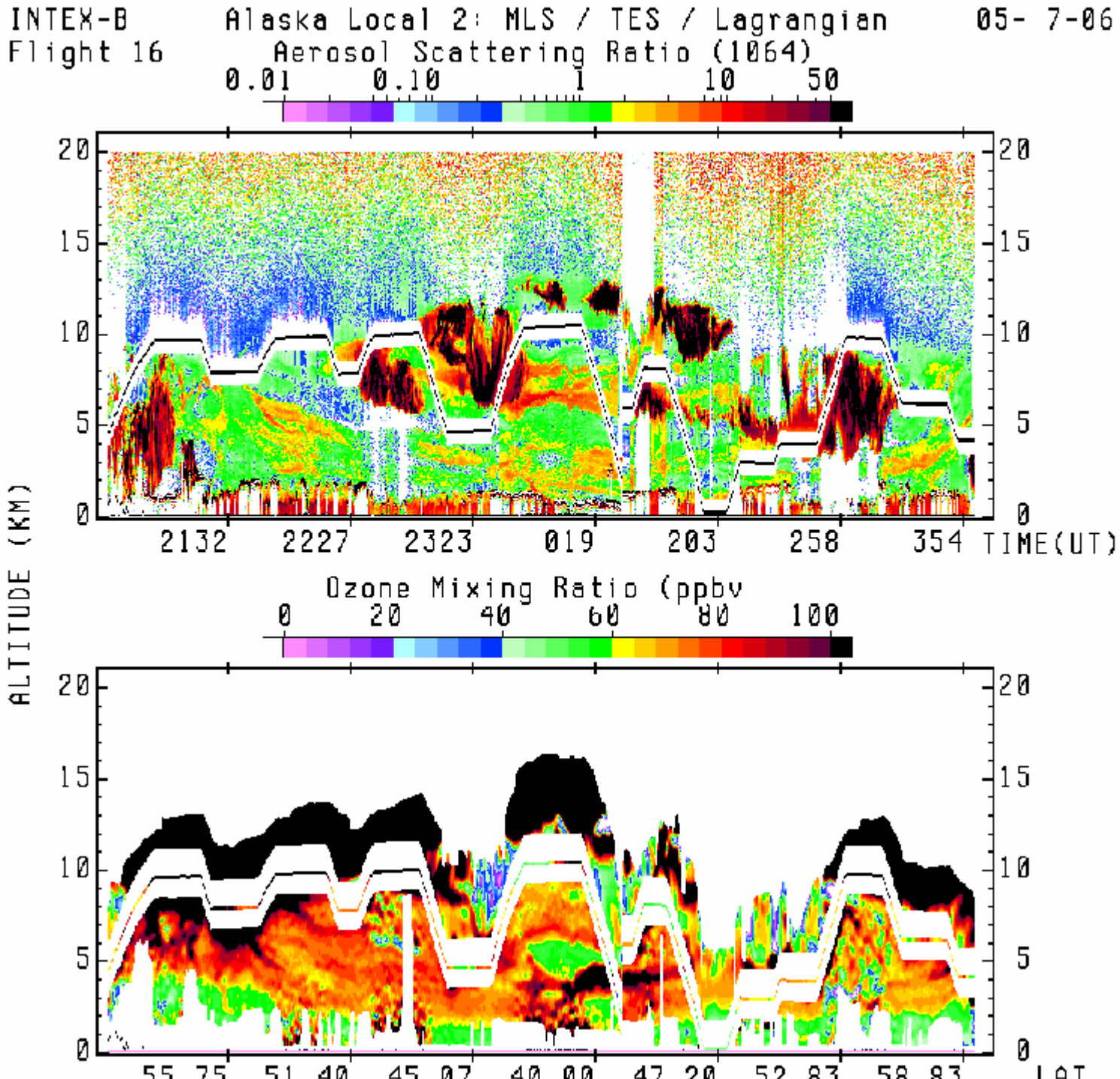




- Asian pollution (Lagrangian w/C-130)
- MLS validation
- TES limb validation

- Points 2-4: MLS track
- Points 6-8: TES limb track
- Points 8-10: Vertical profiling through Asian plumes

Take off: 1230 LT
Flight duration: 8.5 hrs


INTEX-B
Flight 16
Alaska Local 2: MLS / TES / Lagrangian
05- 7-06
Aerosol Scattering Ratio (1064)
0.01
0.10
1
10
50
ALTITUDE (KM)
20
15
10
5
0
2132
2227
2323
019
203
258
354
TIME(UT)
Ozone Mixing Ratio (ppbv
0
20
40
60
80
100
55.75
51.40
45.07
40.00
47.20
52.83
58.83
LAT