The Meteorological Aspects of Regional Air Quality

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ESRL Dedication and Open House

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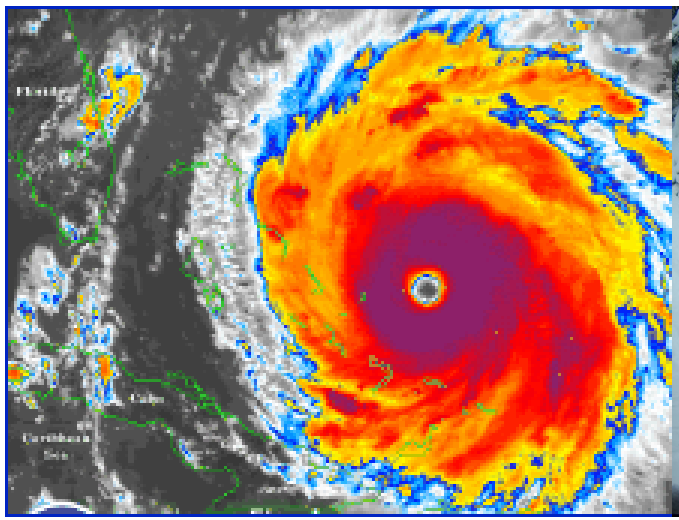
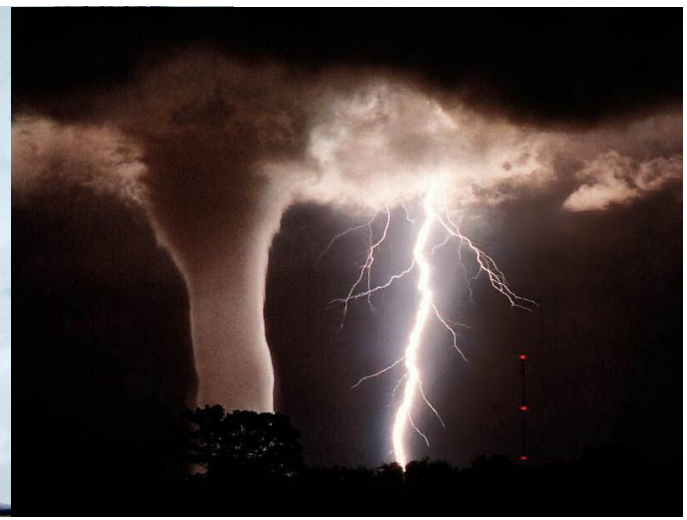
Regional Air Quality – The Problem

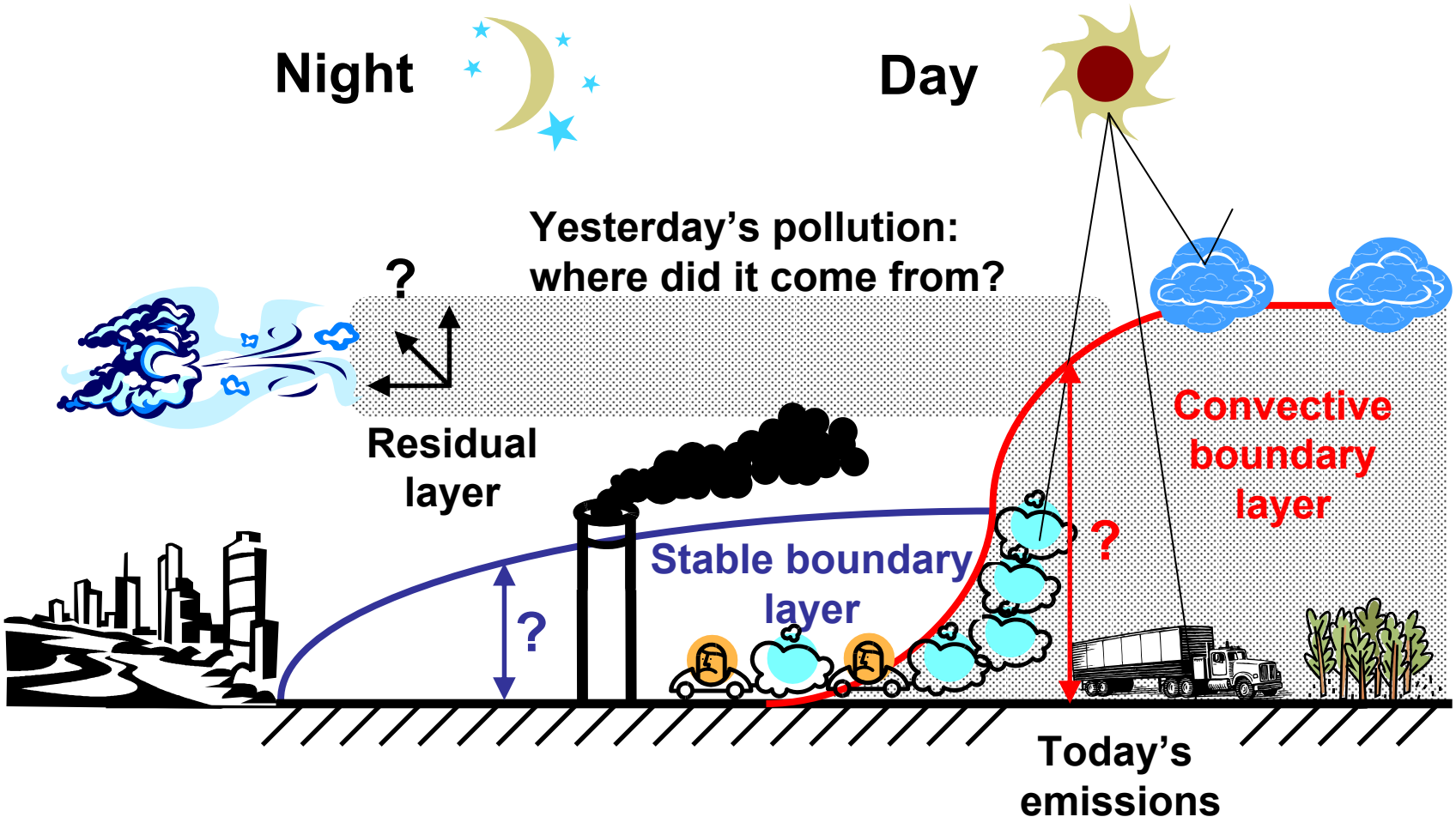
Pollution episodes generally occur under fair weather conditions,

whereas other types of weather are sexier and more violent.





Regional Air Quality – The Problem



- Vertical mixing: what is the depth of the boundary layer?
- Horizontal transport: where does the wind move the pollution?

Regional Air Quality – ESRL Solutions

- Best for shallow boundary layer at night
- Best for deep boundary layer during day
- Best for model assimilation

400 meters; 5-meter resolution

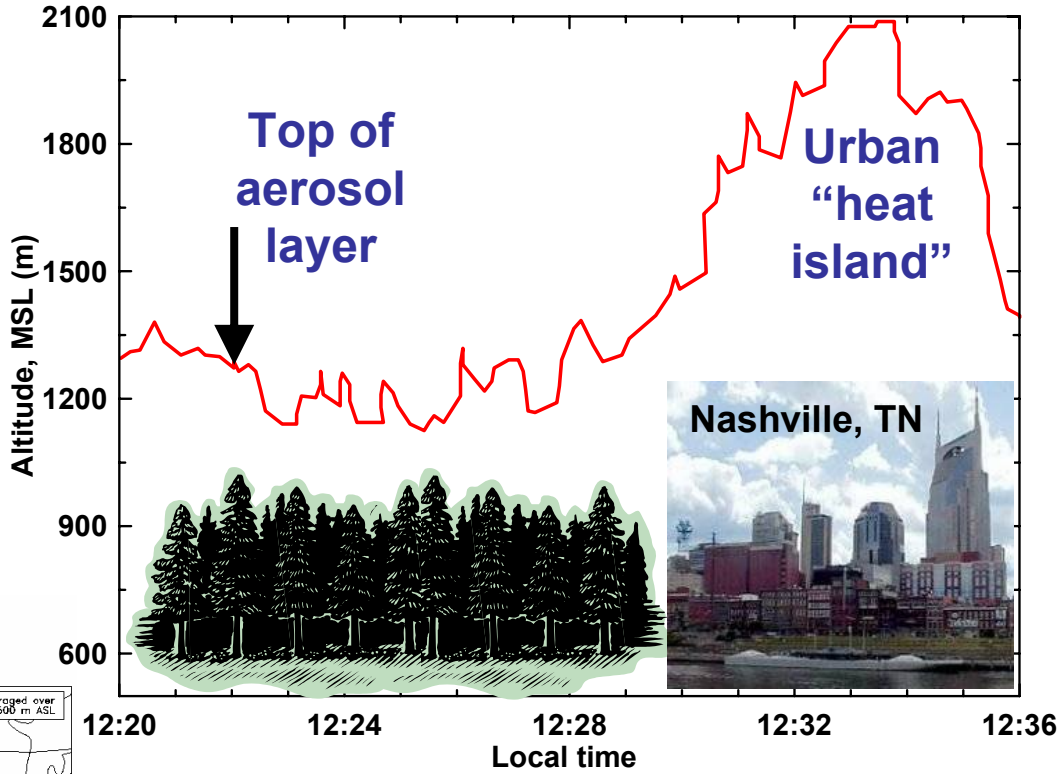
4000 meters; 100-meter resolution for winds

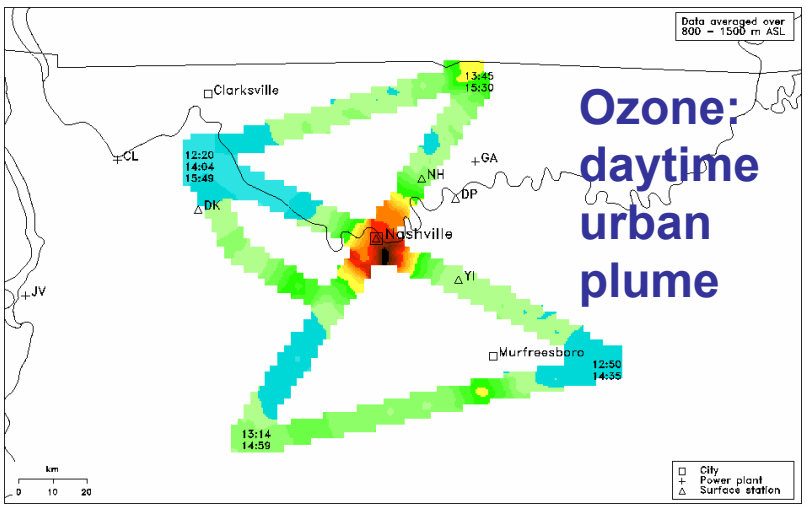
1000 meters; 100-meter resolution for temperature

8000 meters; 100-meter resolution for winds

2000 meters; 100-meter resolution for temperature

Regional Air Quality – ESRL Solutions

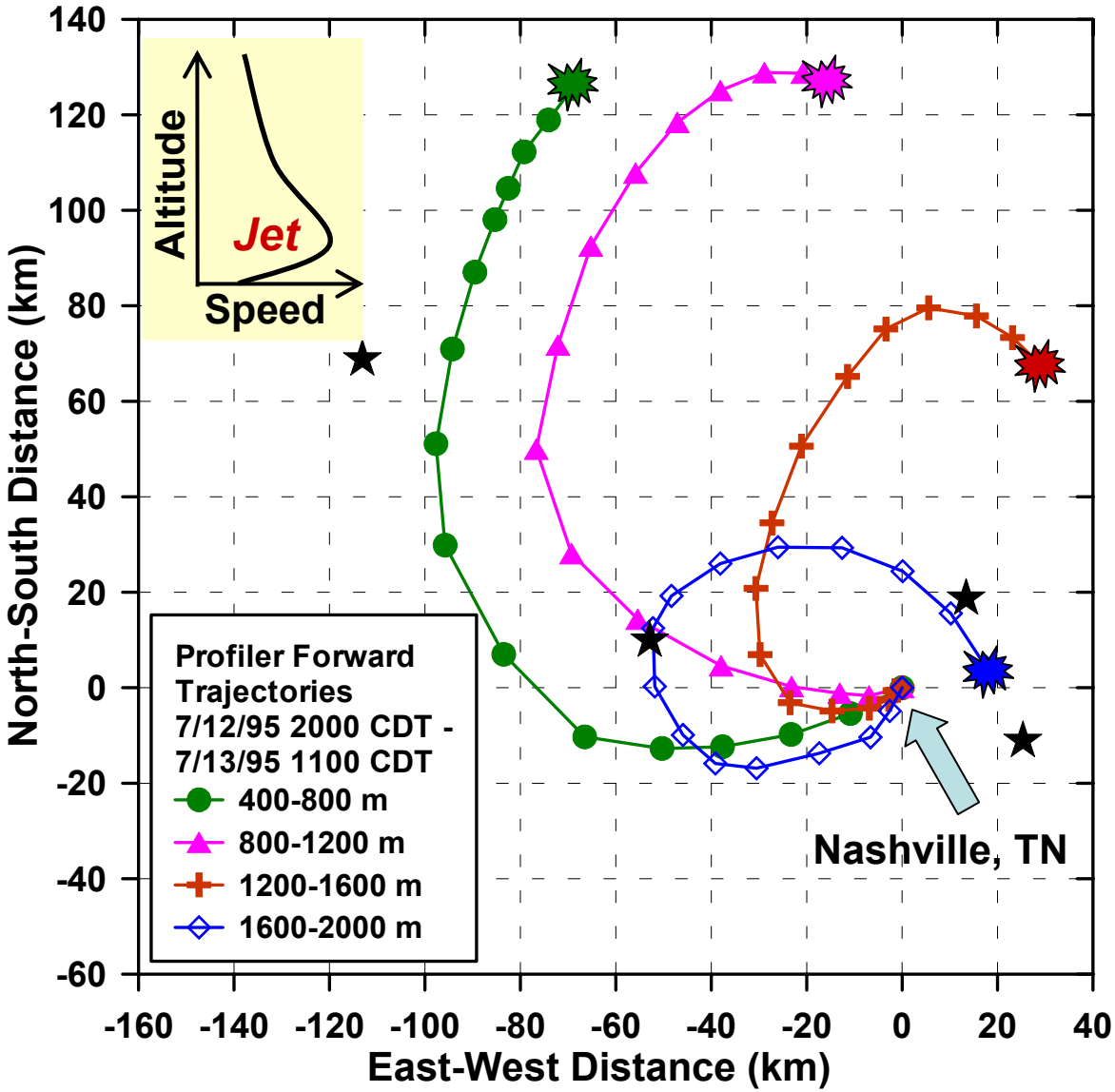




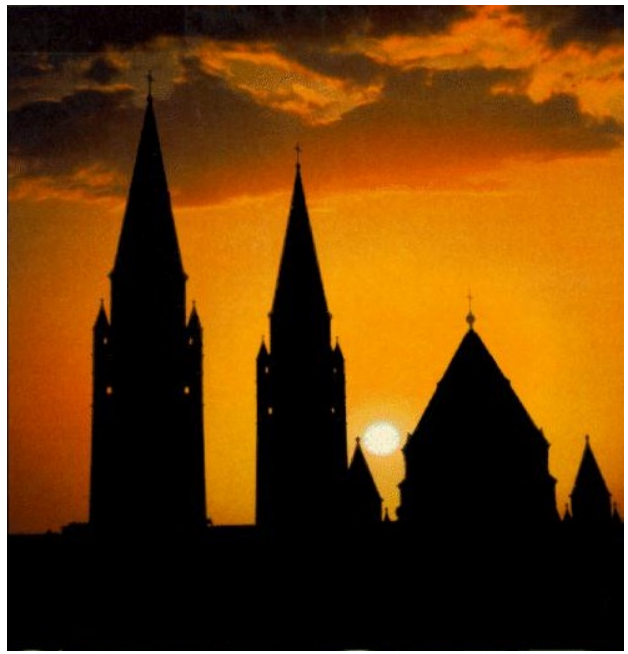
Ozone: daytime urban plume

ESRL airborne ozone/ aerosol lidar delivers fine horizontal resolution that cannot be achieved with ground-based sensors.

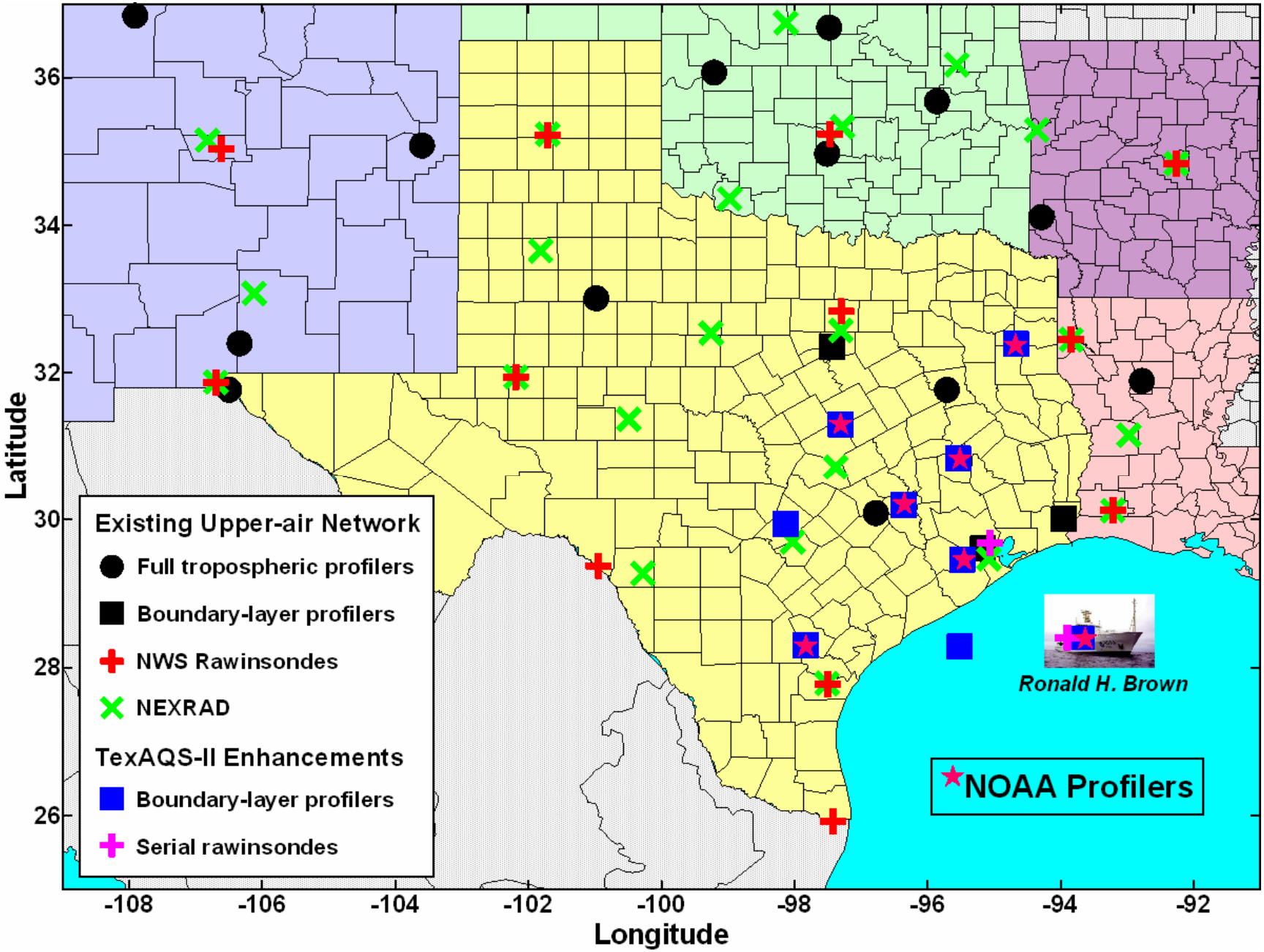
Regional Air Quality – ESRL Solutions



Frequent (hourly) vertical wind profiles are necessary to capture the details of how and where pollution transport occurs at night.



Regional Air Quality – Current Project



Regional Air Quality – New ESRL Solutions

TEXAQS 2006

User's Guide

Start trajectory from:

Fort Worth

or specify:

lat: 32.7539 lon: -97.33624

Start Date (UTC)

7 Aug 2006

Start Time (UTC) 0:00

Time Steps: 36 hours

Direction: Backward

Select Profilers

APC	ELP	LPT	SNR
AZC	HKL	LVW	TCU
BRZ	HVE	MDY	VCI
BVL	JTN	NBF	WNF
CLE	LDB	PAT	BPA
DQU	LMN	PRC	BHM

Specify Altitudes

Color	Min Alt (m-MSL)	Max Alt (m-MSL)
red	200	600
black	600	1000
green	1000	1400
blue	1400	1800

Plot Lat/Lon Range

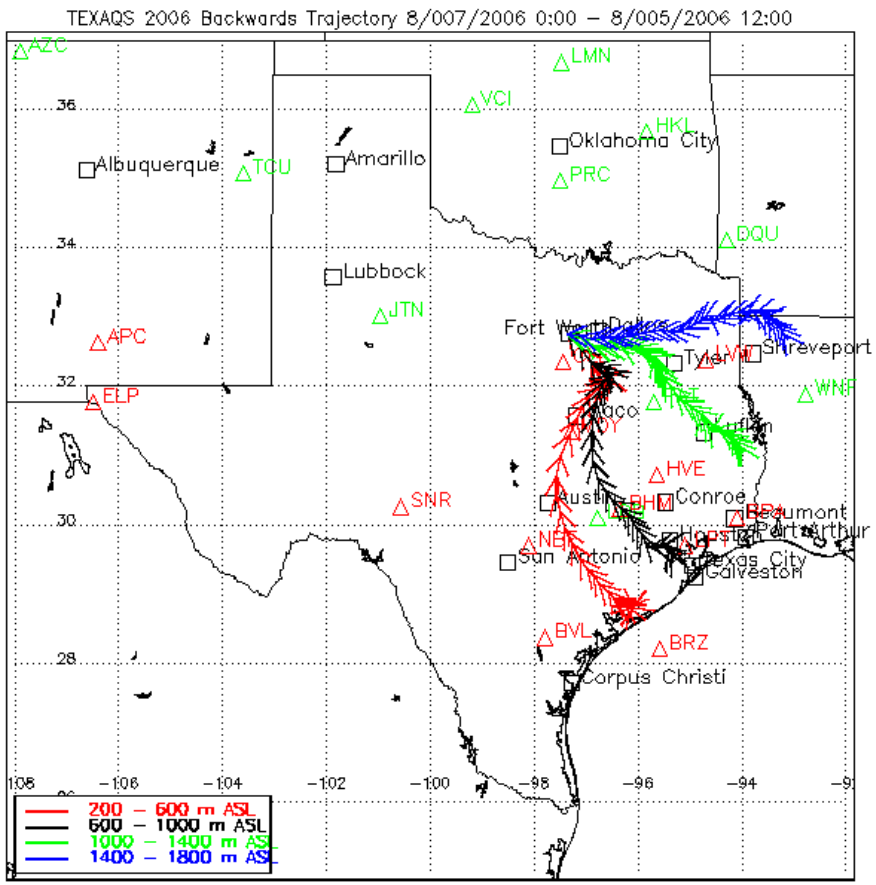
N Lat 37.0

W Lon -108.0 E Lon -92.0

S Lat 25.0

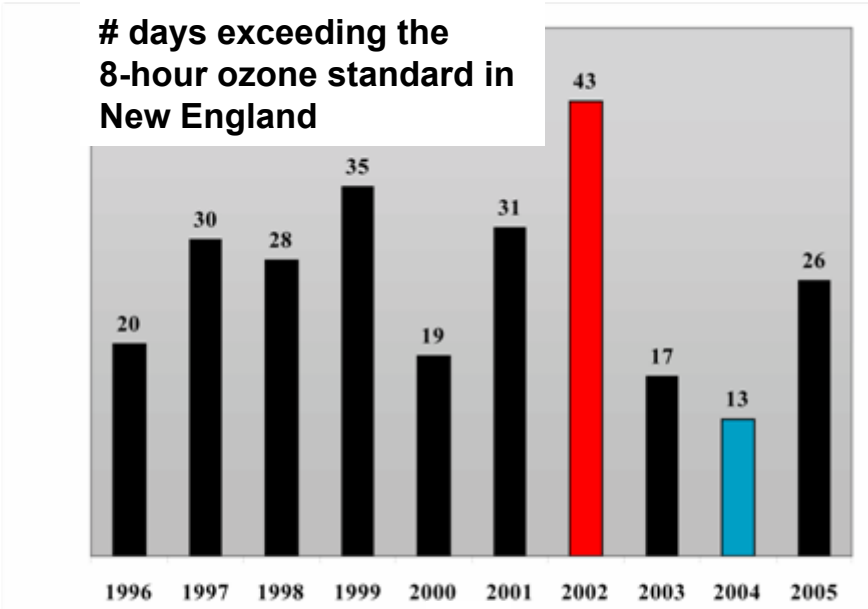
Submit

Trajectory Map Plot | Printable Map Plot | Profiler Statistics | ASCII Trajectory Data | Evaluation



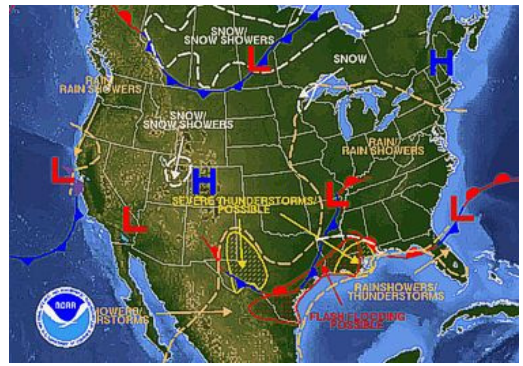
ESRL's interactive wind profiler trajectory tool is available to scientists and forecasters to help monitor air pollution transport.

Regional Air Quality – A Tale of Two Summers



Reduced ozone:

Emissions?



Meteorology?

NWS observing station	Departure from normal (F)		# days with max. temp. above 90º F		Total rainfall % of normal	
	2002	2004	2002	2004	2002	2004
Boston, MA	+2.45	-2.50	22	3	55%	128%
New York, NY	+2.50	-2.05	27	4	72%	154%
Philadelphia, PA	+3.95	-1.25	32	5	56%	147%

- 2002 was climatologically warm and dry; 2004 was cool and wet
- Excessive heat days coincident with enhanced ozone production
- Year-to-year changes in weather dictate need to repeat assessments