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- Thermal Mapping Overview
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The Daily Plan-It

The TexAQS 2000 Field Study Newsletter
Issue 25
September 8, 2000

2000 The Texas Air Quality Study

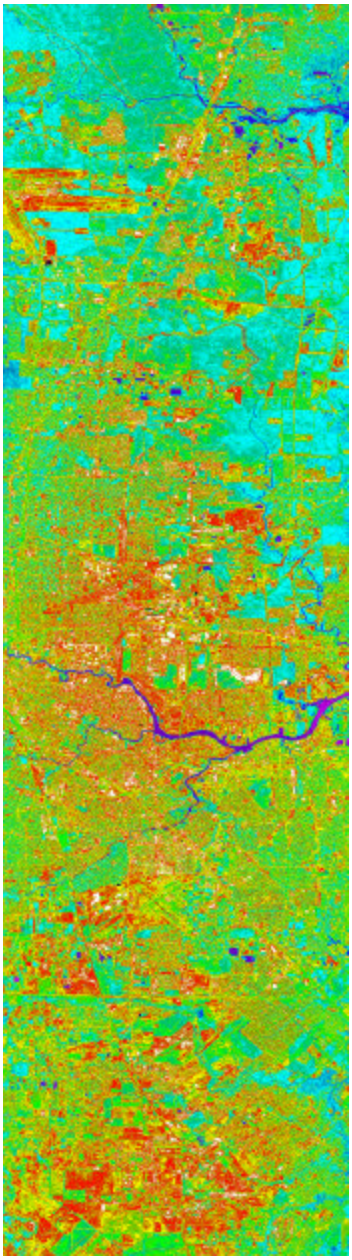
Weekend Rain Near Coast, Clearing Monday

Weather Forecast

John Nielsen-Gammon, Stephanie Naumann and Dick McNider provided today’s weather forecast. This is the last we shall see Dick during the TexAQS 2000 field study. As always, his contributions have been substantial and he will be missed. Morning background ozone levels are low with 6 to 7 AM hourly concentrations ranging from the single digits to a high of 19 ppbv at the Conroe site north of Houston.

Given yesterday’s brisk, persistent northeasterly flow, the maximum surface levels of hourly ozone occurred south-southwest of downtown Houston - at Bayland Park and Clute (72 ppbv) and Galveston Airport (70 ppbv) from 1 to 3 PM. For the first time in eleven days, no Houston area monitoring recorded a preliminary hourly average in excess of 120 ppbv.

Southeasterly flows are edging into the east Texas coast, bringing more clouds, moisture and a chance of showers. The probability of precipitation should increase this evening and throughout Saturday. The longer range models suggest that relatively wide-spread precipitation may continue through Sunday PM. In any event, several days of southeasterly flow are anticipated.



Thermal Mapping

By Jeff Luvall, Maury Estes and Dale Quattrochi

The figure at left depicts the 20 meter thermal imaging data pass collected from our efforts of last Wednesday and Thursday (August 30th & 31st).

Preliminary analysis indicated that temperatures at the surface were as high as 65 to 70 degrees Celsius. These data were collected by a NASA Learjet (N933WA) based at Stennis Space Center with the ATLAS instrument over approximately a 50 x 55 KM area. The data will be used to analyze the surface energy budget and the potential for urban heat islands to impact air quality in the Houston area.

This image is uncalibrated both for atmospheric radiance and instrument response. Air temperatures that day were over 105°F. The white areas are the hottest (>158°F). Blue is coolest.

These were the ground based measurements taken by Maury Estes with a infrared thermometer:

- A dark pitched roof > 150°F
- A black car > 160°F
- Asphalt 130's°F
- Concrete 120's°F

- Non-irrigated grass 105°F
- Irrigated grass 95°F
- Tree canopy 95-100°F
- Bare soil 120-130°F

These results are comparable with the temperatures from the EPA study of Baton Rouge, Sacramento and Salt Lake City. The most similar city (to Houston) of course is Baton Rouge. Baton Rouge data was collected on May 12th so the maximum surface temperatures were more like 140°F than the 160°F we found in Houston.

The next steps depend on funding. With the data from our shadowband radiometer (LaPorte) and the TexAQS radiosonde data we can calibrate the ATLAS visible and thermal data sets. This will allow us to do surface energy budgets and, combined with the repeated flights calculate the Thermal Response Number (TRN).

We will be working with McNider and Lapents to incorporate the TRN into MM5. We are interested in the fine scale interaction of the surface with the atmosphere which is very important in understanding the whole air quality/meteorology linkage. We are really excited about the project and the opportunity we have had to work with TexAQS 2000.

Electra N308D

Yesterday, the Electra conducted an urban and power plant plume characterization flight over the Dallas/Fort Worth area. The Electra made seven north-south oriented transects proceeding from east to west across the DFW area at a nominal altitude of 2000 feet.

Preliminary analytical results suggest that the urban plume chemistry resulted in excess ozone production of 20 to 30 ppbv over the background air for maximum ozone level of about 100 ppbv. These levels correspond well to the maximum hourly average of 99 ppbv from the Dallas/Fort worth surface stations. Carbon monoxide increased from background levels of 150 ppbv to about 230 ppbv in the urban plume. Excess ozone production in the power plant plumes was substantially less than in the urban plume with ozone increases on the order of 10 ppbv about 30 miles downwind.

The Electra will not fly today and will probably not fly tomorrow either.

G-1 N701BN

Yesterday, the G-1 is conducted two 3-hour urban chemistry/power plant plume flights along with an intercomparison with the Twin Otter during the afternoon. The morning flight left Ellington at 9:30 AM to fly a series of parallel north-to-south oriented transects upwind (east), over and downwind (west) of Houston Metropolitan Area and the W. A. Parrish power plant. The morning flight established preconditions for ozone and aerosol production and the 2 PM afternoon flight characterized what actually happened.

The G-1 did not fly today and, given the precipitous forecast, it will probably not fly tomorrow.

DC-3 N56KS

Yesterday's DC-3/Lidar flight upwind (east), over and downwind (west) of Houston encountered both the Houston and W. A. Parrish power plant plumes. Maximum ozone levels ranged from 150 to 160 ppbv. The flight was cut somewhat short because of clouds later in the afternoon.

The DC-3 will not fly today or tomorrow, but will be ready on Sunday, weather permitting.

Twin Otter N153BU

Yesterday, the Twin Otter conducted an urban chemistry/marsh fire characterization flight. Taking off at 1:30 PM, the Twin Otter flew a series of parallel north-to-south oriented transects upwind (east), over and downwind (west) of Houston Metropolitan Area with the southernmost extent of transects just beyond the Gulf coast. The Twin Otter also flew several intercomparison legs with the G-1.

The **figures** on the following page depict ozone and sulfur dioxide levels encountered by the Twin Otter on yesterday's flight. Maximum ozone concentrations - 30 miles southwest of downtown Houston - ranged from 100 to 120 ppbv. Sulfur dioxide peaks are associated with nearby point sources.

The Twin Otter will not fly today, tomorrow and, based on our forecast, is not anticipating flying on Sunday.

Trooper of the Day

Michael Trainer is today's Trooper of the Day for unselfishly providing the CapRock folk's with occasional bags of Cordúa plantain chips.

And, as Fernando says, "(Y)ou look mahvelous! Simply mahvelous!"

Upcoming Events

Computer Network Termination - Monday, September 18th. The offices at LaPorte and Ellington Field will have internet and printing access through the 18th. After that, Cathy's packing it up and going home!

Daily Meteorological and Aircraft Planning Meetings - 7:30 AM and 1:00 PM (Ellington CapRock Building, Conference Room).

Dr. Peter Daum - Speaks at the University of Houston-Clear Lake at Noon on Wednesday, September 13th, in Room1438 of the Bayou Building.

Aerosol Group Meeting - 1:00 PM at the University of Houston-Clear Lake on Wednesday, September 13th, in Room1438 of the Bayou Building.

LaPorte Team Meeting - 2:00 PM at the University of Houston-Clear Lake on Wednesday, September 13th, in Room1438 of the Bayou Building.

Thoughts for the Day

"Eagles may soar, but weasels don't get sucked into jet engines."

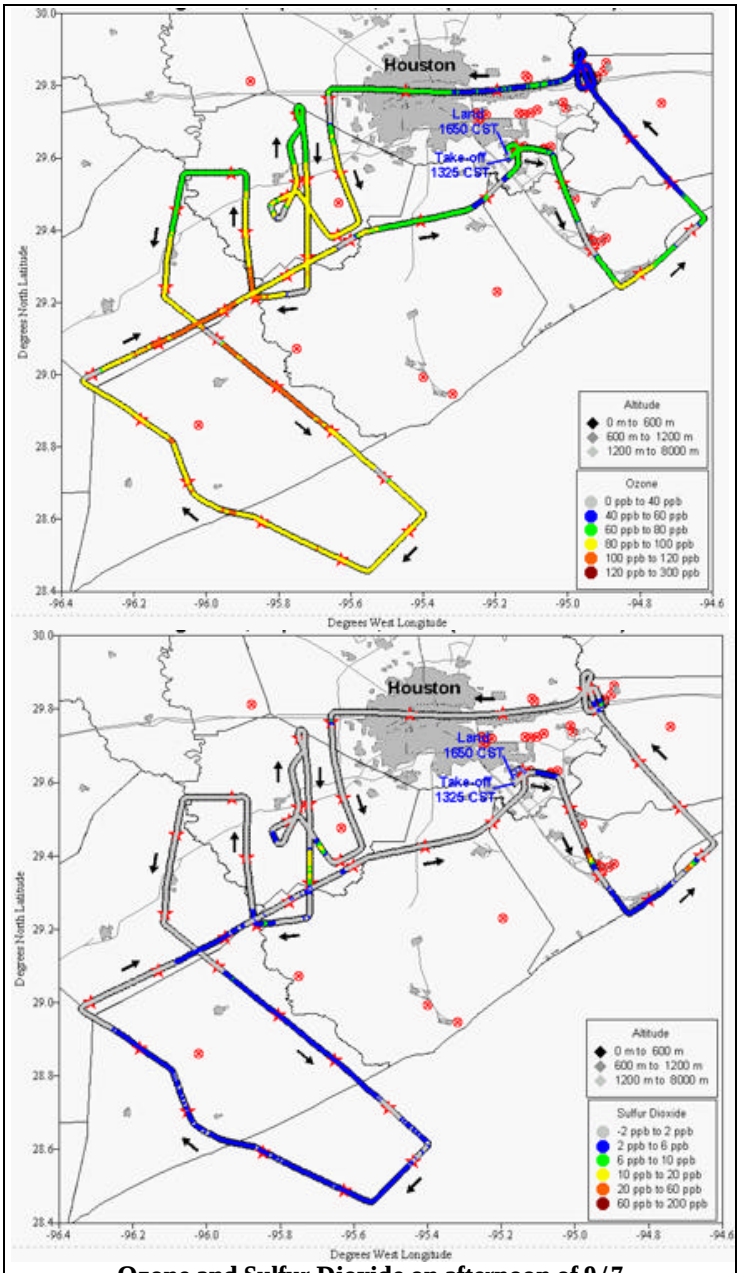
–John Benfield

"The way I look at life - we're all on the Hindenberg, so there's no use in arguing over the window seat."

–Richard Geni

"Wisdom begins in wonder."

–Socrates



Ozone and Sulfur Dioxide on afternoon of 9/7
Courtesy of Twin Otter