

INTEX-B: Flight 15 (AK local 1; May 4, 2006; Thursday)

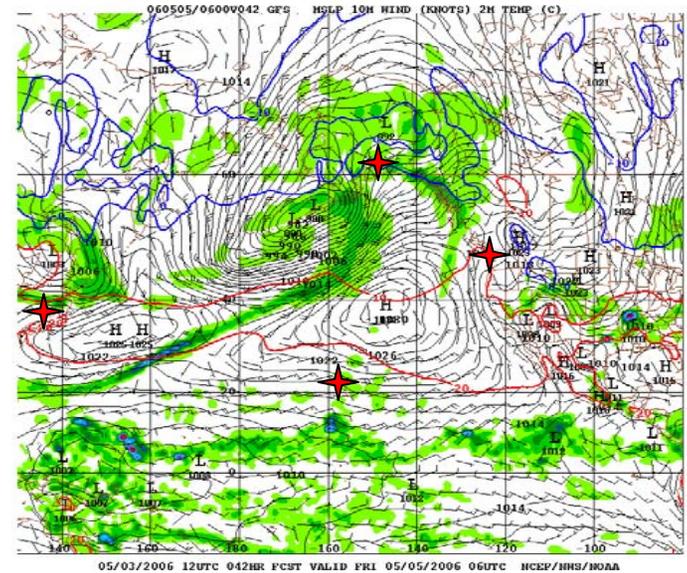
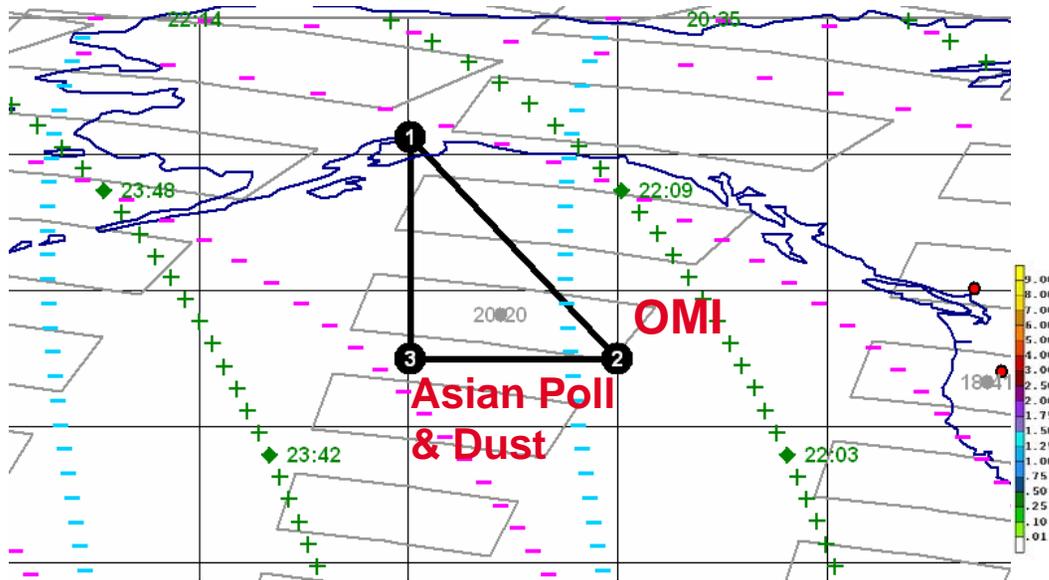
This was the 13th INTEX-B science flight and the first local flight from Anchorage, Alaska. The principal aim of this flight was to provide validation for OMI especially behind a front, perform clear air sampling of Arctic air and recent Asian pollution, and set up coordination with the C-130 for sampling on Friday. 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 11 am (AK-LT) and the flight duration was 8 hours.

Most of the instruments aboard the DC-8 performed normally throughout the flight. Flight 15 was located between two cyclonic systems. The easternmost system was dissipating over northeastern Alaska, with its frontal system along the eastern Pacific coastline. The second system was still developing just south of the central Aleutians; its frontal system/cloud band extended eastward to near 55N, 150W, and then southwestward over the central Pacific. This low was very intense, with a central pressure around 984 mb. The flight track was in the dry, subsiding air behind the first system and just in advance of the warm, ascending air (warm conveyor belt) of the western system. The polar jet stream was located near 45N where the DC-8 encountered winds of 125 kt. In general, the eastern flight leg was relatively cloud free. The cloud tops were very uniform at about 5 Kft. The western flight leg (heading north) had widespread cloud cover that rapidly moved eastward into our region as the second low advanced eastward. Low level winds along the northward moving track were very strong, reaching 45 kt at 1 Kft. There were indications of stratospheric air along some portions of the flight; however, the DC-8 never fully passed into the stratosphere.

This was a successful flight and we were able to meet all our main objectives. Climbing out of Anchorage the DC-8 encountered pollution layers with moderately high CO (180 ppb) and O₃ (75 ppb) at 10-12 Kft. At the first 21 Kft leg there were already stratospheric influences with O₃ ranging from 80-120 ppb, depleted N₂O, and moderately high HNO₃ mixing ratios (50-120 ppt). Slide 3 shows a DIAL profile of O₃ and aerosols along the Flight 15 track. We headed in the south easterly direction profiling and sampling the troposphere. The boundary layer was generally clean (O₃-45 ppb, HCHO-150 ppt, NO_x<50 ppt) and showed very little variability while the middle and upper troposphere were highly variable as a result of pollution and stratospheric influences. At the southern end of this leg we spiraled down from 33 to 0.5 Kft behind a front within the OMI swath and coincident time under relatively cloud free conditions. This spiral was selected for OMI validation which has typically shown high NO_x columns behind fronts. This was not the case in this spiral and actually NO_x concentrations were rather low (<50 ppt) but O₃ remained high (40-70 ppb). This front was expected to be closer to Seattle for the C130 to cross the front and sample the following day. Moving west on the southerly leg we encountered several layers of relatively fresh pollution in the lower troposphere with CO and O₃ in excess of 225 ppb and 100 ppb. The composition indicated unique signatures with high SO₂ (0.2-1 ppb), SO₄ (0.4 ppb), and H₂O₂ (1-2 ppb) but relatively low NO_x (<50 ppt) and HCHO (0.2 ppb). Heading north under relatively cloudy conditions we encountered several dust layers in the middle to upper troposphere. We profiled the troposphere extensively on this path on our way to Anchorage.

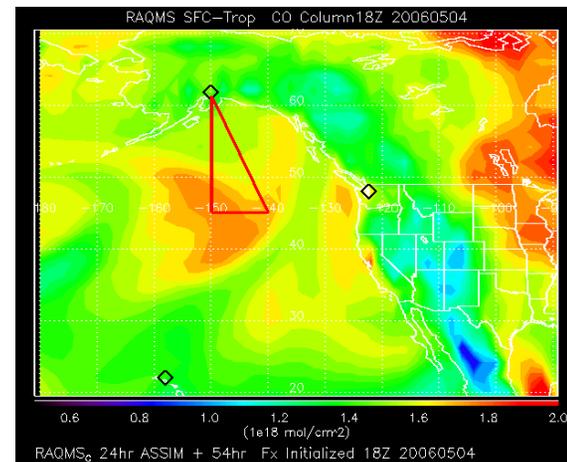
ICATS archived data files for INTEX-B are available at: <http://www.nasa.gov/centers/dryden/research/AirSci/DC-8/ICATS/FY06/INTEX-B/index.html>

Flight Plan Thursday, 5/4/2006



11 AM Take off; 8.5 hours

- Clear air sampling of mixing of Arctic background, clean maritime, and recent Asian emissions within synoptic low.
- OMI/SCIA NO₂ validation spiral at pt 2
- OMI ozone validation with Dial curtain under cirrus
- Coordinated with C130 frontal transect flight on Friday



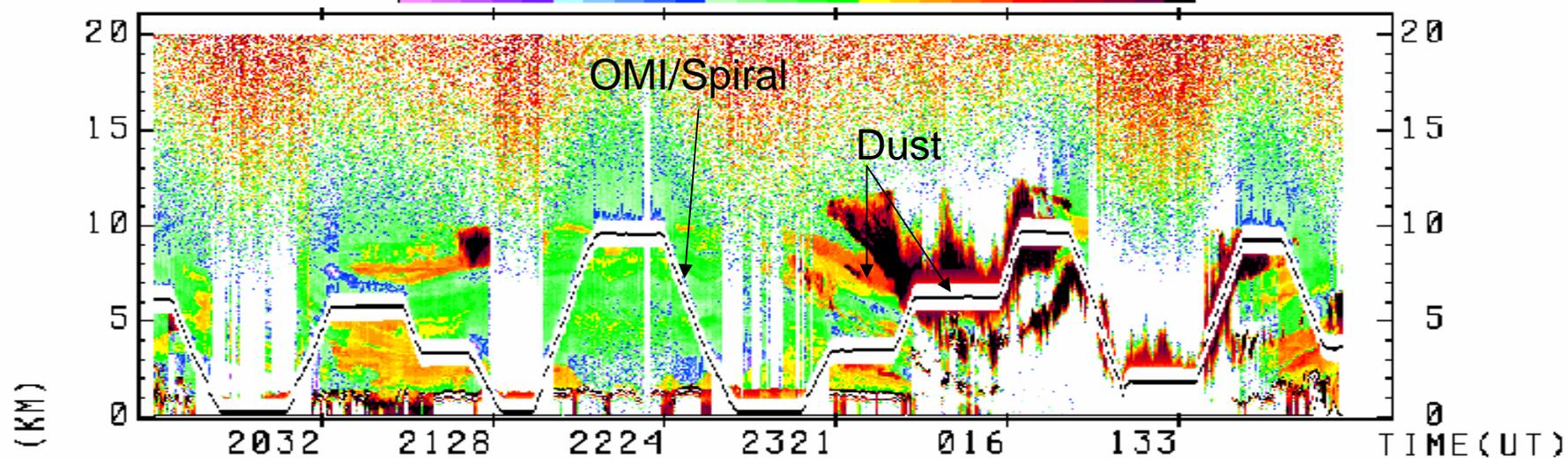
RAQMS
CO Col

INTEX-B
Flight 15

Alaska Local 1: Frontal Outflow / OMI

05-4-06

Aerosol Scattering Ratio (1064)
0.01 0.10 1 10 50



Ozone Mixing Ratio (ppbv)
0 20 40 60 80 100

