INTEX-B: Flight 14 (Hi-AK transit; April 30, 2006; Sunday night)

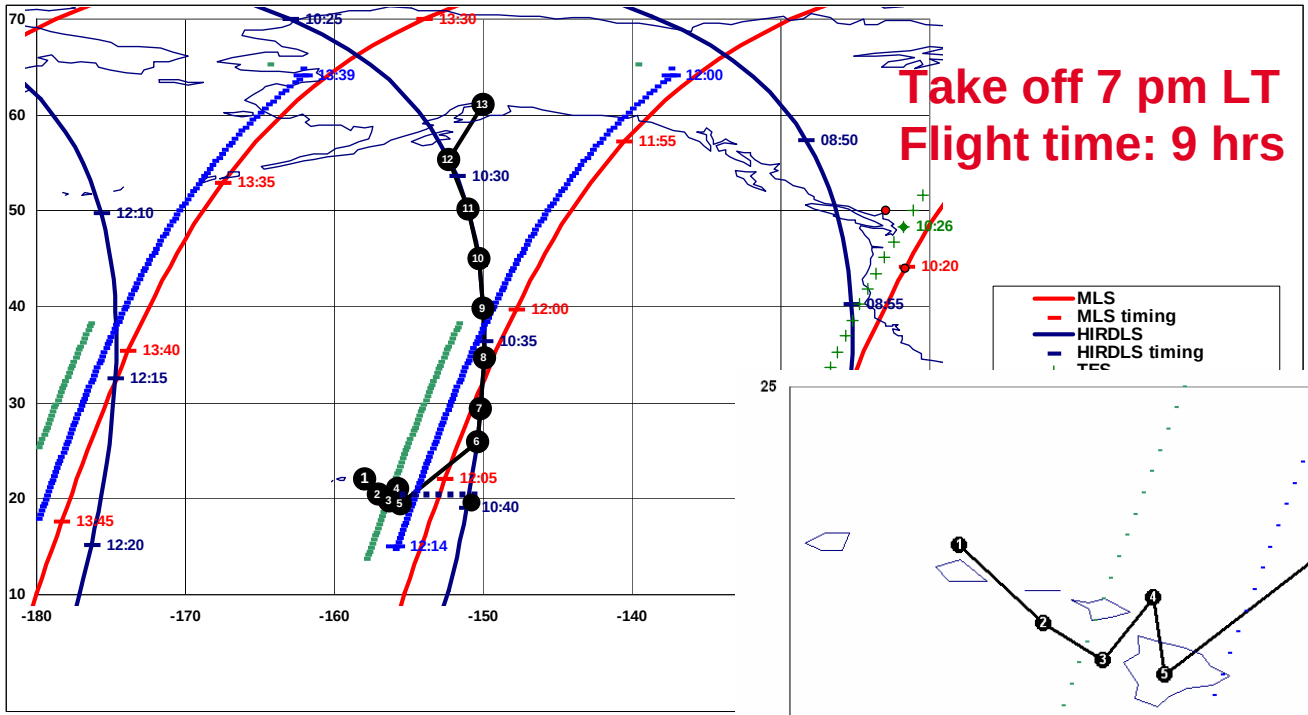
This was the 12th INTEX-B science/transit flight that originated in Hawaii and concluded in Anchorage, Alaska. The principal aim of this flight was to provide extensive validation of the HIRDLS instrument aboard the Aura satellite and accordingly this was a night flight. In addition to HIRDLS validation, the DC-8 had several other objectives that included sampling Asian pollution, TES validation, inter-comparisons with instrumentation at the Mauna Loa observatory, and a specialized channel run targeted to study air-sea exchange processes. The nominal flight track for the DC-8 are shown in slide 2 but this were somewhat modified to avoid significant clouds. Takeoff time for the DC-8 was 07:10 pm am (Hi-LT) and the flight duration was 9.2 hours.

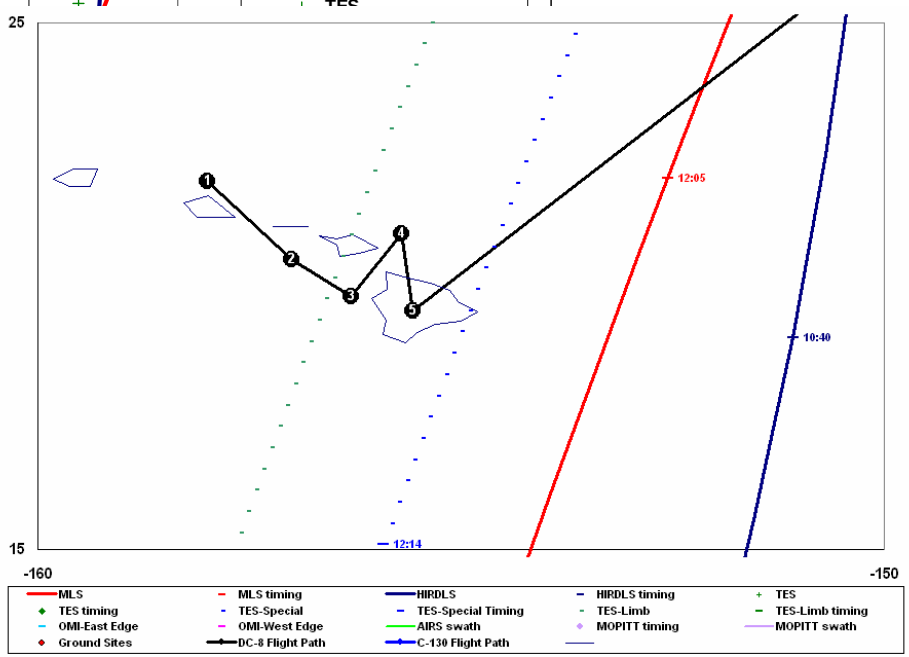
Most of the instruments aboard the DC-8 performed normally throughout the flight. Despite many concerns about clouds, the atmospheric conditions turned out to be quite favorable for achieving stated objectives. Two low pressure systems had a major effect on the transit from Honolulu to Anchorage. An inverted trough at the surface and a closed low aloft produced a small area of convective precipitation near 30N, 150W. The second system was a major low pressure system over the Gulf of Alaska with a trailing cold front to the south. This system produced a broad area of multi-layered clouds through which the DC-8 traveled. Conversely, skies were relatively clear near Hawaii and near the approach to Anchorage. The DC-8 crossed the polar jet stream near 30N, passing near the exit region of a jet streak whose center was near 30N, 170W. The mid-tropospheric flow continued to be relatively zonal in the southern middle latitudes, and more highly amplified in the northern latitudes.

This was a successful flight and we were able to meet all our main objectives. After an initial warm up period we descended down to 1 Kft to perform the channel run which included a transect south of Maui at 1 Kft and then a return leg a 15 kft.. The surface layer was moderately polluted (SO_2-1 ppb; HCHO-1 ppb; O_3-30 ppb) and somewhat cleaner at 15 Kft (HCHO-0.3 ppb; O_3-30 ppb. Subsequently we spiraled over the Mauna Loa observatory to do some inter-comparisons with Lidar's and in-situ instrumentations operating at Mauna Loa. Automatic Umkerr, JPL ozone/temperature/aerosol lidar, and several in-situ instruments operated at the observatory during the spiral. The plan to launch an ozonesonde had to be scrubbed due to operational difficulties at the observatory. After the Mauna Loa run the DC-8 headed east to randevouz with the HIRDLS track at 35 Kft under cloud free conditions. We headed north along this track under excellent solar zenith conditions for AROTAL to continue to get data in the stratosphere with occasional cirrus caused blackouts (slide 3). There was evidence of mid-tropospheric pollution along the southern part of the HIRDLS track (slide 4). Near point 11 the conditions were good enough to do a complete TES spiral where we saw a double stratospheric fold as well as pollution at multiple levels. Here stratospheric ozone was mixed with pollution (high CO and PAN) but contained very little nitric acid. CO as high as 200 ppb and O_3 as high as 80 ppb was measured in this TES column. During descent and ascent back to 39 Kft there was evidence of mid-tropospheric pollution. We continued on the HIRDLS track from 19-51 N remaining near the tropopause most of the time. After 51N we penetrated the tropopause (39 Kft) north of the jet stream. For the remainder of the high altitude leg we were in the stratosphere with O_3 exceeding 700 ppb. The AROTAL instrument continued to perform normally throughout this flight collecting extensive amount of O_3 and T data deep into the stratosphere useful for HIRDLS validation (slide 3). After completing the northerly leg mostly in the lower stratosphere we headed for Anchorage to land in daylight.

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

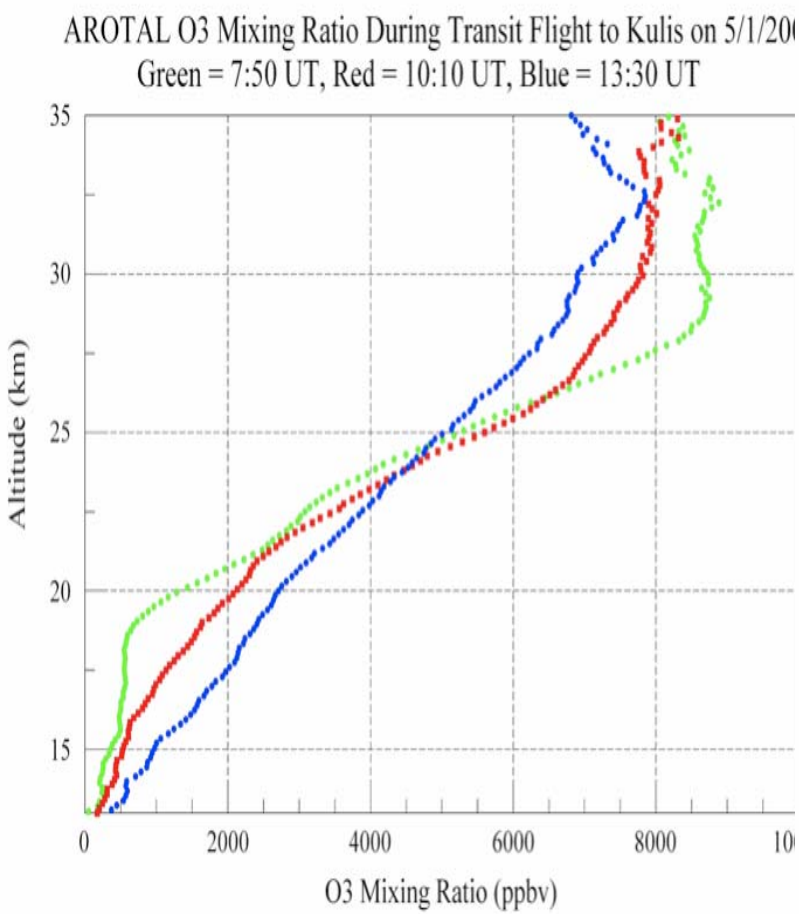
DC-8 Flight 14 Transit to Alaska- Sunday April 30-night flight

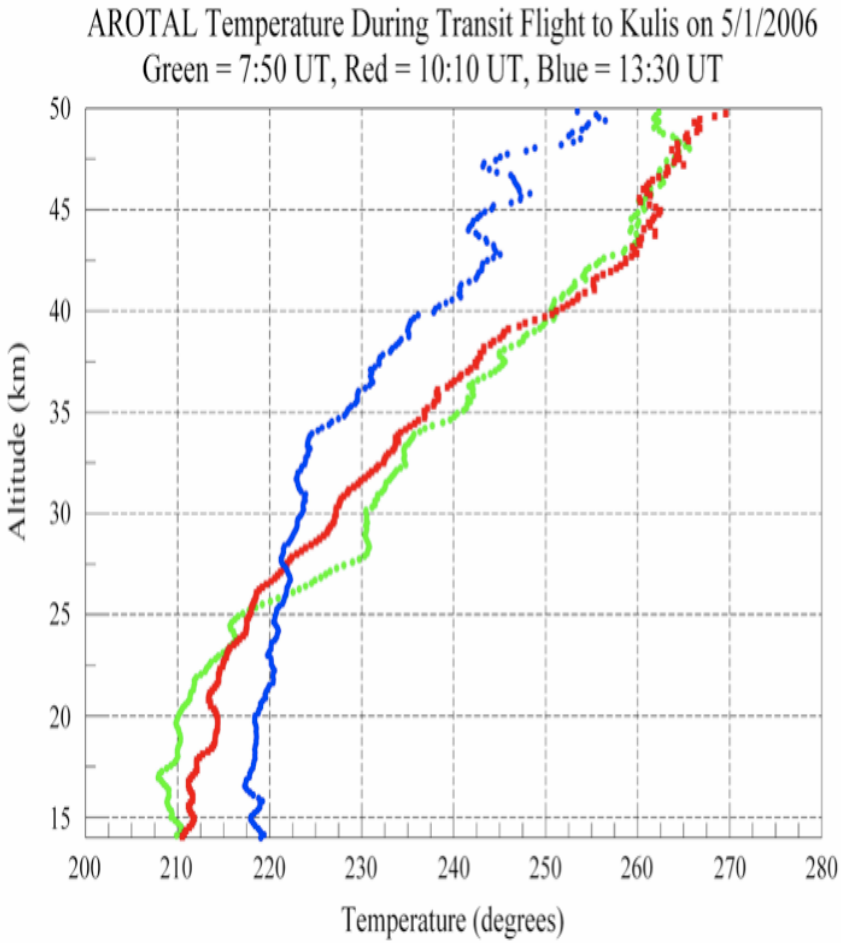




- HIRDLS Track
- TES spiral
- Channel run
- Mauna Loa spiral

DC-8 Night Flight 14: AROTAL O_3 and Temperature





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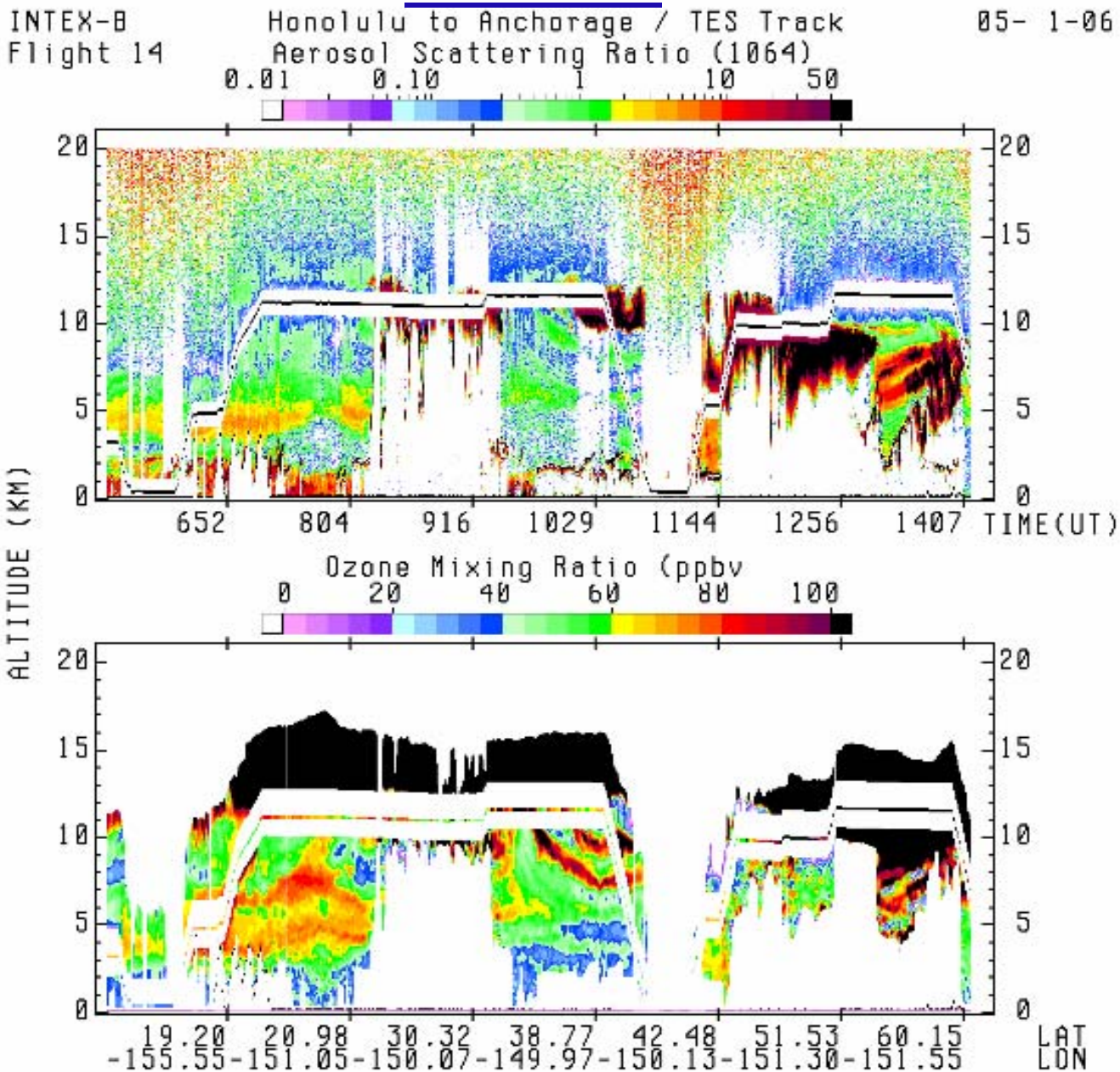
INTEX-B
Flight 14
Honolulu to Anchorage / TES Track
Aerosol Scattering Ratio (1064)
05- 1-06
0.01 0.10 1 10 50
ALTITUDE (KM)
652 804 916 1029 1144 1256 1407 TIME(UT)
Ozone Mixing Ratio (ppbv
0 20 40 60 80 100
19.20 20.98 30.32 38.77 42.48 51.53 60.15 LAT
-155.55-151.05-150.07-149.97-150.13-151.30-151.55 LON