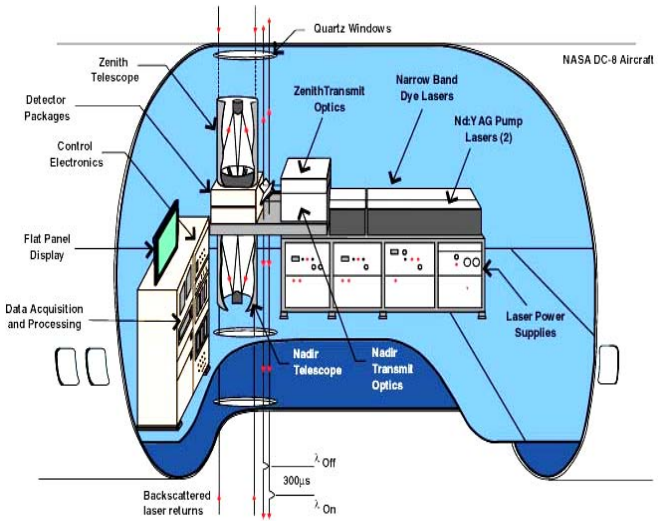
Large-Scale Variability of O_3 and Aerosols Over Mexico & Gulf of Mexico During INTEX-B/MILAGRO

Ed Browell, John Hair, Carolyn Butler, Marta Fenn, Tony Notari, Susan Kooi, Syed Ismail, Rich Ferrare, Melody Avery, & INTEX-B Science Team



Ozone & Aerosol Measurements

- **Nadir & Zenith Ozone Profiles**
- **Nadir & Zenith Aerosol Backscatter at 588 and 1064 nm**
- **Nadir & Zenith Aerosol Depolarization at 588 nm**

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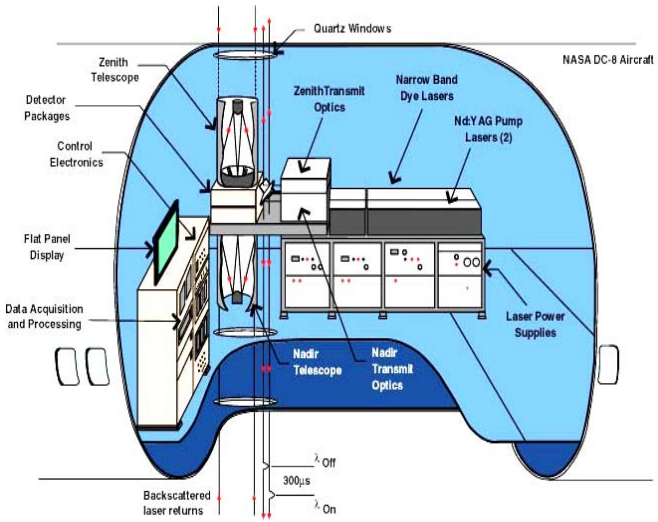

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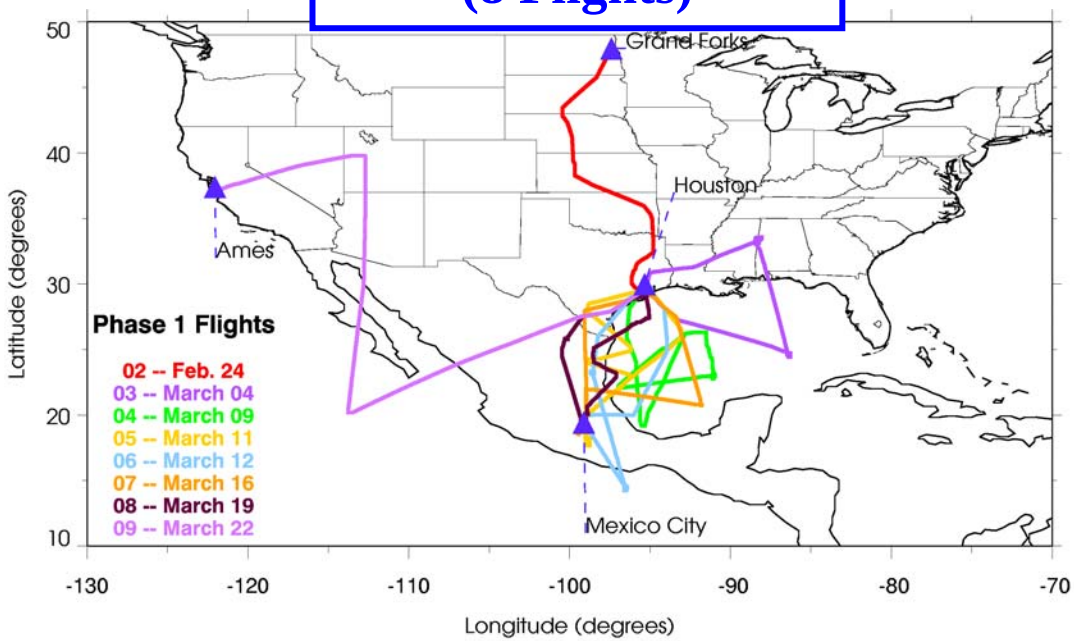
Derived Parameters

- **Aerosol Backscatter Profiles Corrected For Aerosol Extinction**
- **Chemical Tropopause Altitudes & Column Ozone Values**
- **Average Latitudinal & Longitudinal Ozone and Aerosol Distributions**
- **Estimate of Stratospheric Contribution to Tropospheric Ozone Budget**

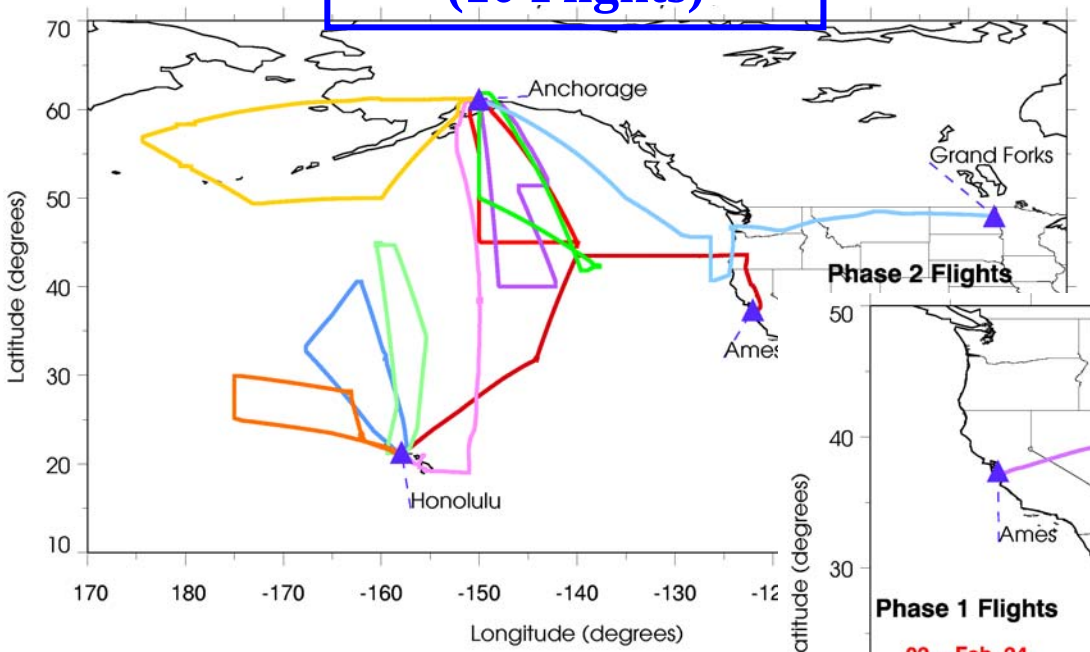
INTEX-B (24 Feb.-15 May 2006)
Airborne UV DIAL Flight Tracks

Phase-1
24 Feb.-22 March
(8 Flights)

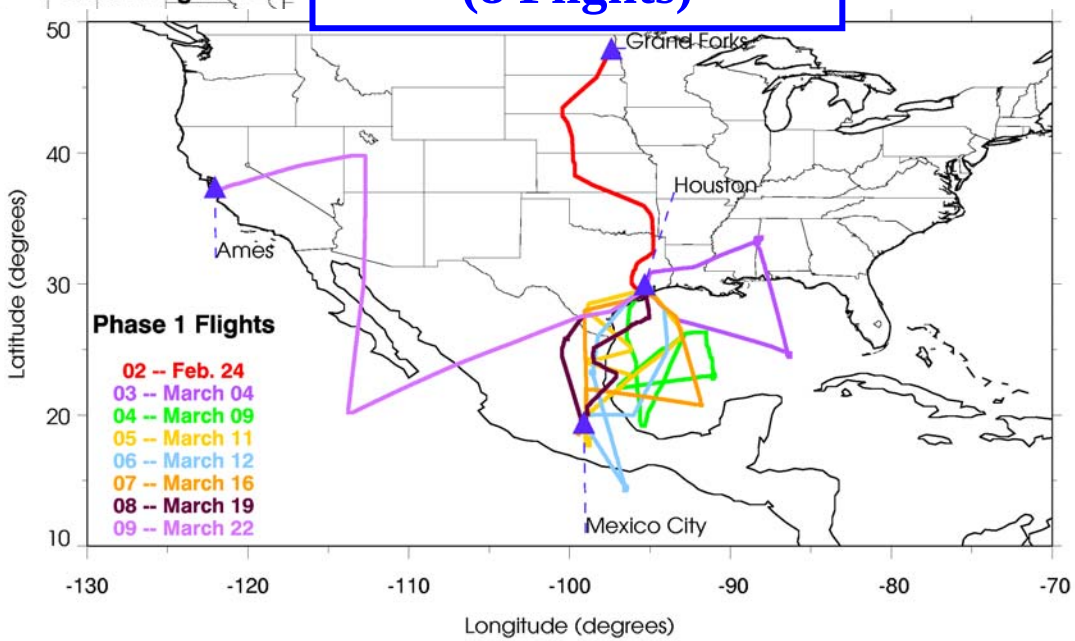


INTEX-B (24 Feb.-15 May 2006)
Airborne UV DIAL Flight Tracks

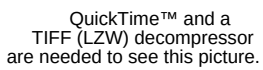
Phase-2
17 April-15 May
(10 Flights)



Phase-1
24 Feb.-22 March
(8 Flights)

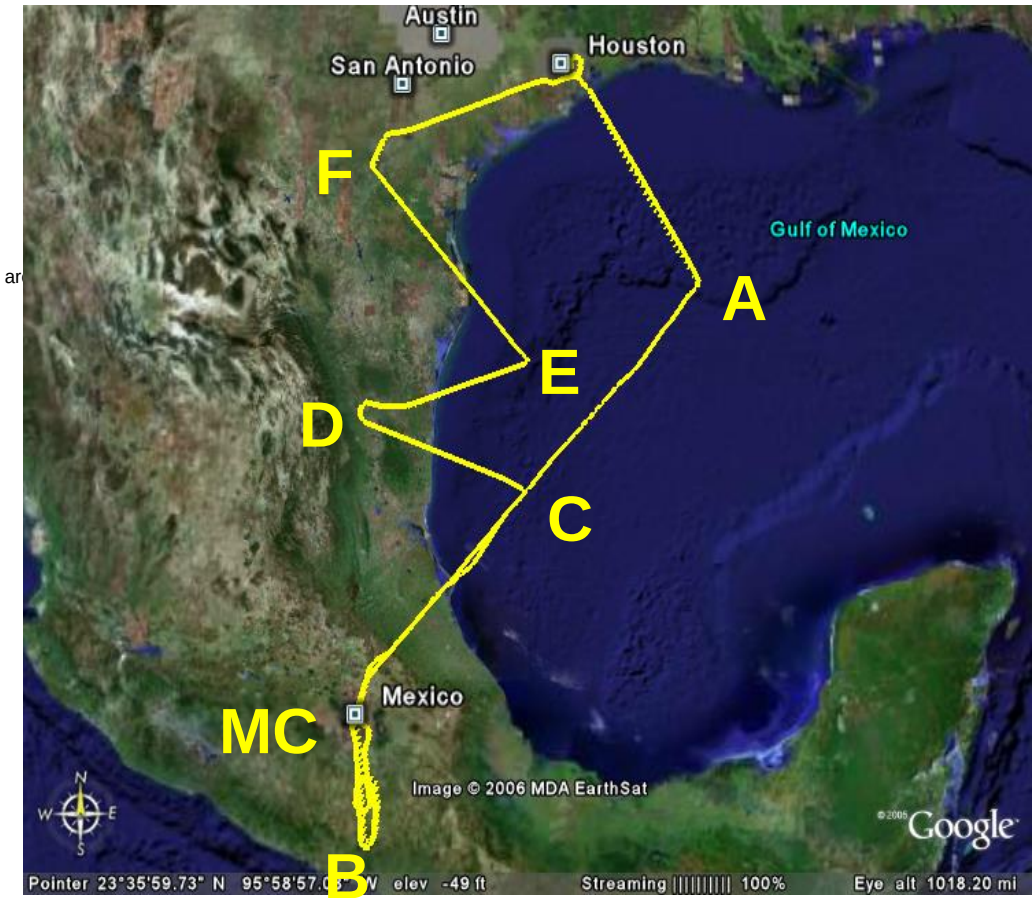


Mexico City Plume Flt. #1, 11 March 2006



Mexico City Plume Flt. #1, 11 March 2006

DC-8/DIAL Flight Track



Mexico City Plume 1
Flight 5
Aerosol Scattering Ratio (1064 nm)

11 Mar 06

0.01 0.1 1 5 10 50

18:00 19:00 20:00 21:00 22:00 23:00 UT

A MC B MC C D E F

Altitude, km ASL

0 2 4 6 8 10 12 14 16

Ozone Mixing Ratio, ppbv

0 20 40 60 80 100

17:30 18:30 19:30 20:30 21:30 22:30 23:30 UT

A MC B MC C D E F

Altitude, km ASL

0 2 4 6 8 10 12 14 16 18

27.57 23.20 18.31 20.21 23.28 24.93 28.59 N Lat

-93.73 -95.82 -99.02 -98.83 -96.82 -96.10 -98.46 E Lon

Mexico City Plume 1
Flight 5
11 Mar 06

Aerosol Scattering Ratio (588 nm)

0.01 0.1 1 5

18:00 19:00 20:00 21:00 22:00 23:00 UT

A MC B MC C D E F

Altitude, km ASL

0 2 4 6 8 10 12 14 16

Total Depolarization %

0 10 20 30 40 50

18:00 19:00 20:00 21:00 22:00 23:00 UT

A MC B MC C D E F

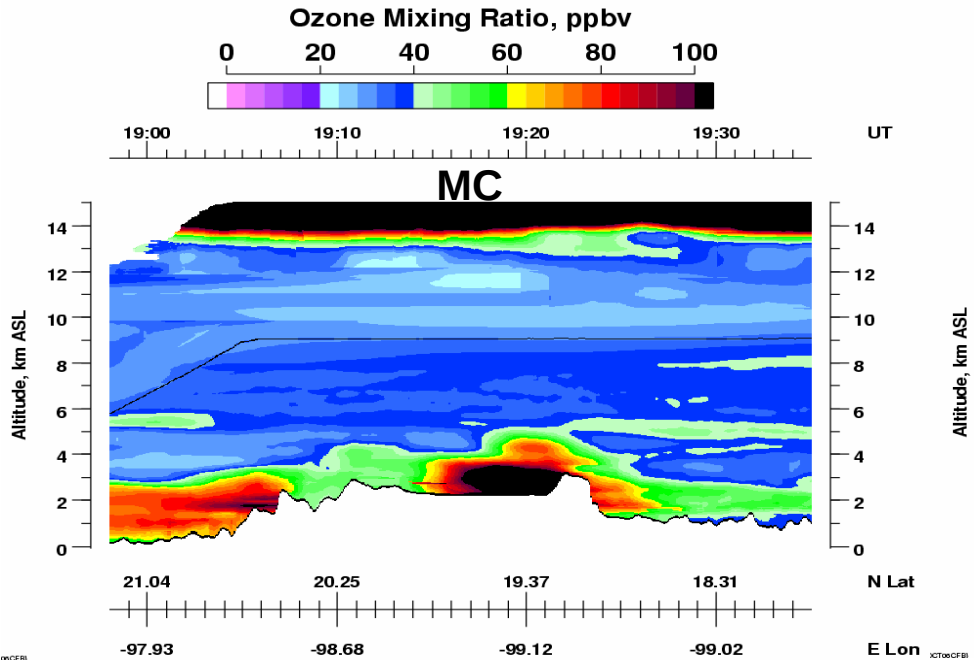
Altitude, km ASL

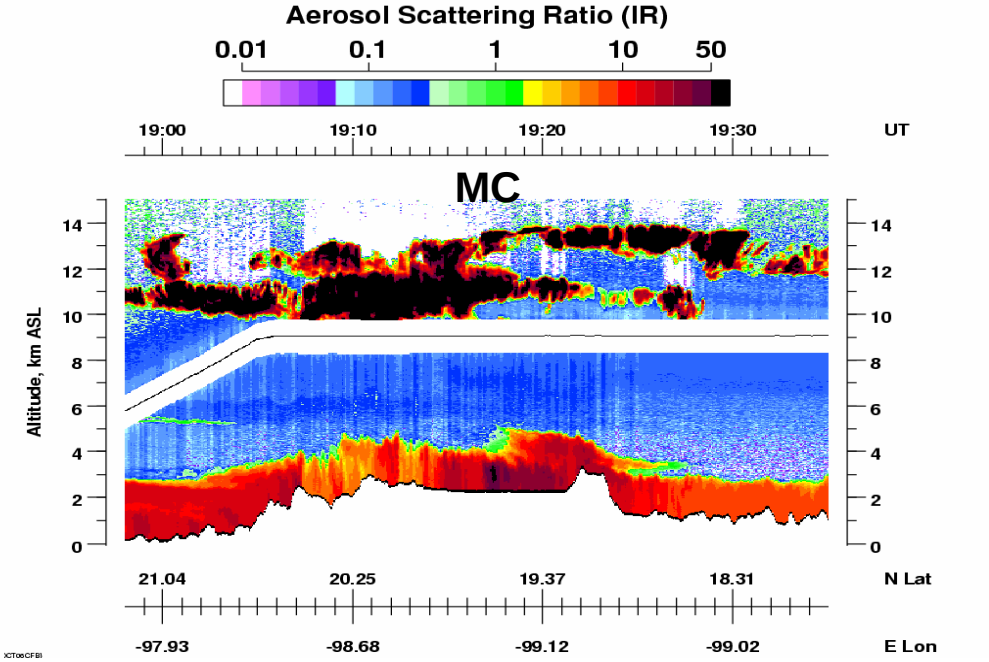
0 2 4 6 8 10 12 14 16

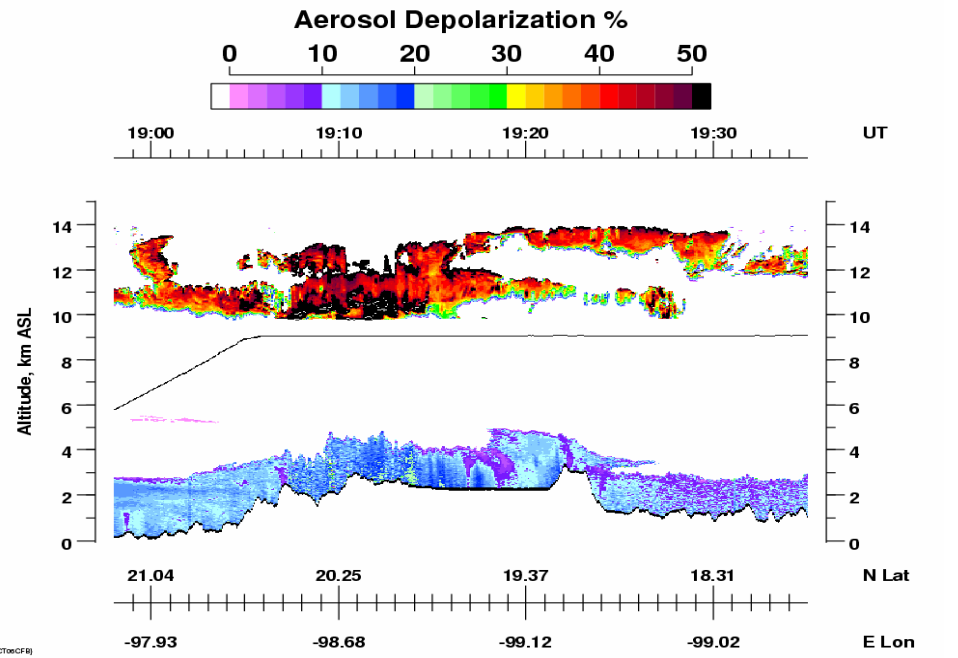
24.97 21.00 17.98 21.73 24.18 26.70 N Lat

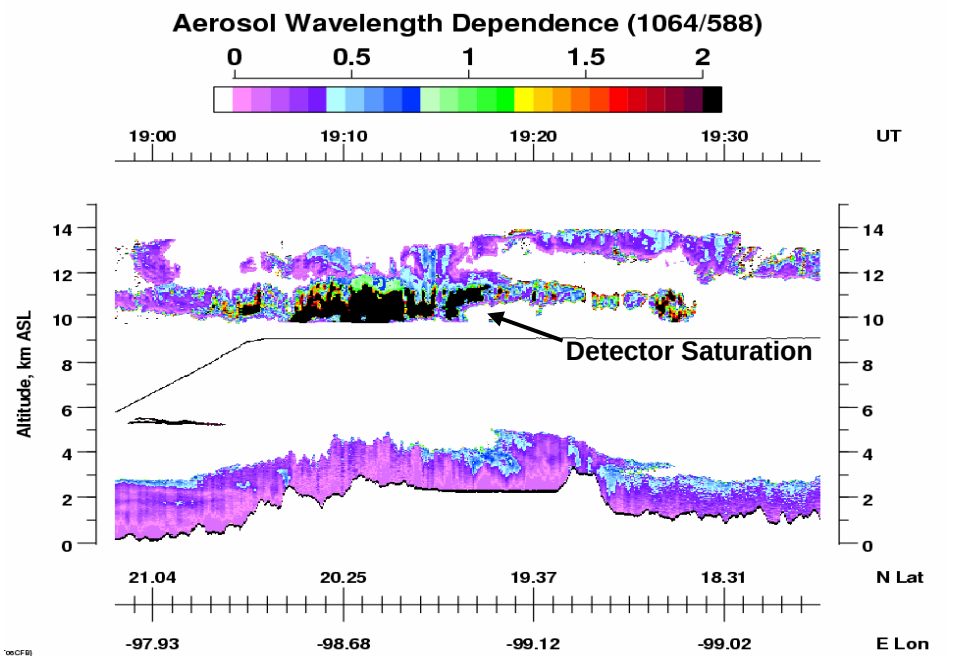
-93.90 -97.95 -98.83 -97.12 -99.08 -97.68 E Lon

Mexico City Basin Overpass (north to south) 11 March 2006

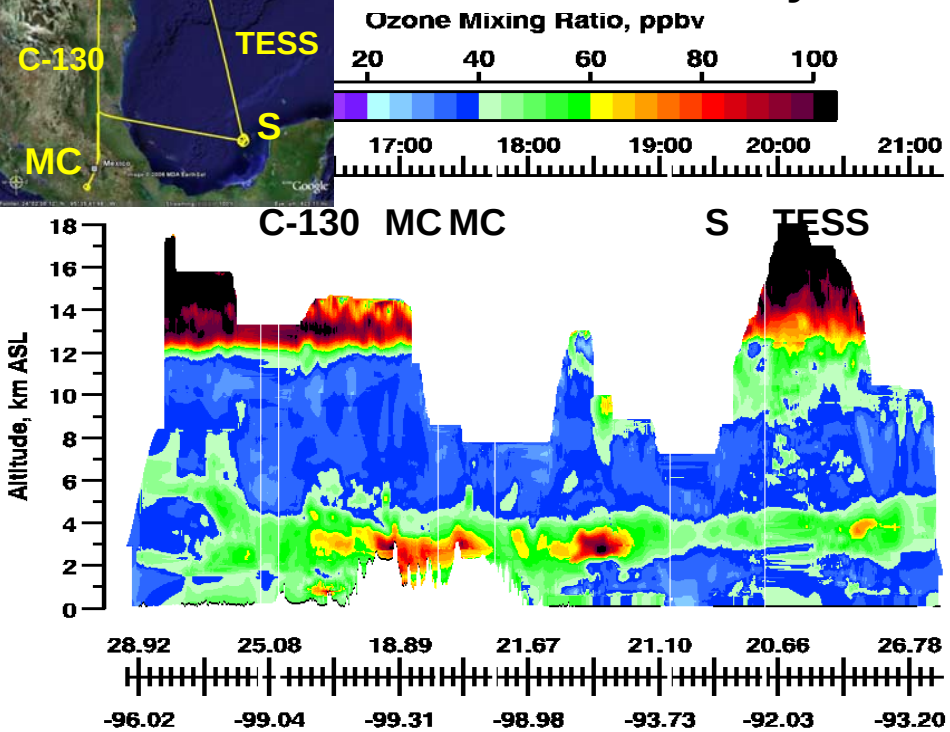


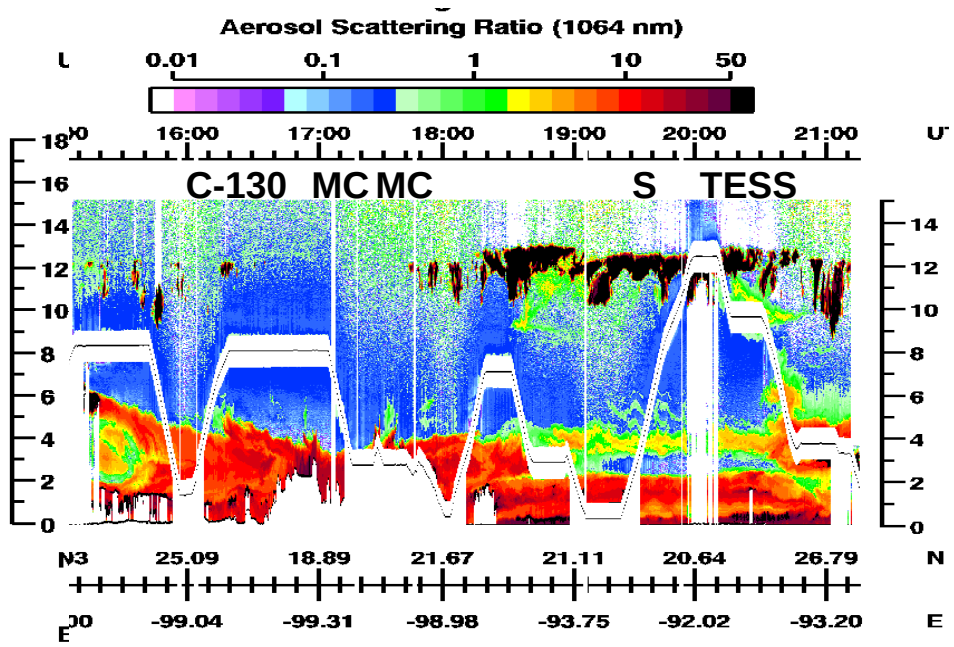


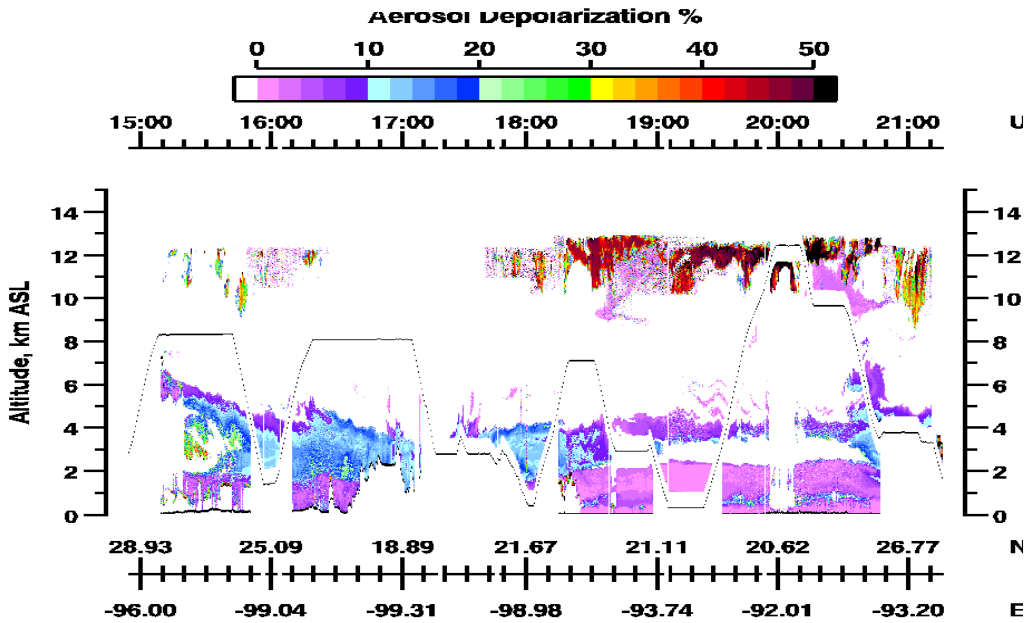




Mexico City Plume #3, Flight 7 - 16 March 2006

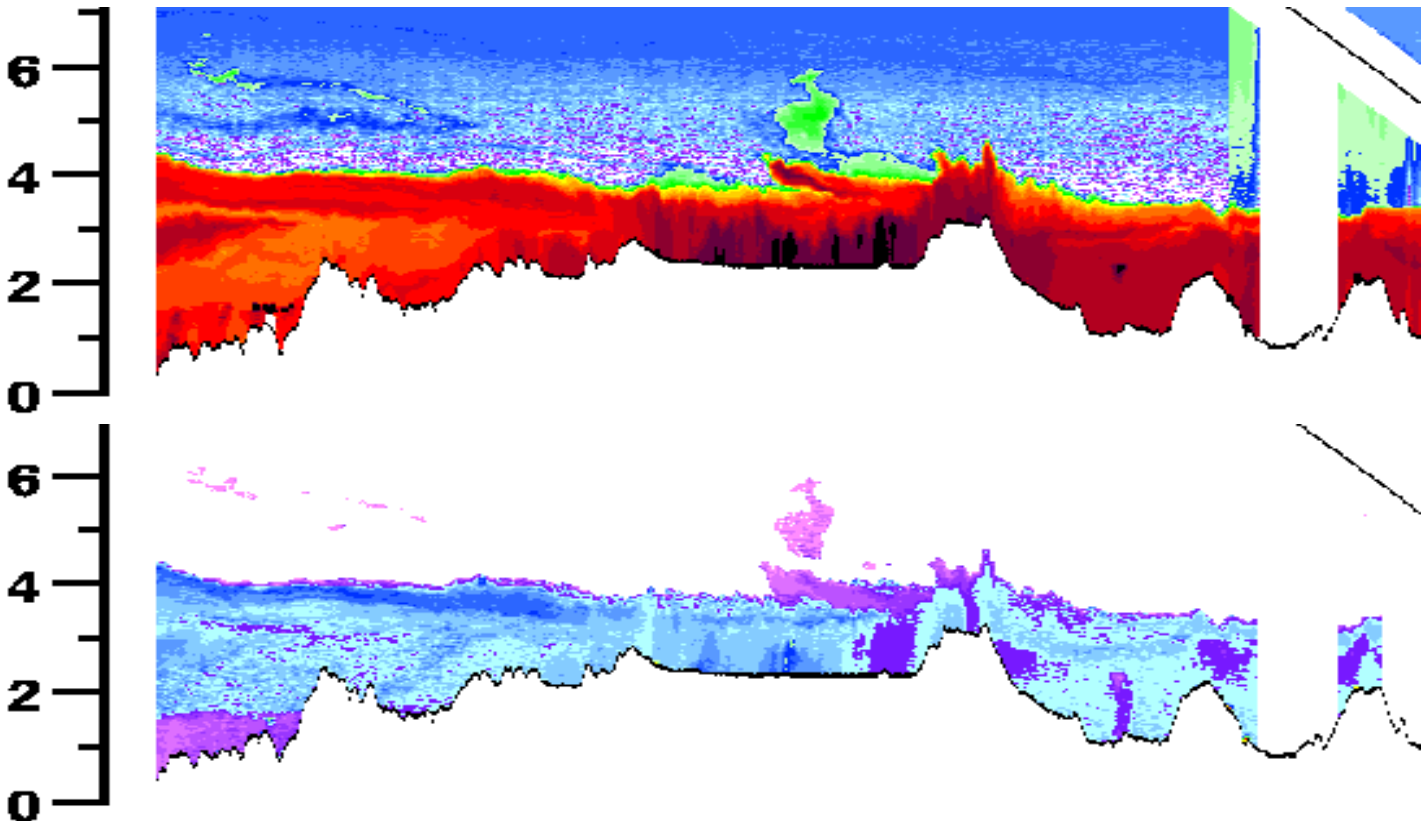




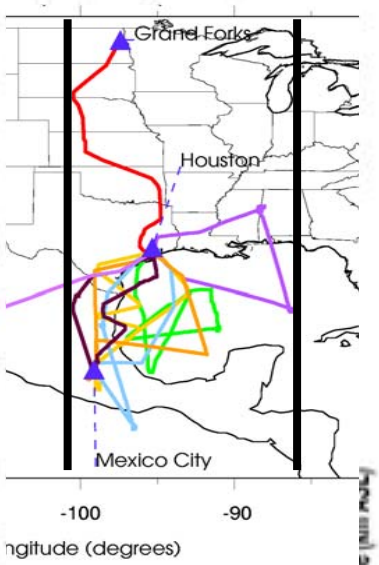


Mexico City Plume #3, Flight 7 - 16 March 2006

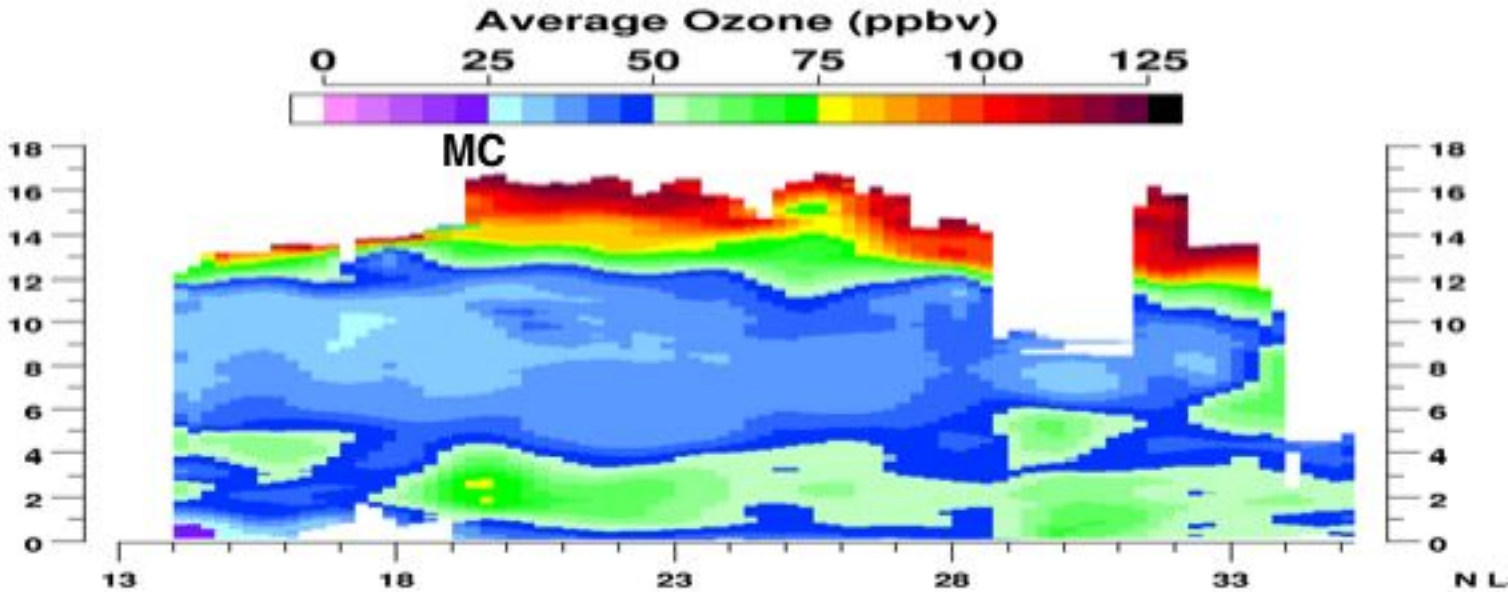
Mexico City

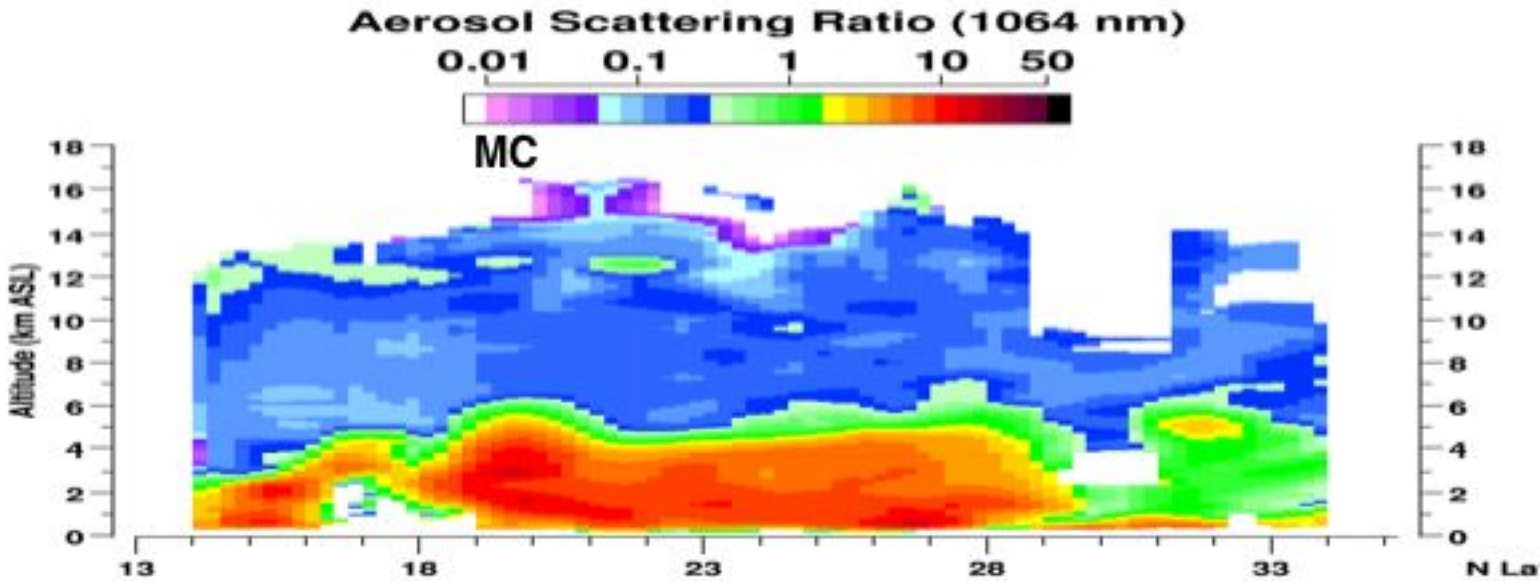


Average Tropospheric Ozone & Aerosols



101-86 W





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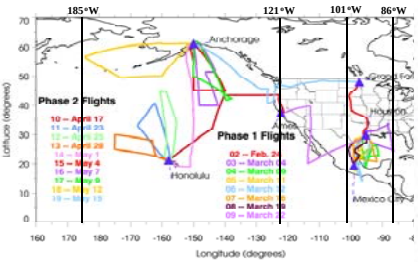
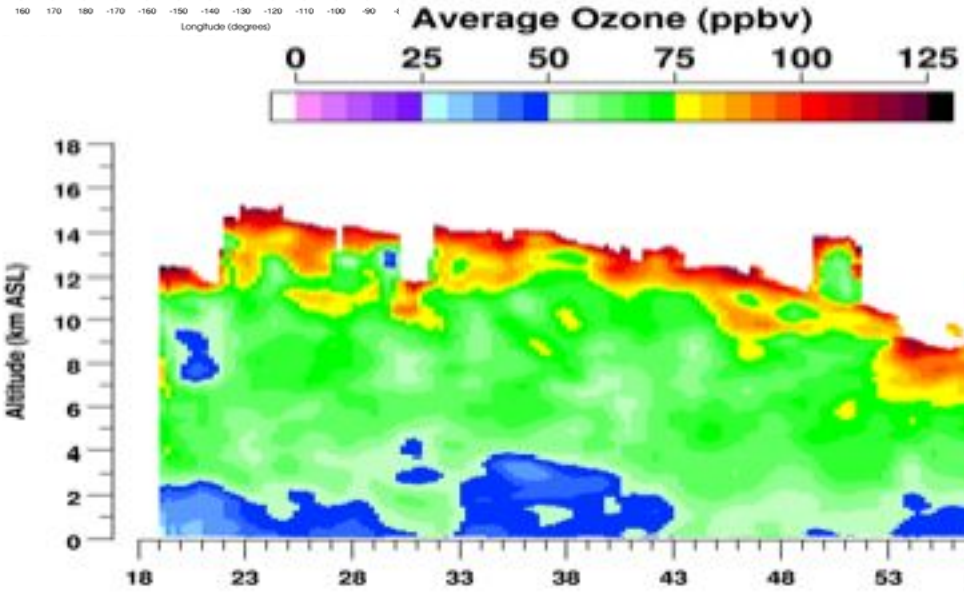
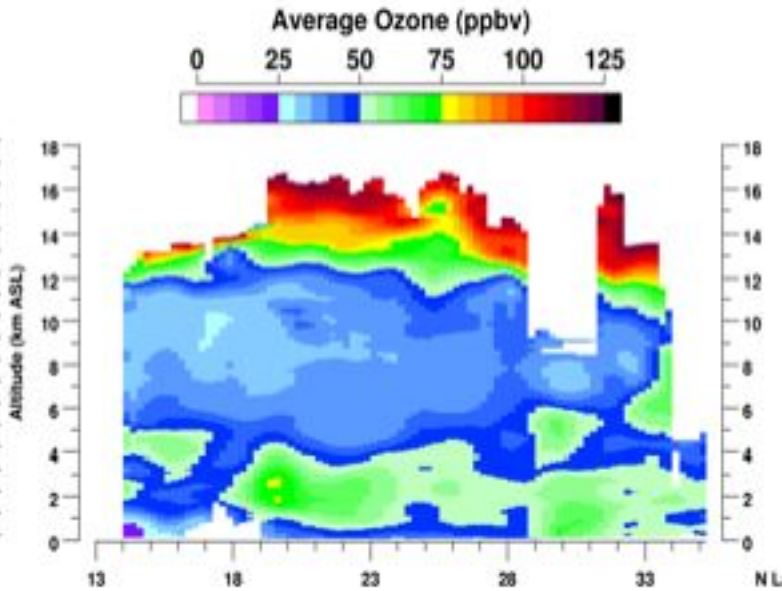
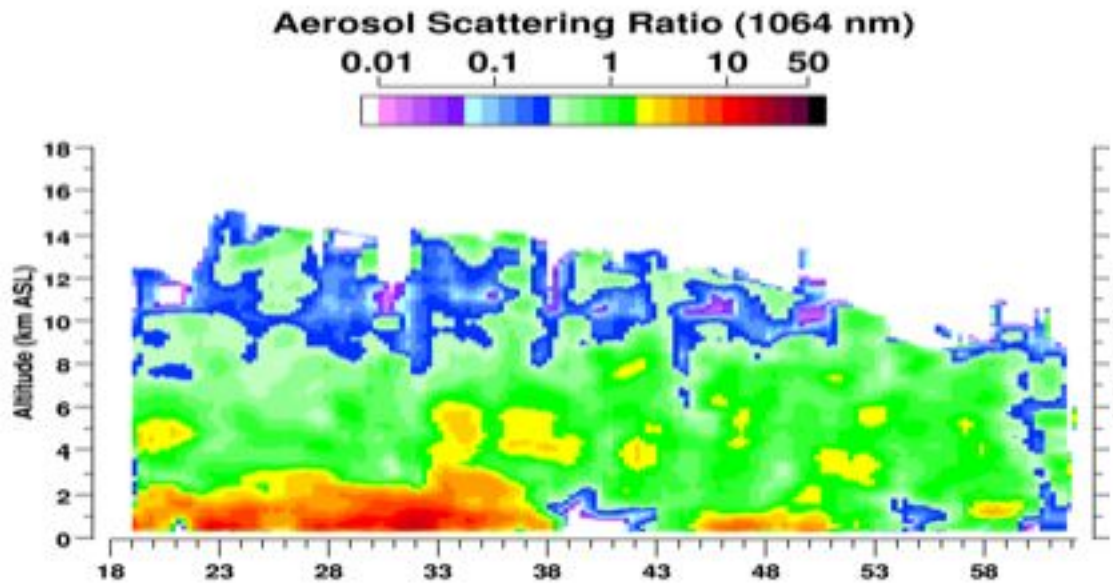


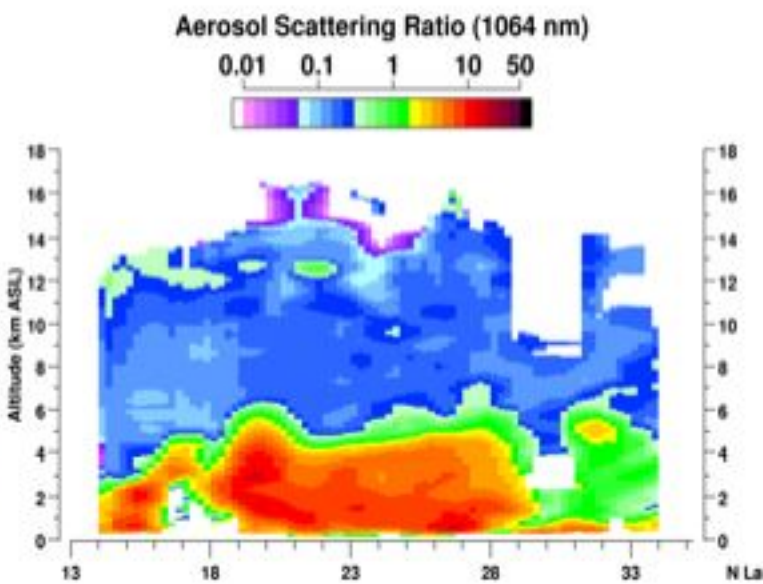
121-185 W

101-86 W

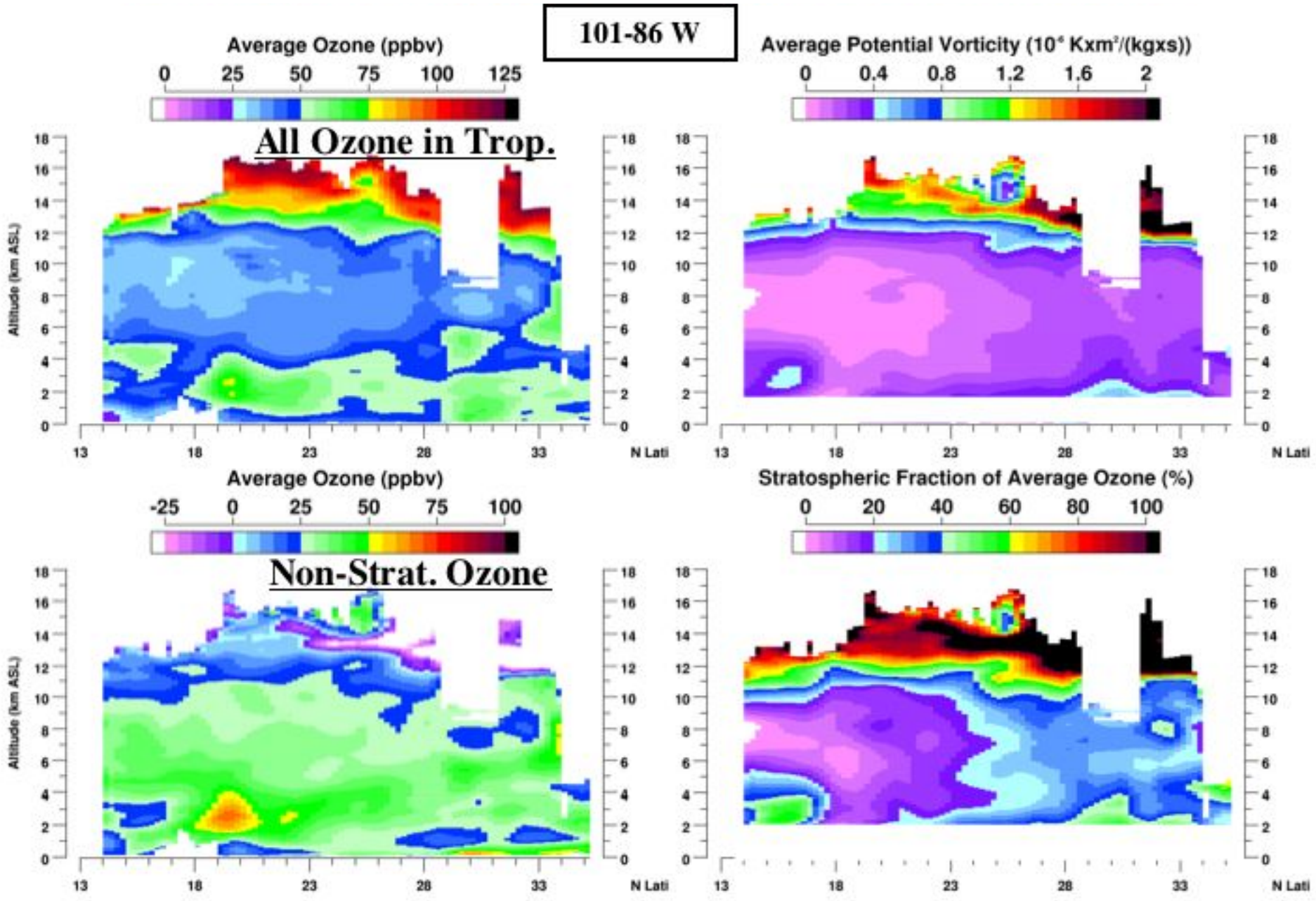








Average Stratospheric Ozone Contribution



INTEX-B/MILAGRO Results

- **Obtained large-scale O_3 and multi-wavelength aerosol scattering and depolarization cross sections on all INTEX-B/MILAGRO flights.**
- **Biomass burning plumes from southern Mexico were often observed over Gulf of Mexico and eastern Mexico.**
  - **Plumes below ~5 km; O_3 >60 ppbv; aerosol S >5 & D >10%**
- **Mexico City (MC) pollution readily apparent with enhanced O_3 and aerosol scattering with large gradients across basin.**
  - **MC PBL <2.5 km AGL; O_3 >100 ppbv; aerosol S >20 & D >10%**
- **MC outflow carrying enhanced O_3 (>80 ppbv) and aerosols (S >10) clearly observed on south and southwest.**
- **MC outflow to north/northeast evident on 16 March in 2.5-4 km range with O_3 >60 ppbv; aerosol S >5 & D >10%.**
- **Average latitudinal and longitudinal variations of O_3 and aerosols show general conditions during INTEX-B/MILAGRO.**
- **Stratospheric contribution to O_3 budget (>23N; 2-10 km) 20-40%.**
- **O_3 and aerosols very different than for Asian transport over Pacific.**