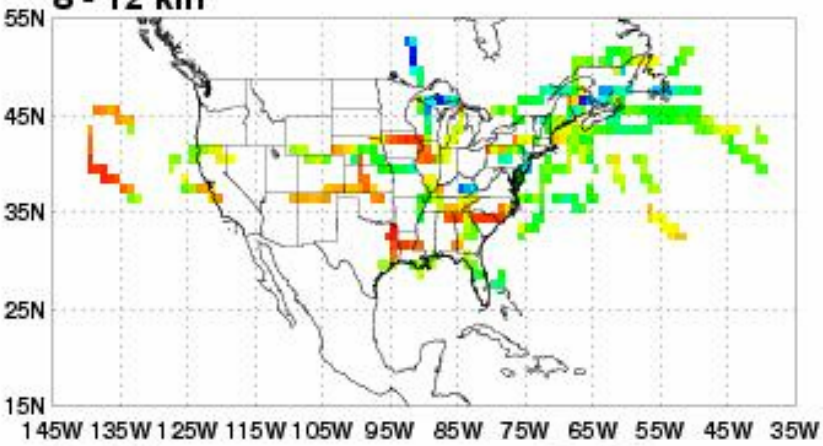


**Evidence of North American CO₂ sources and sinks
from regional observations during INTEX-A**

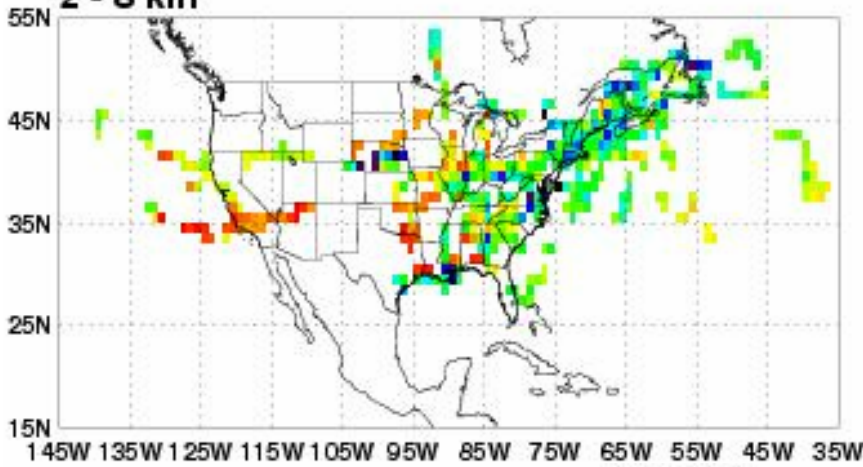


**S. Vay, Y. Choi, J.-H. Woo, K. Prasad, R. Washenfelder,
P. Wennberg, S. Nolf, A. Aknan, J. Barrick,
S. Branham, C. Hudgins, J. Plant**

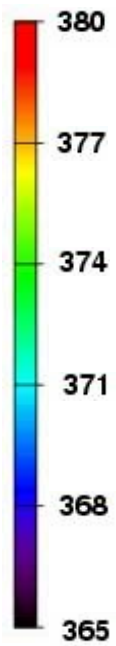
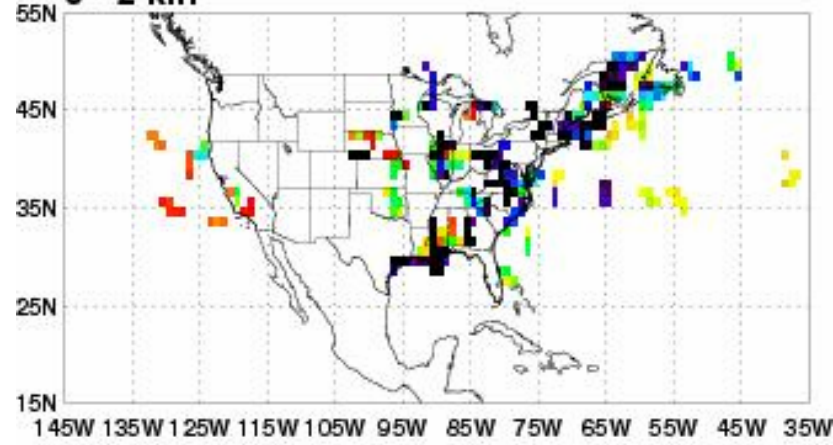
8 - 12 km



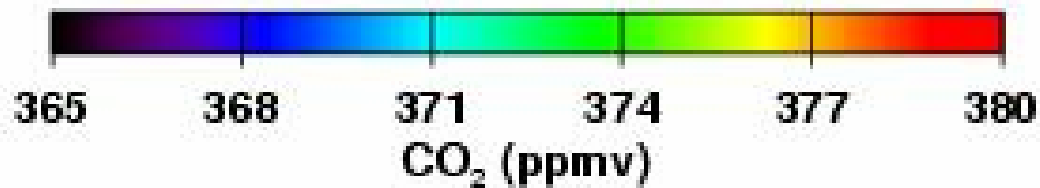
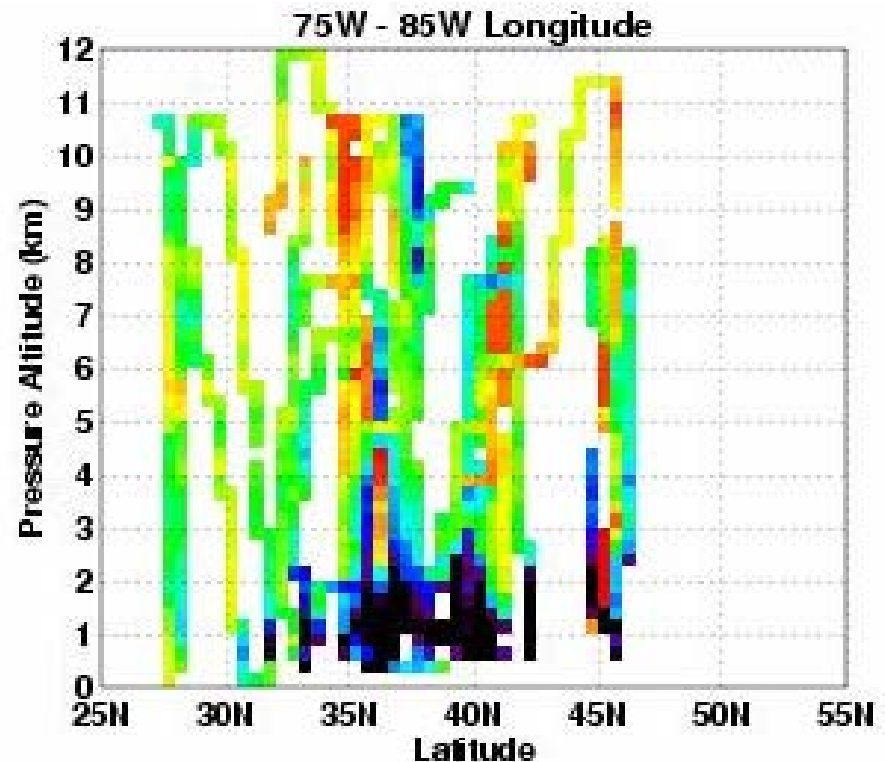
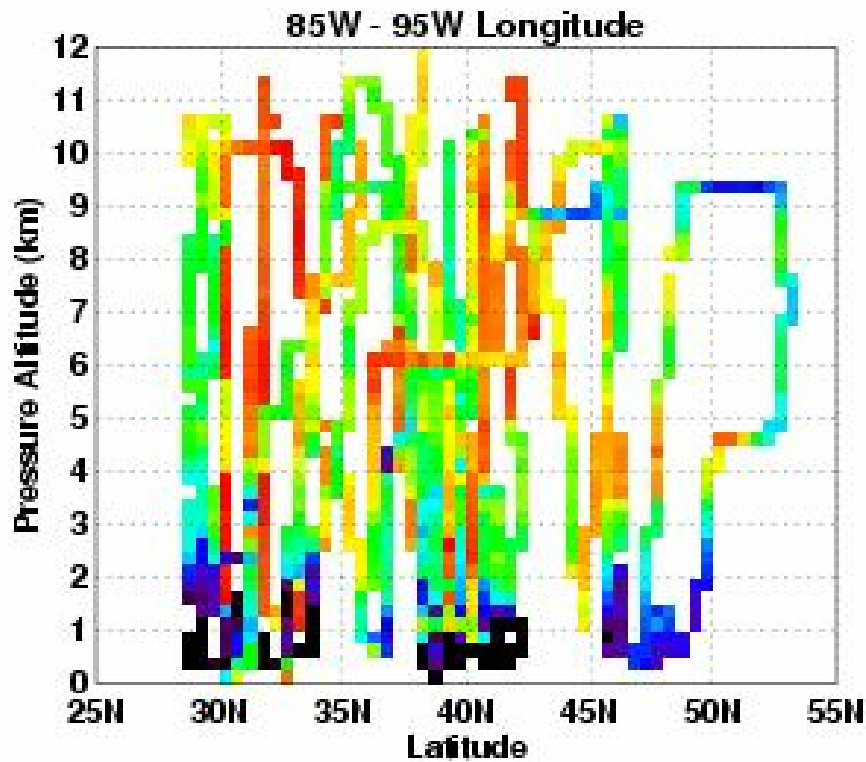
2 - 8 km



0 - 2 km



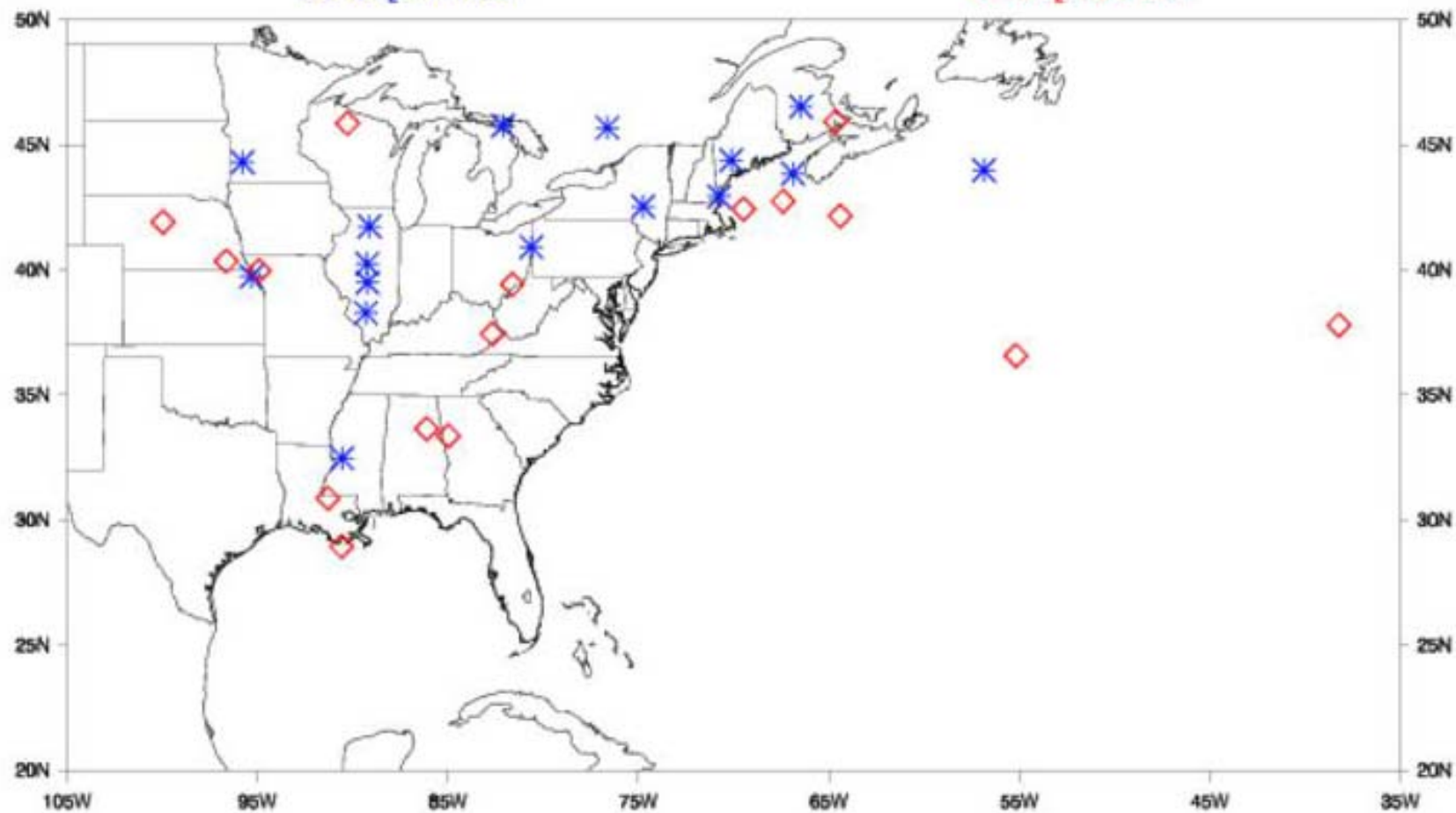
INTEX (20040701 - 20040814)



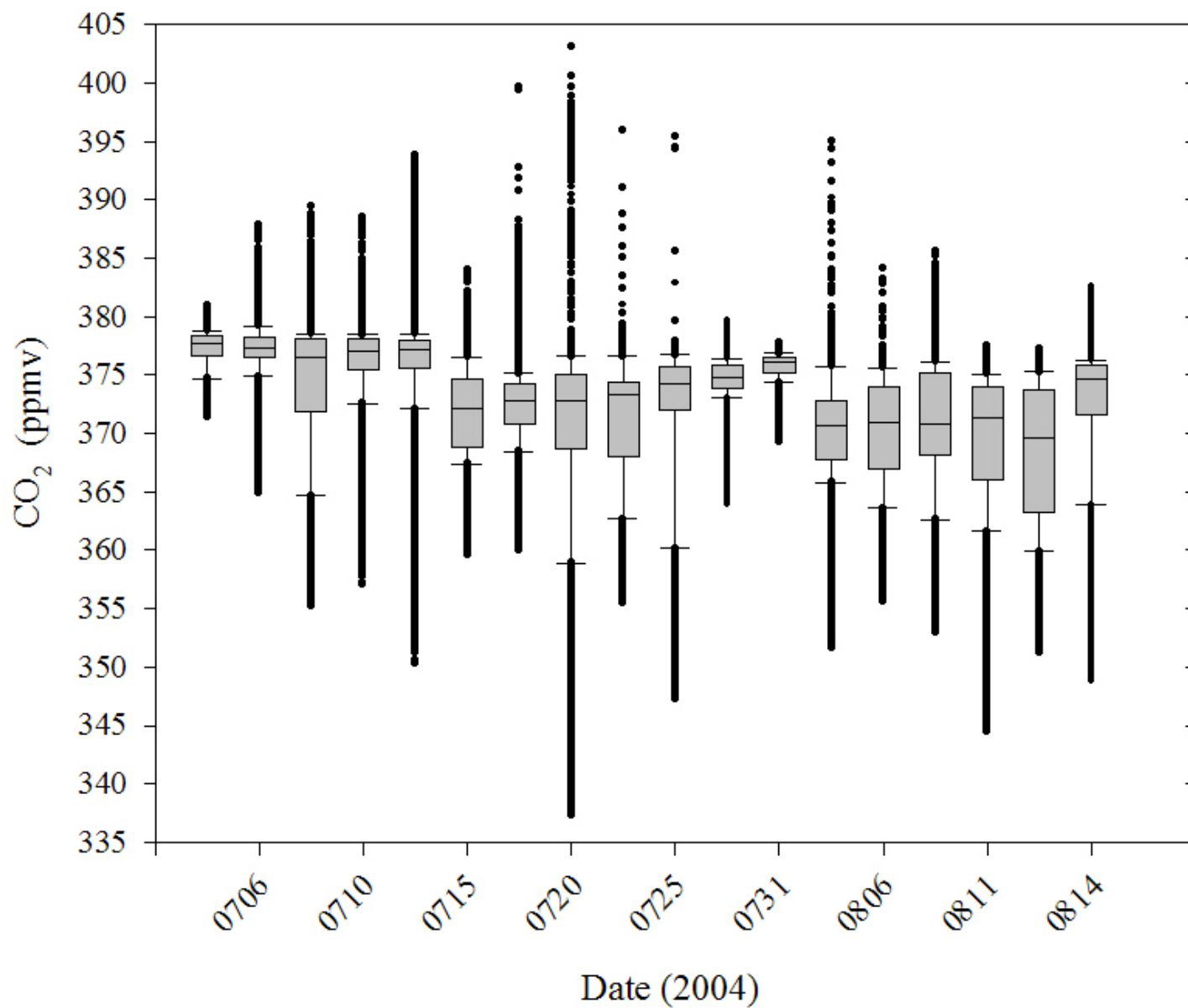
INTEX
20040706 - 20040813

✱ CO₂ Minimum

◇ CO₂ Maximum



INTEX-A
1 July - 14 August 2004

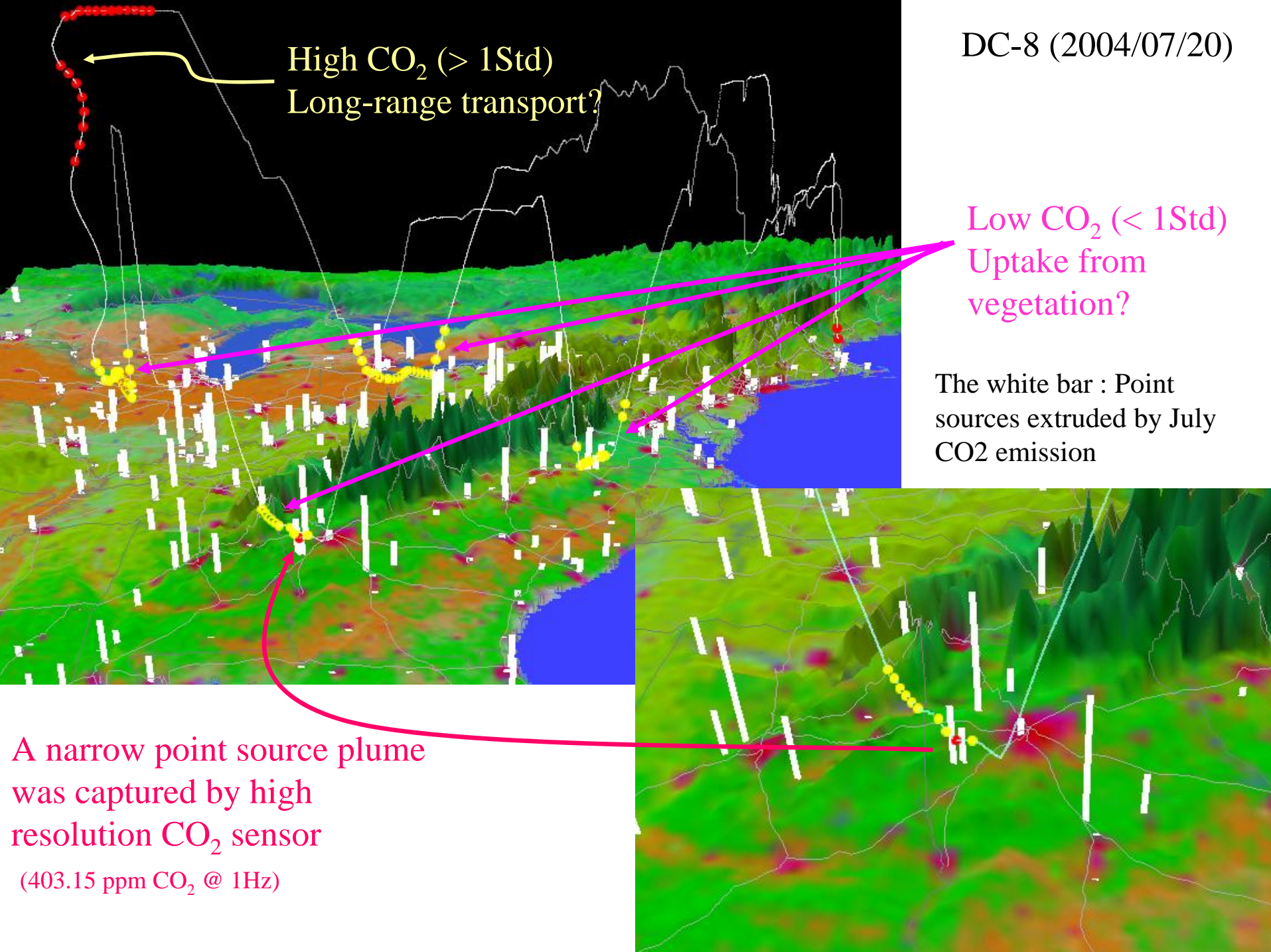


DC-8 (2004/07/20)

High CO₂ (> 1Std)
Long-range transport?

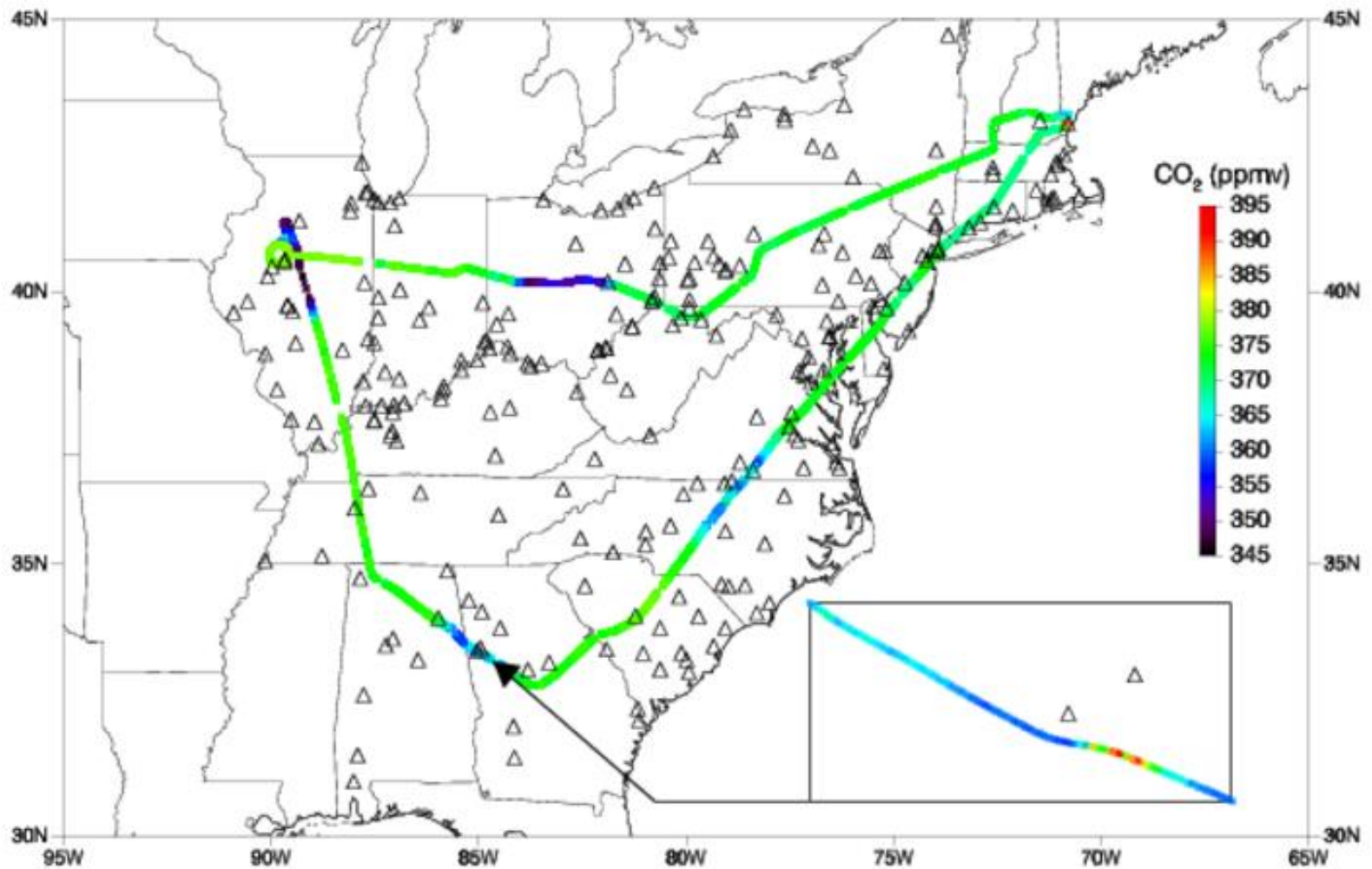
Low CO₂ (< 1Std)
Uptake from
vegetation?

The white bar : Point
sources extruded by July
CO₂ emission

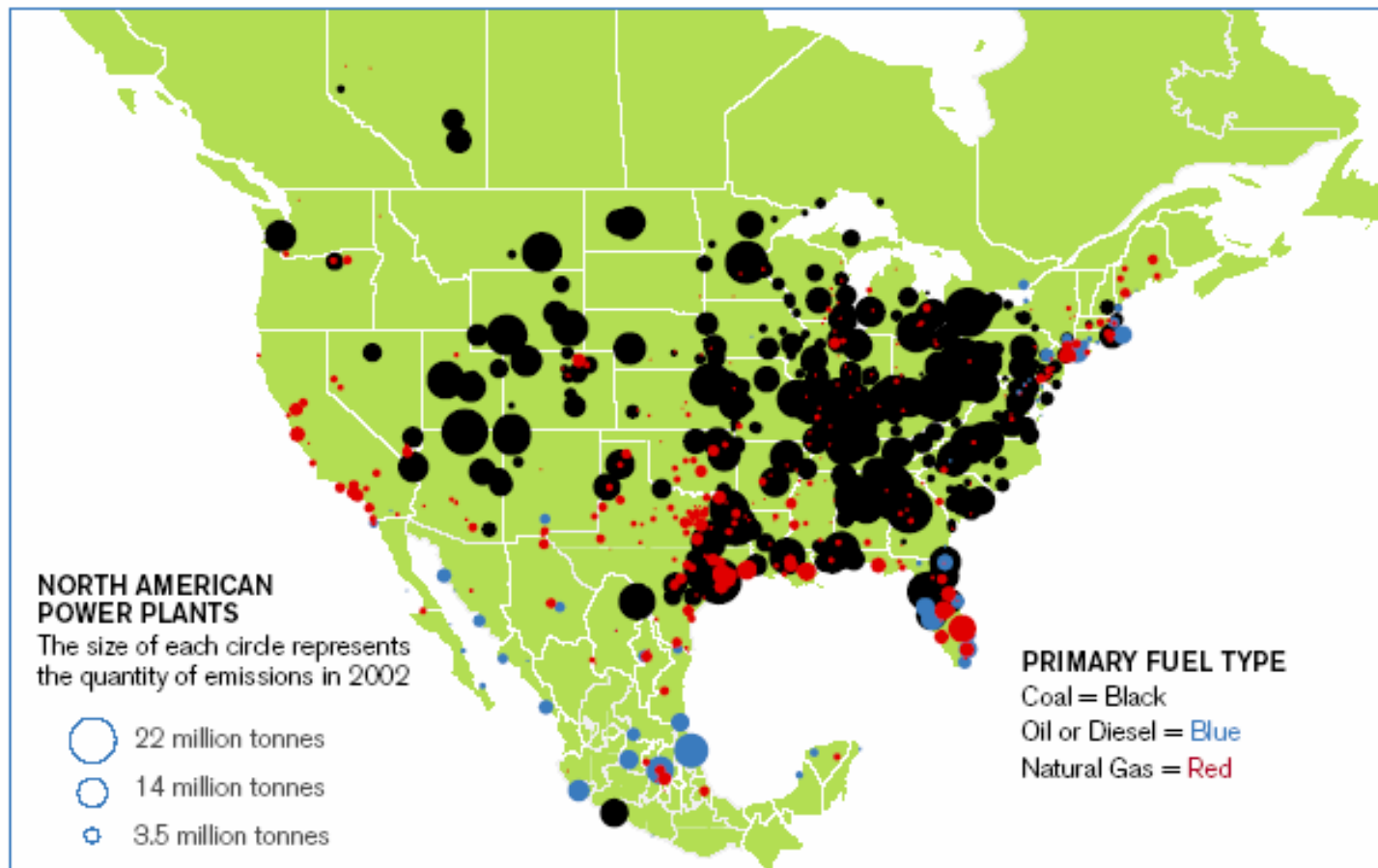


A narrow point source plume
was captured by high
resolution CO₂ sensor
(403.15 ppm CO₂ @ 1Hz)

INTEX
20040720



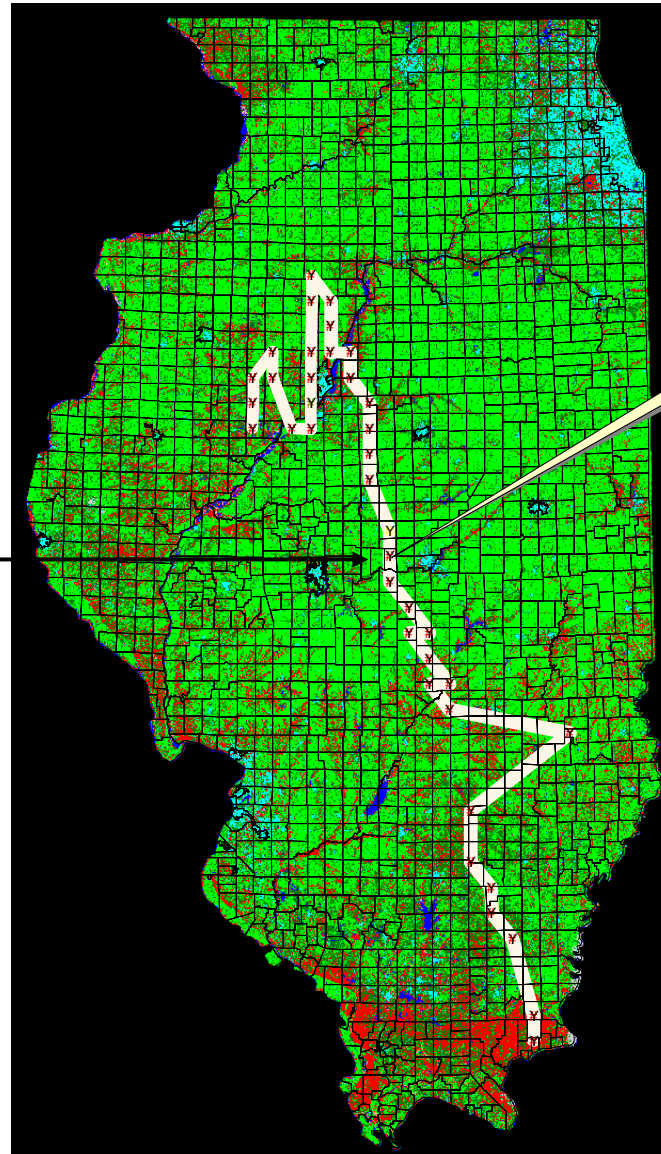
GEOGRAPHIC DISTRIBUTION OF POWER PLANT CO₂ EMISSIONS*



* In general, CO₂ emissions data were not available for individual Canadian power plants. Data were available for the major facilities in the Province of Ontario from Ontario Power Generation's *Towards Sustainable Development: 2002 Progress Report*. In Alberta, the map reflects only a subset of the major power plants in the province. CO₂ emissions data were only available for facilities included in AECO Power's *Environment, Health and Safety Review 2002*. All other facilities without public CO₂ emissions data for 2002 are not shown on the map.

CO2 ANALYSIS AT LEVEL 1 CLASSES (AG. vs NON-AG)

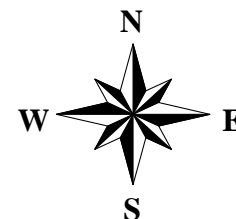
Flight path
overlay on
LANDSAT
map and
Aircraft based
CO2 data
aggregated at
7.5 minute
Quadrangles
for LEVEL 1
classes.



339 ppm CO2

Land cover classes

-  Agriculture
-  Clouds
-  Pasture
-  Unclassified
-  Urban
-  Water
-  Wetlands
-  Woods



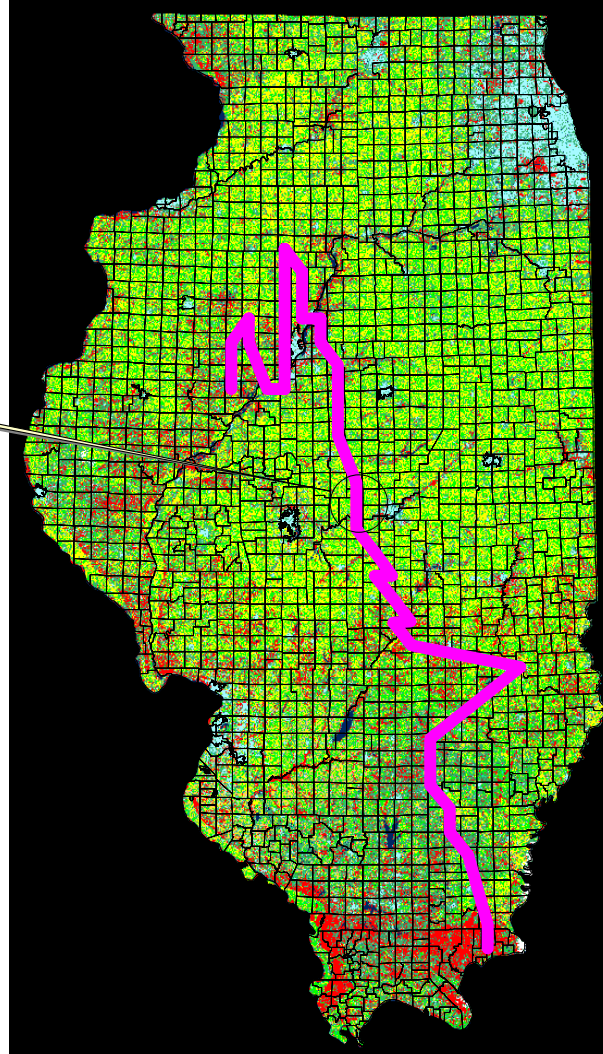
80 0 80 160 240 320 400 480 560 Miles



CO2 ANALYSIS AT LEVEL II CLASSES

**Flight path
overlay and
Aircraft based
CO2 data
aggregated at
7.5 minute
Quadrangles
for LEVEL II
classes.**

339 ppm CO2

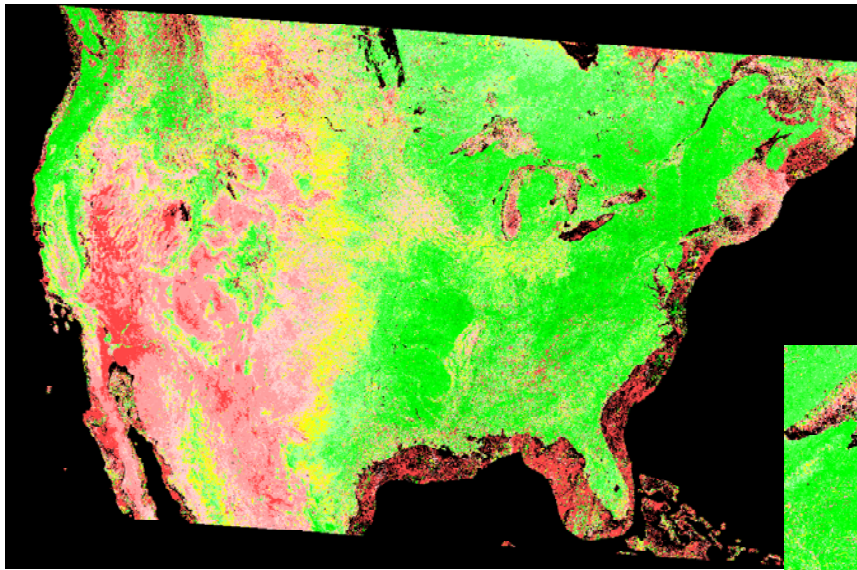


Land cover classes

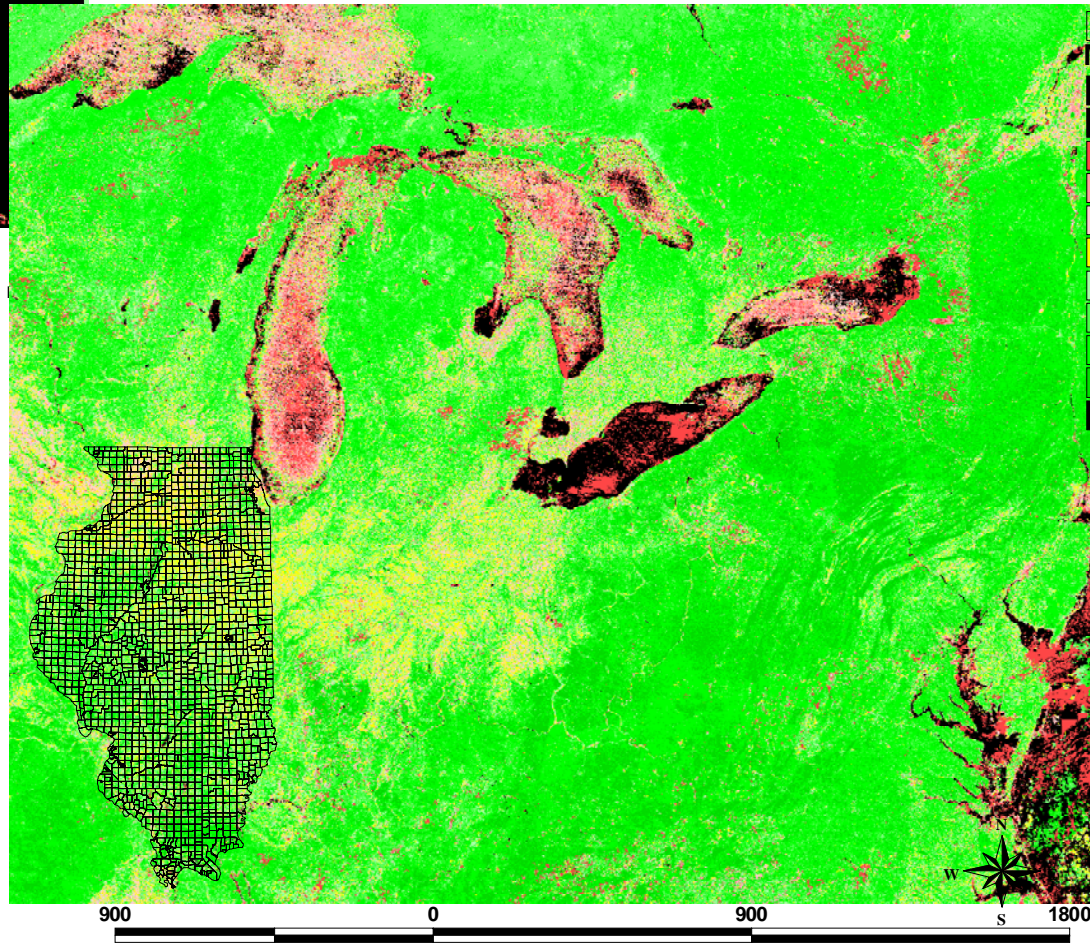
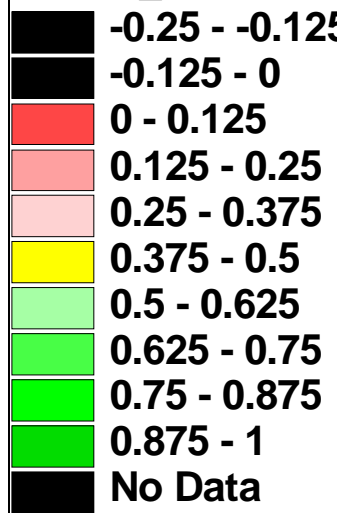
- Alfalfa
- Clouds
- Corn
- Cotton
- Double crop WW/Soybeans
- Oats
- Other crops
- Other small grains / hay
- Pasture
- Pasture/ Grass / Non-Ag
- Pasture/Grassland/Non-Ag
- Potatoes
- Pumpkins
- Rice
- Snap beans
- Sorghum
- Soybeans
- Unclassified
- Urban
- Water
- Wetlands
- Winter Wheat
- Woods



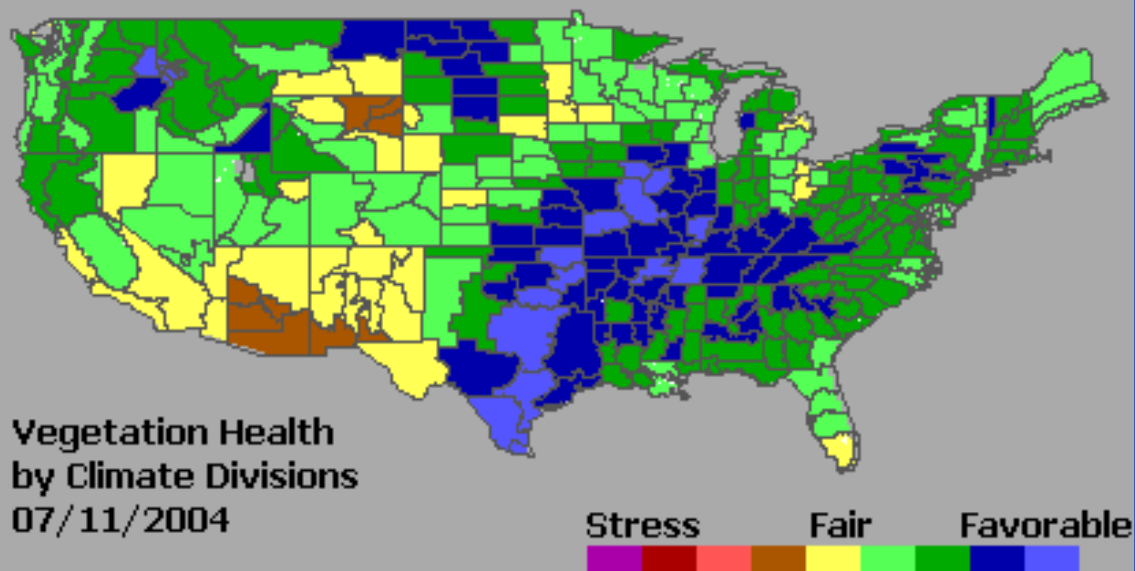
RELATING MODIS_NDVI DATA (7/04) TO CO₂ VMR



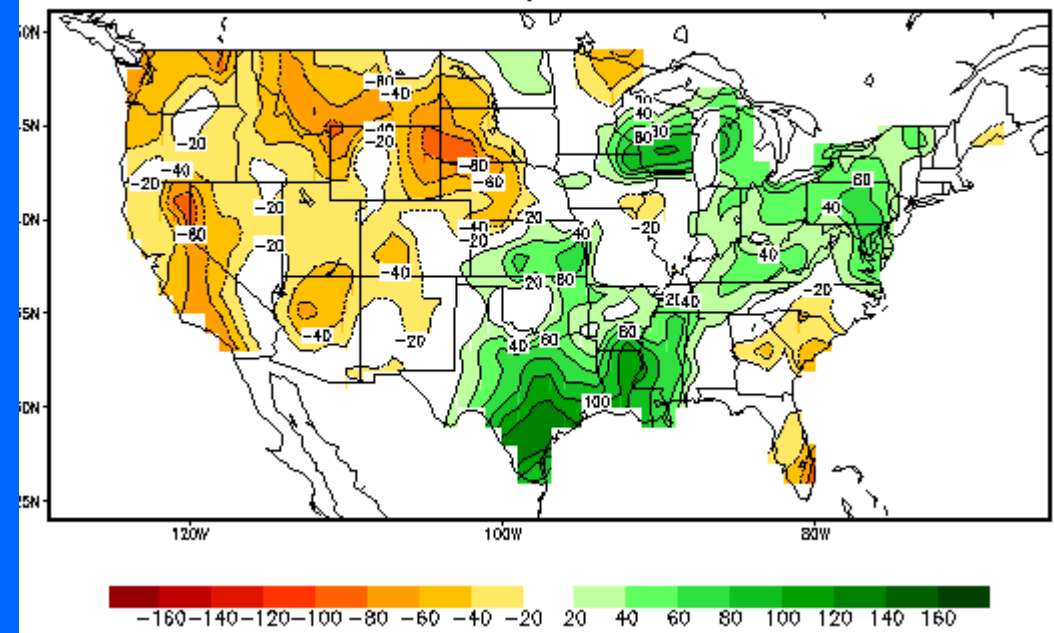
MODIS_NDVI



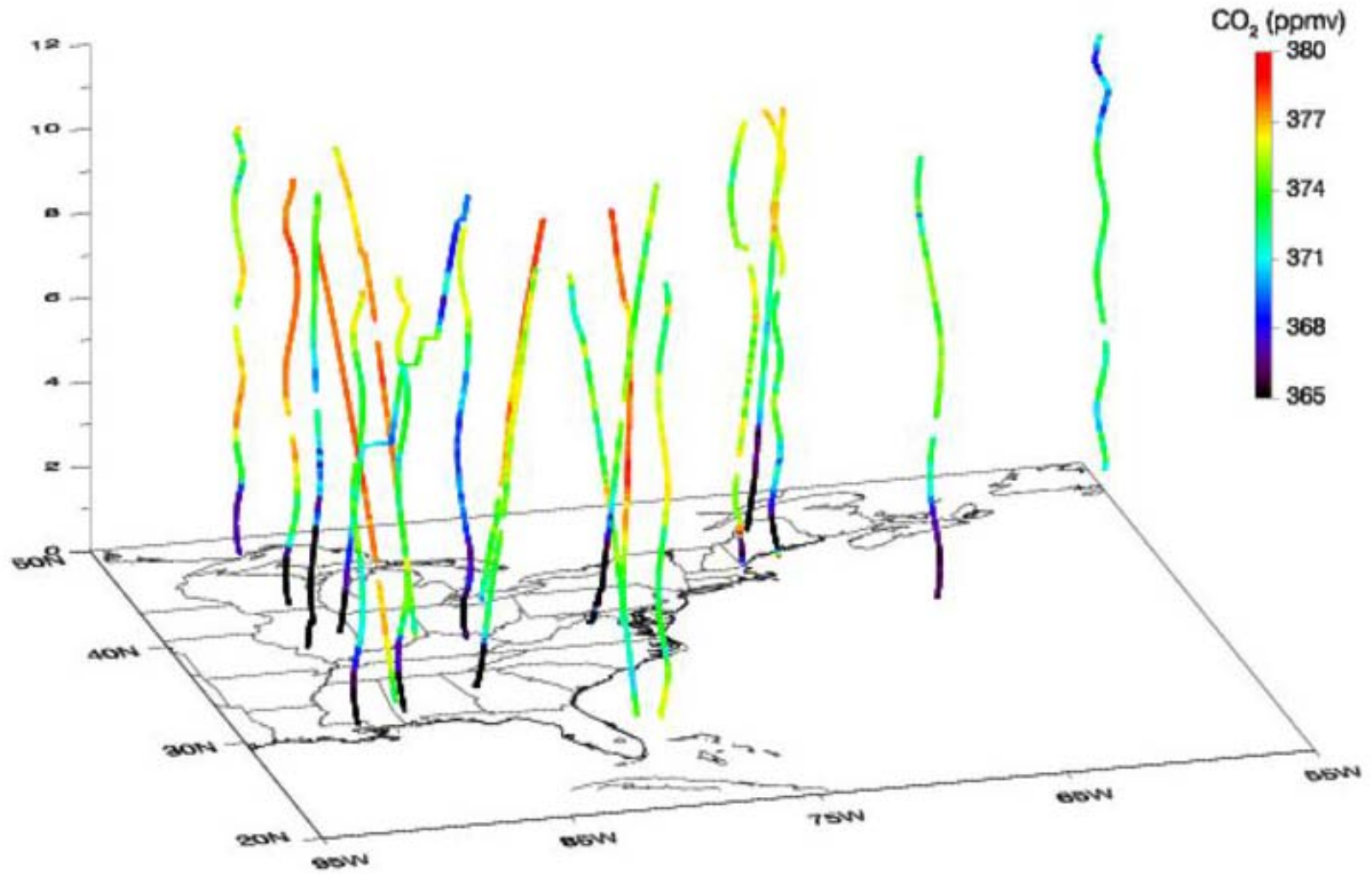
Vegetation Health
by Climate Divisions
07/11/2004



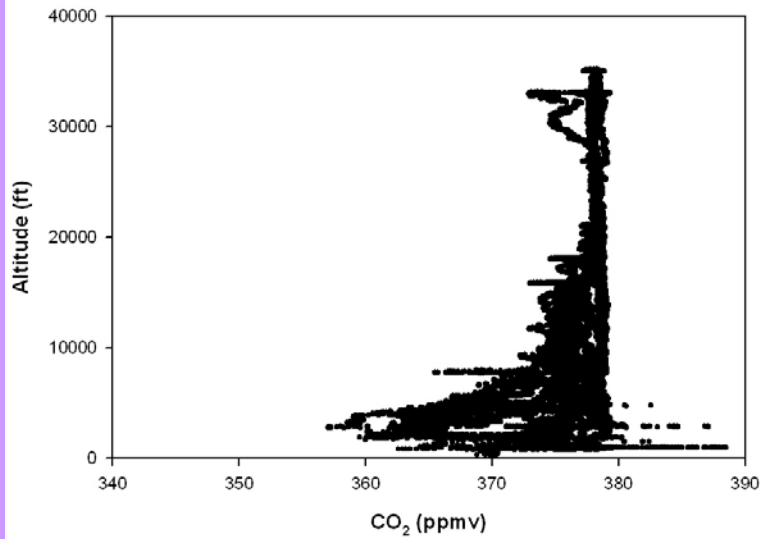
Calculated Soil Moisture Anomaly (mm)
JUL, 2004



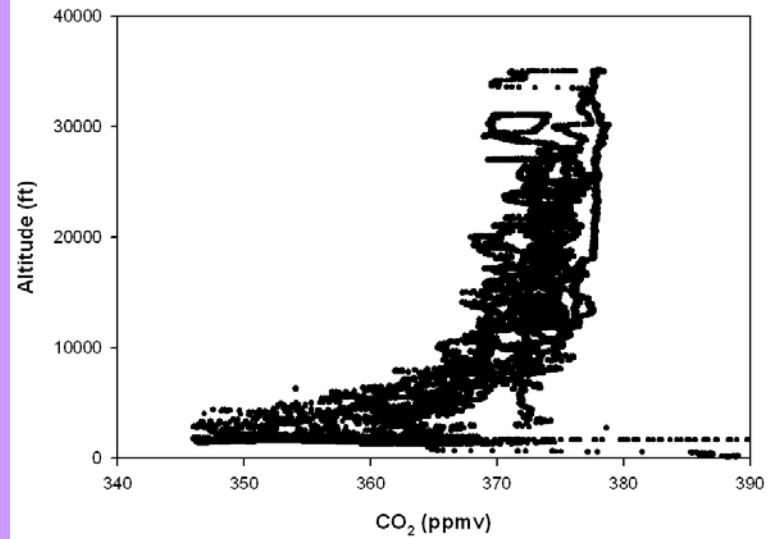
2004 - Vertical Profiles
Actual CO₂ Range: 348.20 - 379.66 (ppmv)



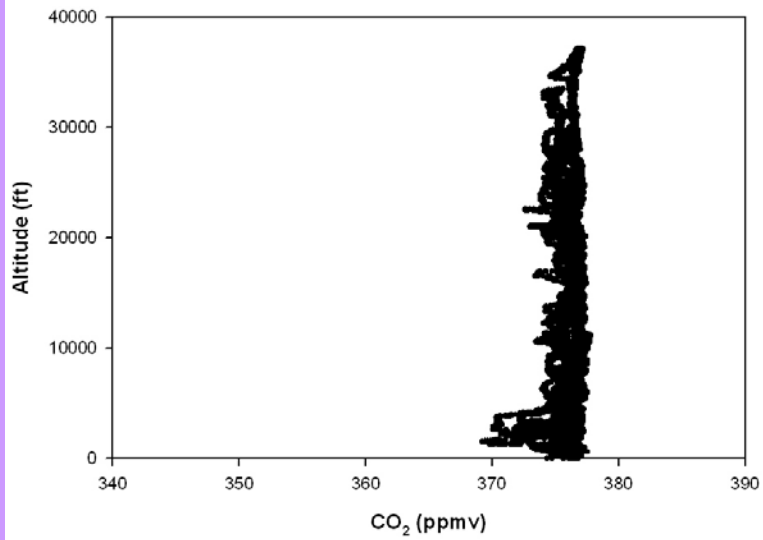
20040710



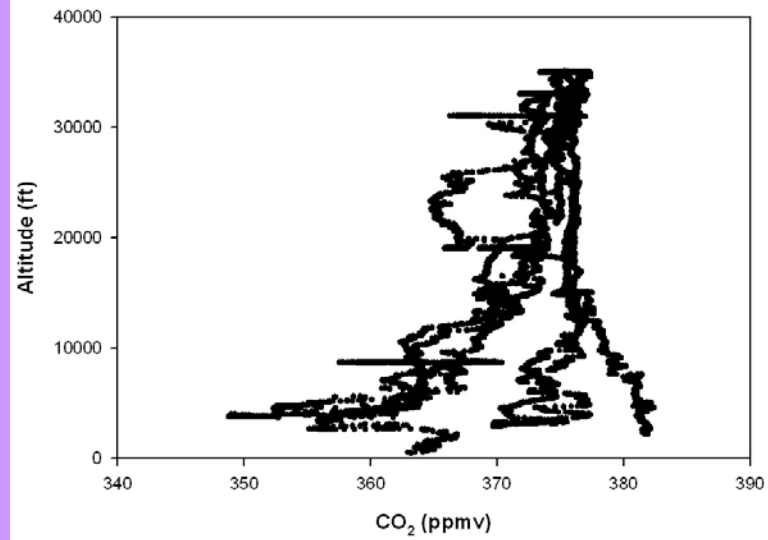
20040720



20040731



20040814



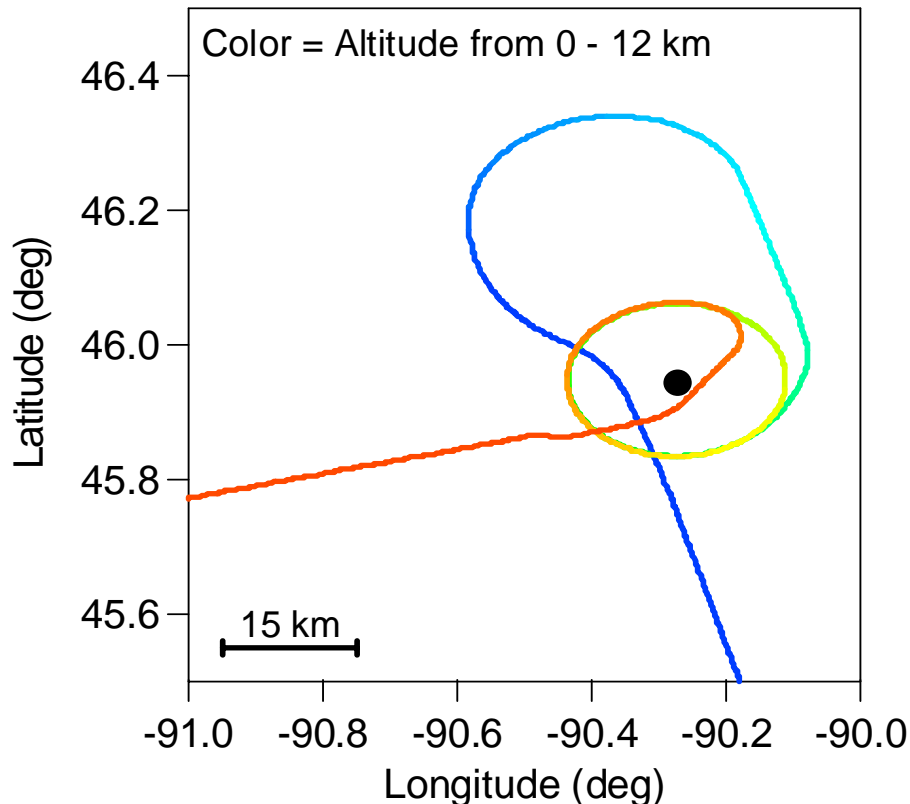
Calibration of Absolute Column CO₂ Using Aircraft Data

Intercontinental Chemical Transport Experiment – North America (INTEX-NA)

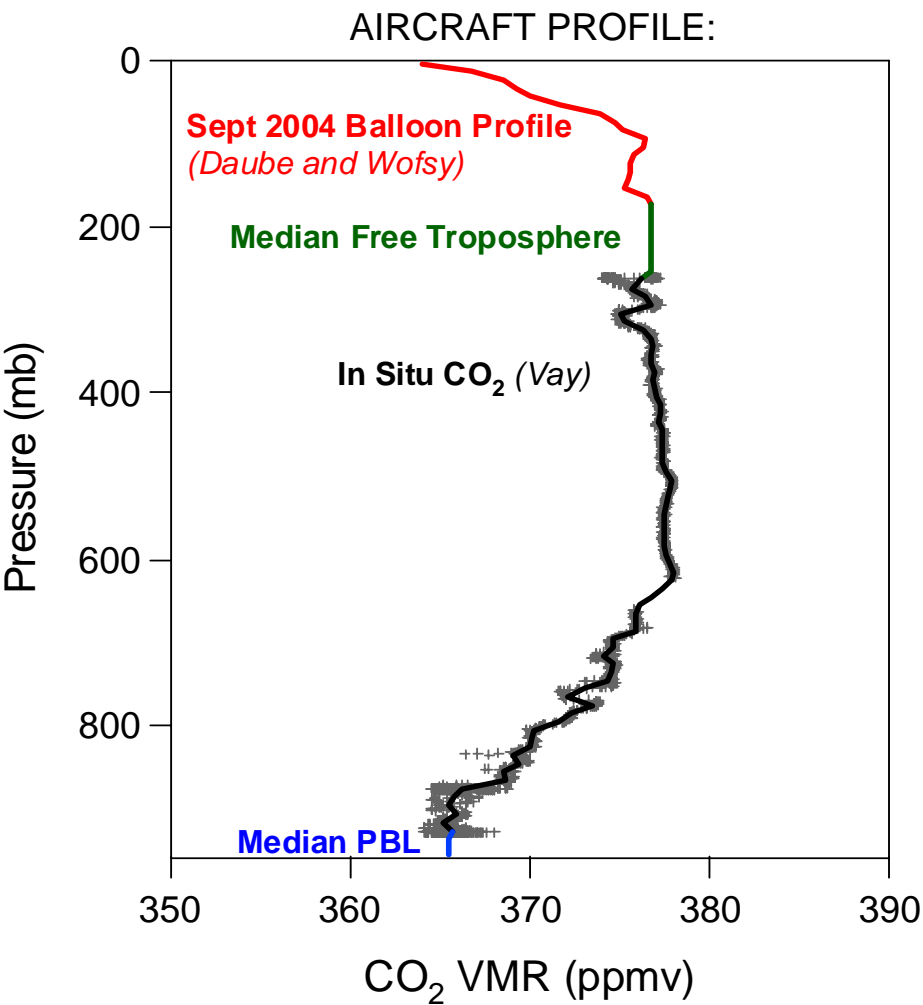
- NASA DC-8 and King Air measured in situ CO₂ during tower profiles
- Eight unique aircraft profiles:
 - DC-8: **July 12, July 15** (twice)
 - King Air: **July 14, July 15, August 14, August 15** (twice)

Allows us to place our column CO₂ retrievals on the same scale as the in situ network.

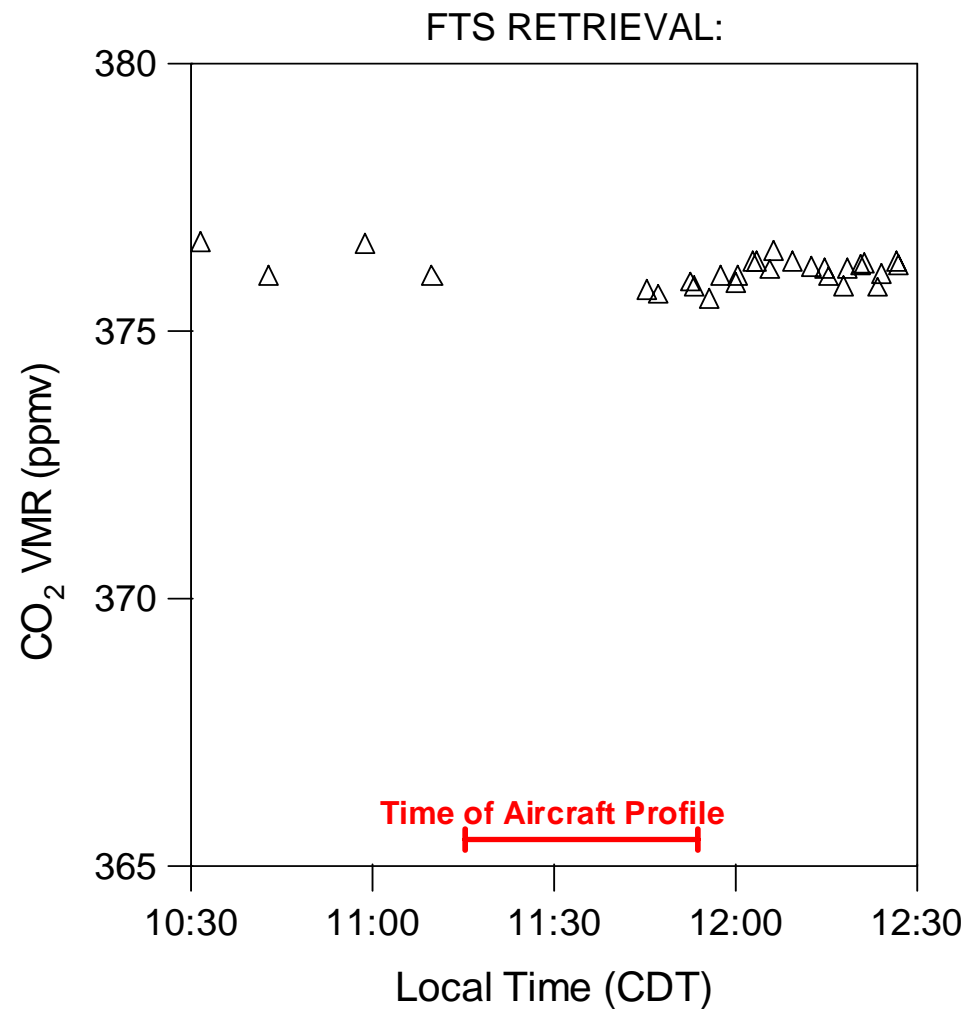
DC-8 Flight Path and Photograph from 12 July:



FTS Column and Aircraft In Situ Data – 12 July 04

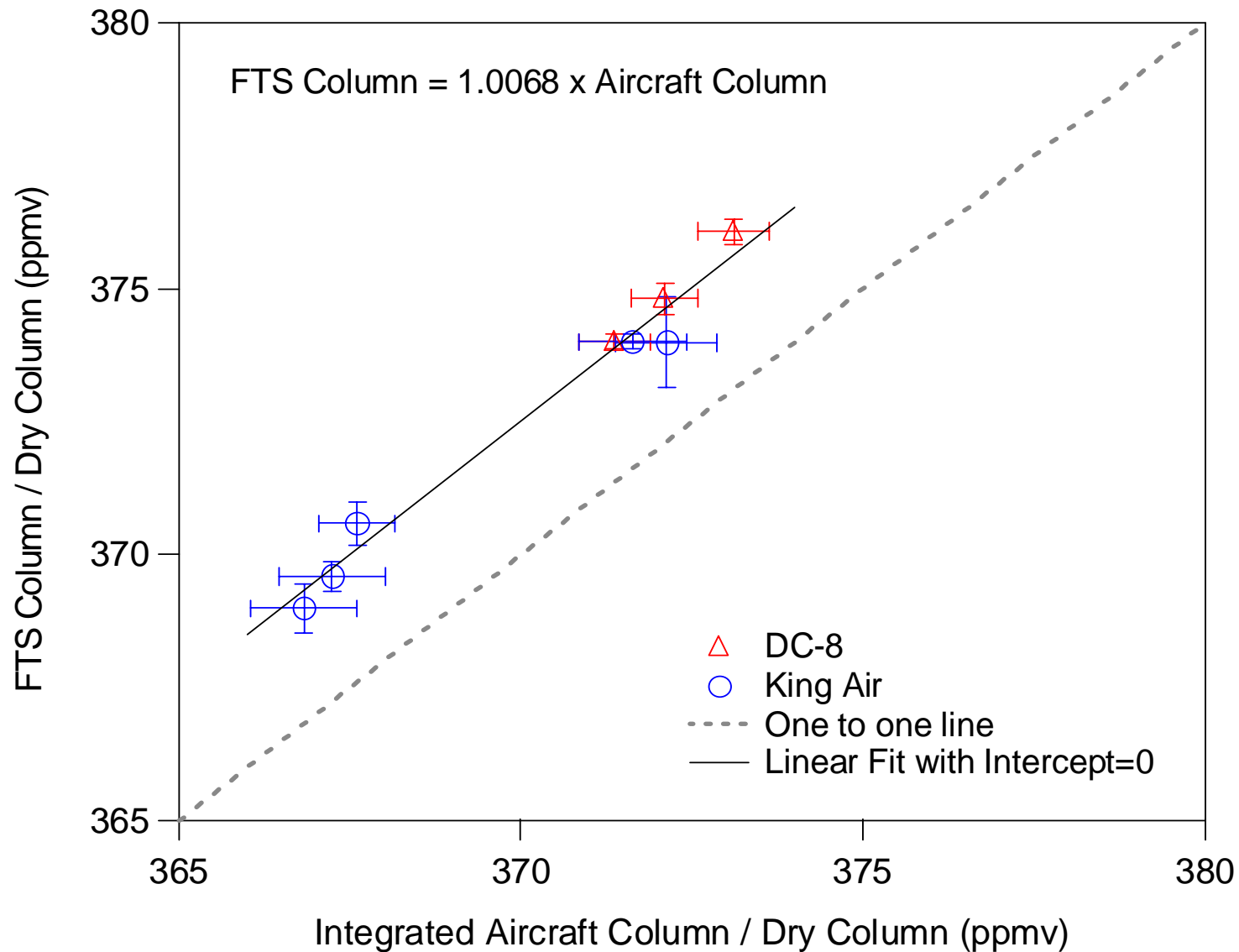


Aircraft Column / Total Dry Column =
373.11 ± 0.52 ppmv



FTS Column / Total Dry Column =
376.07 ± 0.24 ppmv

Comparison of FTS Column and Integrated Aircraft CO₂





- OCO – S. Denning (CSU); H. Boesch (JPL)
- AIRS – C. Crevoisier (LSCE); M. Chahine (JPL)
- SCIAMACHY – M. Buchwitz (U. Bremen); I. Aben (SRON)