

INTEX-B: Flight 19 (Transit AK to ND; May 15, 2006; Monday)

This was the 17th and final INTEX-B science flight originating in Anchorage, AK and concluding in Grand Forks, ND. This final mission had several science objectives in addition to transit to Grand Forks to end the campaign. In priority order these included: final inter-comparison with the C-130, a spiral with the Duchess, a boundary layer leg over Montana in the OMI view to seek apparent NO₂ hotspots (thought to relate to agricultural practices), and several opportunities to intercept plumes of Asian outflow. The nominal flight track and model forecast for the DC-8 are shown in slides 2 and 3 respectively. Nominal takeoff time for the DC-8 was 0700 (AK-LT) and the flight duration was 8.8 hours.

Instruments aboard the DC-8 performed normally throughout the flight. Synoptic conditions during Flight 19 were considerably different from those of most previous flights in the area. The persistent low pressure over the Gulf of Alaska finally had moved southward to off the west coast of California (near 40N, 140W). It was replaced by weak high pressure over central Alaska. A high pressure ridge was oriented over the Rockies, with a deep cut off low over the Mississippi River Valley. Intense low pressure areas forming over eastern Asia now were moving more northeastward, instead of eastward toward the Gulf of Alaska. These factors represented a major shift to much higher amplitude flow and apparently got the sea otters in Alaska feeling particularly perky! As the DC-8 headed southward from Anchorage toward the low, the tropopause lowered, with stratospheric conditions encountered near 29,000 ft. The polar jet stream was crossed near 55N. The tropopause then began to rise in altitude as the aircraft headed east toward the high pressure ridge. Regions of clear to cloudy skies were encountered between Anchorage and the Seattle area. The C-130 comparison leg contained ideal weather conditions. Overcast cirrus were present over the northern portion of the run, but these diminished to only scattered cirrus farther south. No middle or low level clouds were located over the inter-comparison region. The area of the Duchess spiral also contained only broken cirrus clouds. The leg from Washington to Grand Forks was virtually cloud free. Light turbulence was encountered in the boundary layer.

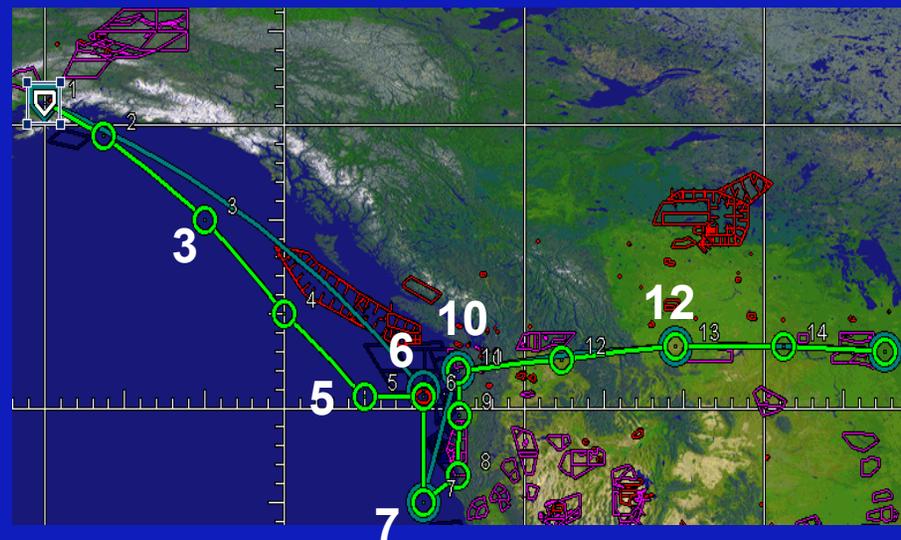
All objectives were met. Takeoff was a little late, and unexpectedly strong headwinds were encountered as we headed to the C-130 rendezvous. When the first high altitude leg was clearly in the stratosphere we remained at altitude to make up time. Pollution (Asian?) was encountered on all subsequent high altitude legs over the Pacific (marked primarily by elevated CO and PANs). The DC-8 was nearly 30 minutes late to meet the C-130 but the pilots and navigator arranged a very smooth meeting and superb formation flight for all 3 planned legs (separation appeared less than on all previous attempts throughout INTEX B). Meeting up with the Duchess was further delayed due to a lower ceiling for this platform than expected, again changes were successfully made in real time and the concentric spirals were executed as planned. In the boundary layer run after this spiral very high levels of North American pollution, including giant aerosols, were measured. Enroute to Montana we had splendid views of the volcanoes of the Cascades, particularly Rainier (for those on the left) and St. Helens (on the right). The 20 minute boundary layer run over the high plains went as planned, NO₂ was elevated (to several 100 ppt) but the feeling was that this was not a real event like those reported by OMI (too long since the last rain??). We ascended to 32 K feet for the final science leg of INTEX B, to stay in the troposphere and search for aged Asian pollution. A DIAL summary showing O₃ and aerosol distribution along the flight track is shown in slide 4. Near the end of this leg strong enhancements in CO (over 270 ppb, which was near the max for this flight) were observed, accompanied by less extreme enhancements in PANs. To top it all off, we landed at Grand Forks after 8.8 hours, only to find that the "NSERC" hangar was in use by the Air Force.

JICATS 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 INTEX-B flight#19 – Anchorage-Grand Forks transit on Monday 5/15 updated Sunday 5/14 @20Z

Objectives:

- Transpacific Asian plume previously sampled Friday
- Intercomparison w/C-130
- Intercomparison w/Duchess (Jaffe)
- Boundary layer over Montana farmland



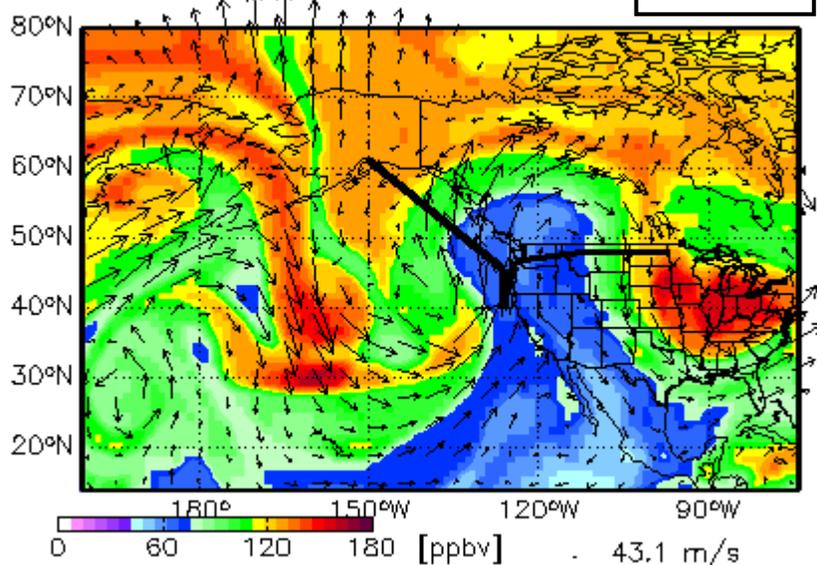
- Points 3-5: vertical profiling at 25-35K
- Points 6-7: C-130 intercomparison starting at 1755Z
 - three 15-min legs at 17K, 10K, 1K, in-progress descent at 1K/min
- Point 10: Duchess intercomparison starting at 20Z
 - 7-min circle at 19K, spiral down to 1K at 1K/min, 5-min 1K leg in progress at the end
- Points 12: Montana 1K 20-min leg

Take-off time about 0655 local, < 9h flight

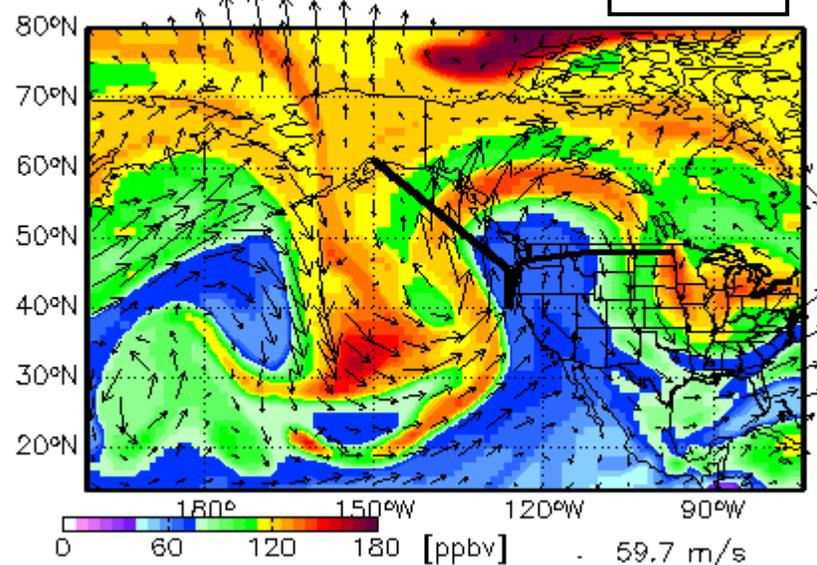
5/14 00Z forecast

Monday 5/15 18Z

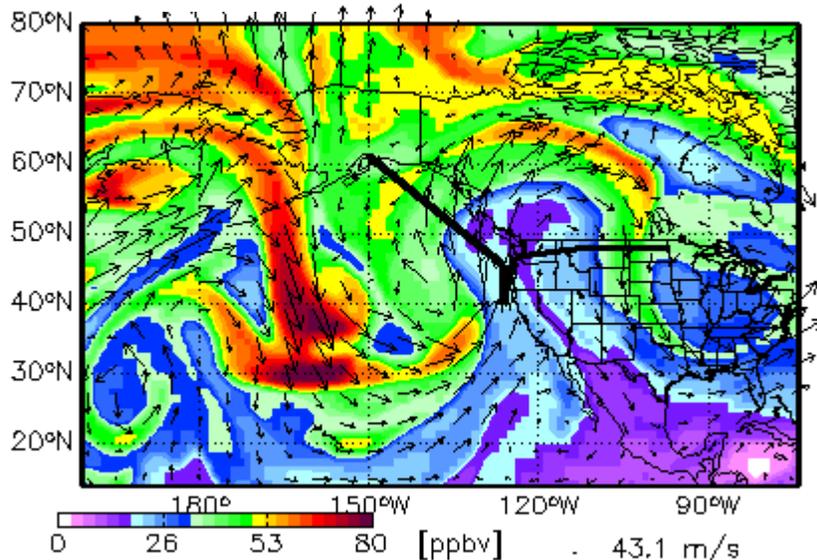
CO 20060515 18 GMT at 430 hPa (6.6km)



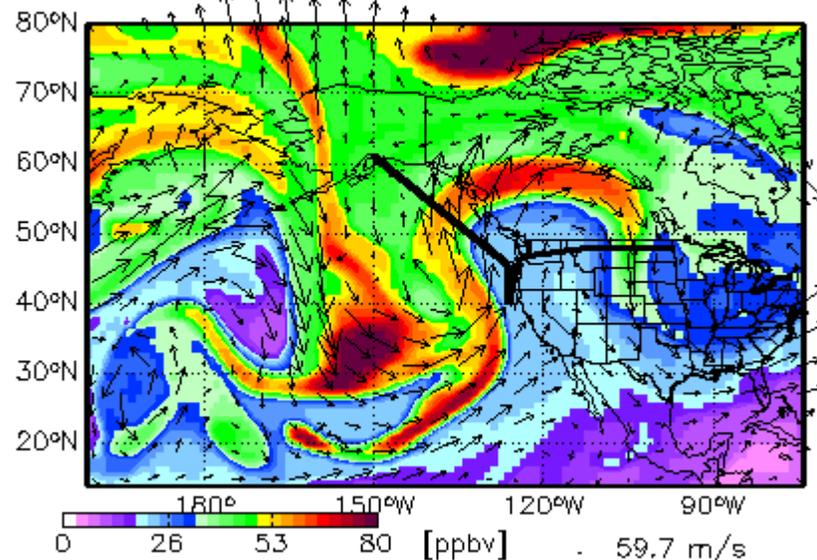
CO 20060515 18 GMT at 310 hPa (8.8km)



Asian CO 15 18 GMT at 430 hPa (6.6 km)



Asian CO 20060515 18 GMT at 310 hPa (8.8 km)

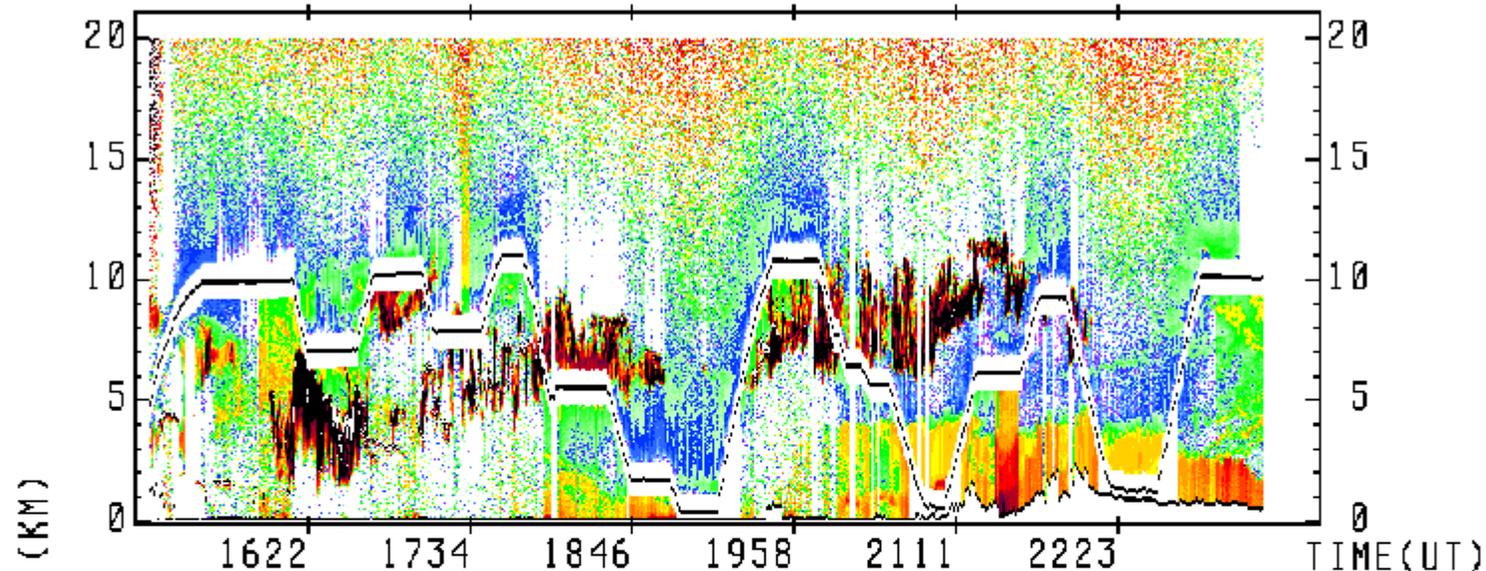


INTEX-B
Flight 19

Alaska to North Dakota: C130 / Duchess
Aerosol Scattering Ratio (1064)

5-15-06

0.01 0.10 1 10 50



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

