FASTNET: Fast Aerosol Sensing Tools for Natural Event Tracking

CATT: Combined Aerosol Trajectory Tools

Web-Based Data Acquisition, Visualization, Analysis Tools,

Developed by CAPITA (R. Husar, S. Falke, K. Hoijarvi),

Funded by the 5 US Regional Planning Organizations,

Managed for MANE-VU by Gary Kleiman & Serpil Kayin

Based on Data Architecture Developed with previous support from NSF and NASA

Found at http://datafed.net

DATAFED.NET

For effective use of aerosol data

Aid air quality data flow
Share processing services
Support specific projects

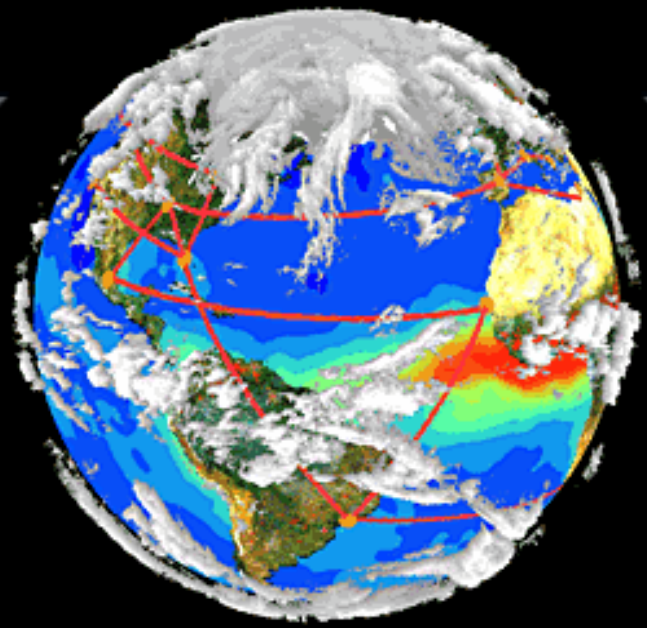
Home | Datasets | Web Services | Views | Web Apps | Projects | Community

- Projects
- FASTNET
- CATT
- FSAN
- NAmEN
- SHAirED
- TableRock

Catalog

ViewEdit

ViewURL



Animate

DataLog

Bulletins 9/29 CATT and FASTNET report to: RPO

Sponsors

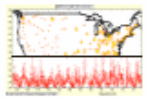
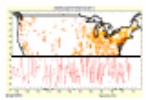
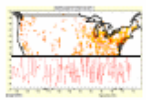
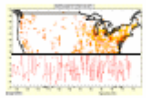
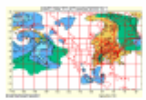
Membership

Technologies

Data Catalog(s) Provide Access to Many: Fast (rapidly available), Current (near-real-time, recently archived & continuing) and Slow (historical data Like IMPROVE Aerosol & ATAD trajectories)

DATAFED For effective use of aero

DataFed Catalog

Dataset	Dataset Icon	Description	Domain * Aerosol	Provider All	Platform All	Method All	Format All
View ASOS_STI		Hourly avg. ASOS Surface Weather from NOAA NWS through NCDC and STI	Aerosol	STI	Network	RemoteSens	Point
View AIRNOW_PM25IMG		EPA AirNow PM2.5 Images Daily	Aerosol	EPA	Network	ContSens	SeqImage
View AIRNOW_OL		EPA Particulate Matter, FRM	Aerosol	CAPITA	Network	FilterSmp	Point
View WRFModel		Weather Research and Forecasting Model	Aerosol	NOAA	Model	Model	SeqImage
View AIRNOW		EPA Particulate Matter, FRM	Aerosol	CAPITA	Network	FilterSmp	Point
View TOMS_AI		TOMS Aerosol Index	Aerosol	TOMS	Satellite	RemoteSens	SeqImage
View PM25		EPA Particulate Matter 2.5, FRM	Aerosol	CAPITA	Network	FilterSmp	Point
View NAAPS_NAM_MIX_AOT		NAAPS model: Mixed Dust, Smoke, Sulfate AOT, N.America	Aerosol	NRL	Model	Model	SeqImage

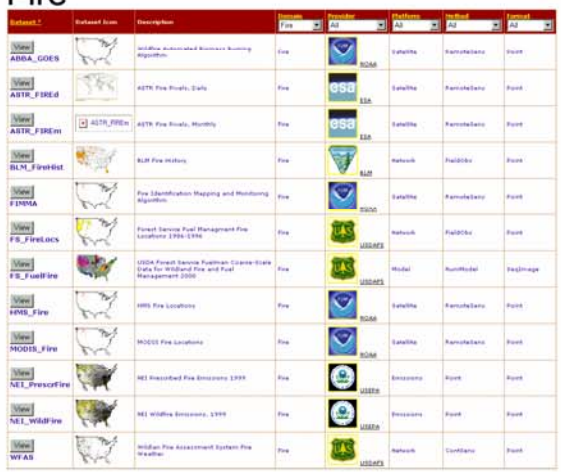
Data Catalogs: Aerosol, Fire, Maps, Meteorology, Emissions, Images, Events

http://webapps.datafed.net/dvoy_services/datafed_catalog.aspx

Aerosol

Aerosol (Cont.)

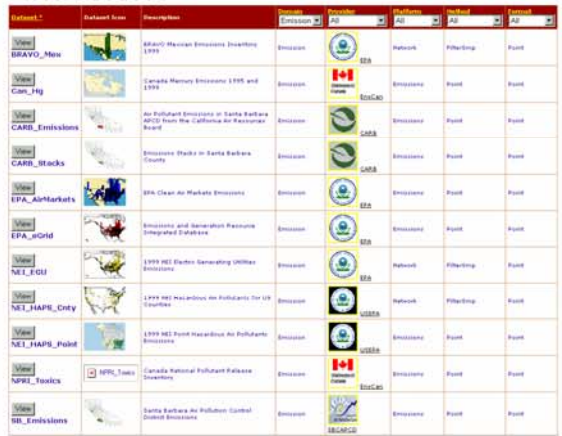
Fire



GIS Maps

Meteorology

Emissions



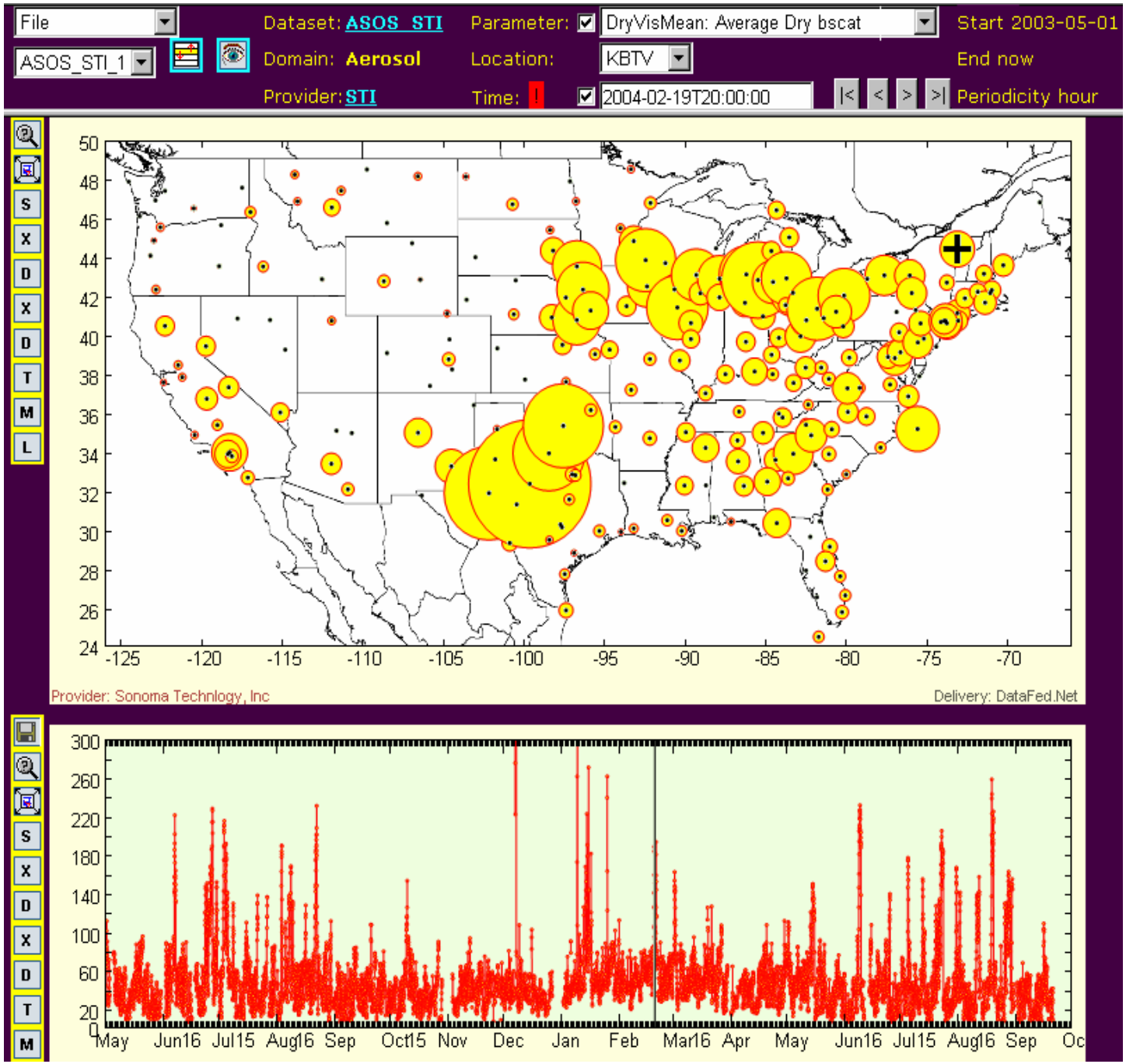
Events & Images

Data Viewer:

Open & View Any File in Catalog(s).

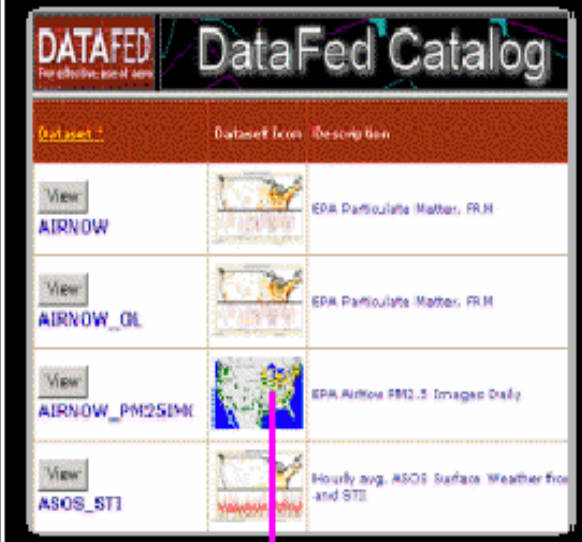
Many Files Include Time Series, Linked to Map – Point & Click.

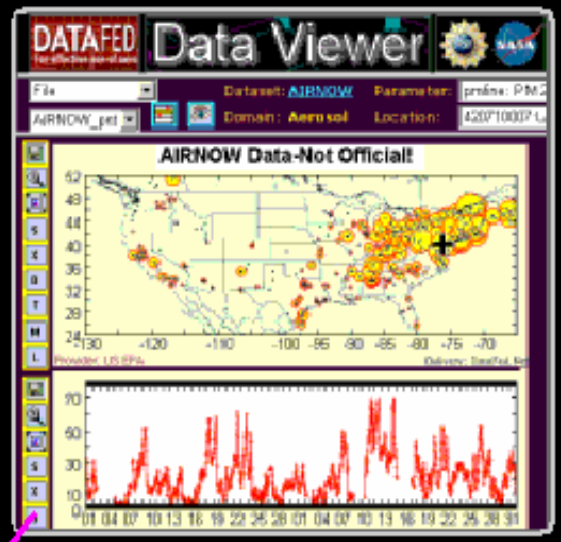
Zoom Map or Time series, Change Size, Symbols, Variables, Add Layers, Export Data – Copy Paste.

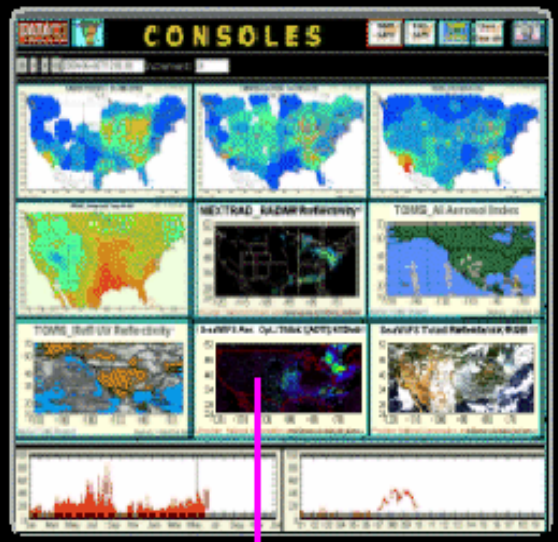


Fast Aerosol Sensing and Tools for Natural Aerosol Tracking

Real-time and retrospective detection and analysis of smoke, dust and other aerosol events.

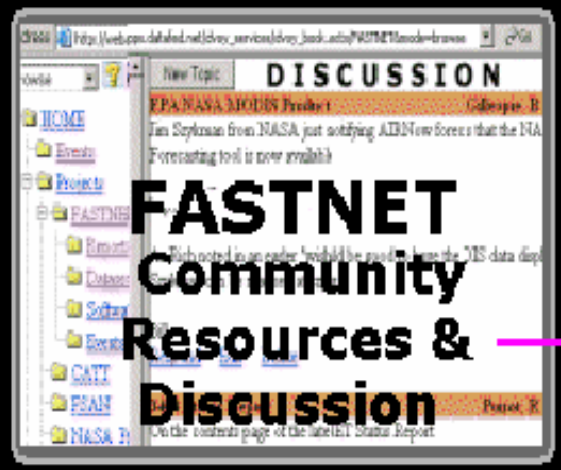






Find It, Add To It

See It, Get It
Screen It,
Aggregate It,
Show It, Grow It



FASTNET
Community Resources & Discussion

Layer It, Compare It,
Merge It, Analyze It
Interpret It.

Save It, Share It,
Communicate It,
Discuss It,
Understand It

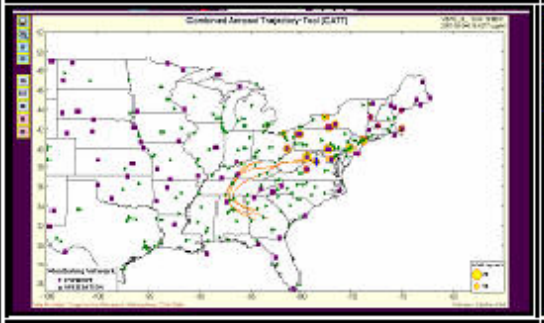
Combined Aerosol Trajectory Tool

Resources/Discussion

Manual -pdf , ppt

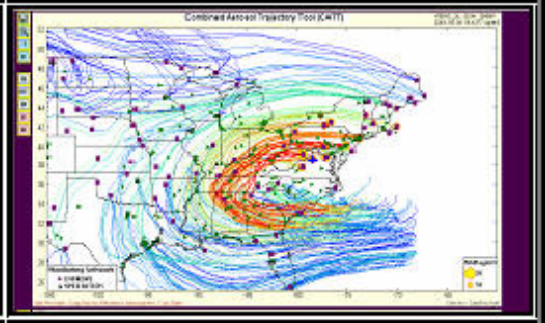
Ensemble Trajectory Browsers

Single Site , Single Day

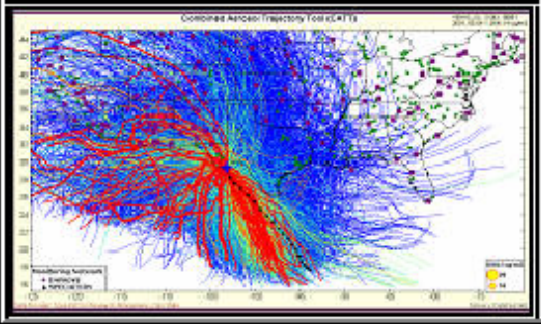


Multi-Site, Single Day

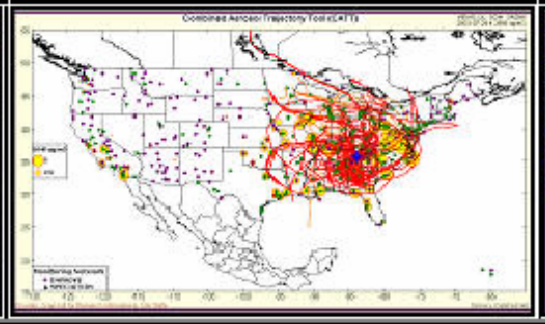
All Sites, Single Day



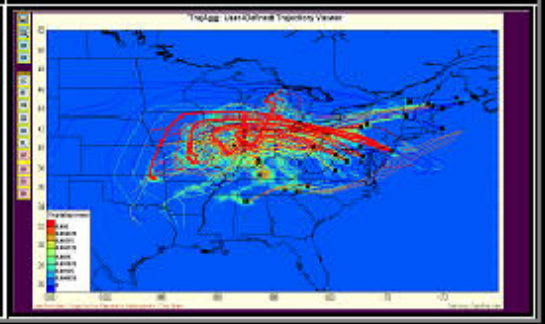
Single Site, Time-Range



Concentr. Percentile

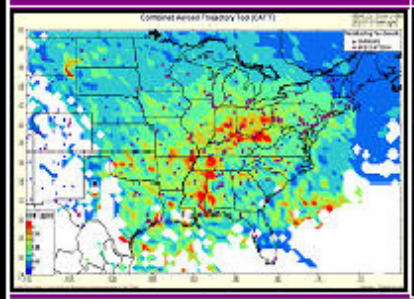


User-Defined Filter

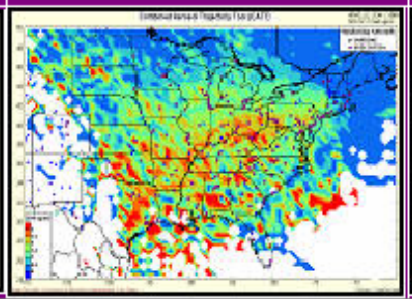


Gridded Transport Metrics Browsers

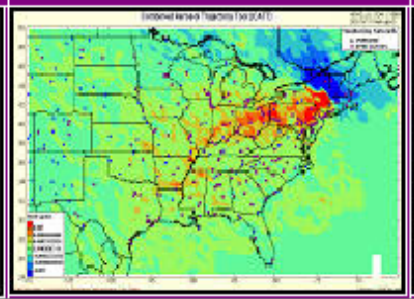
Inc. Prob.'Poirot'



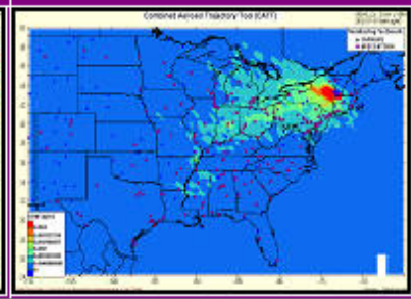
Src.Contr.'Hopke'



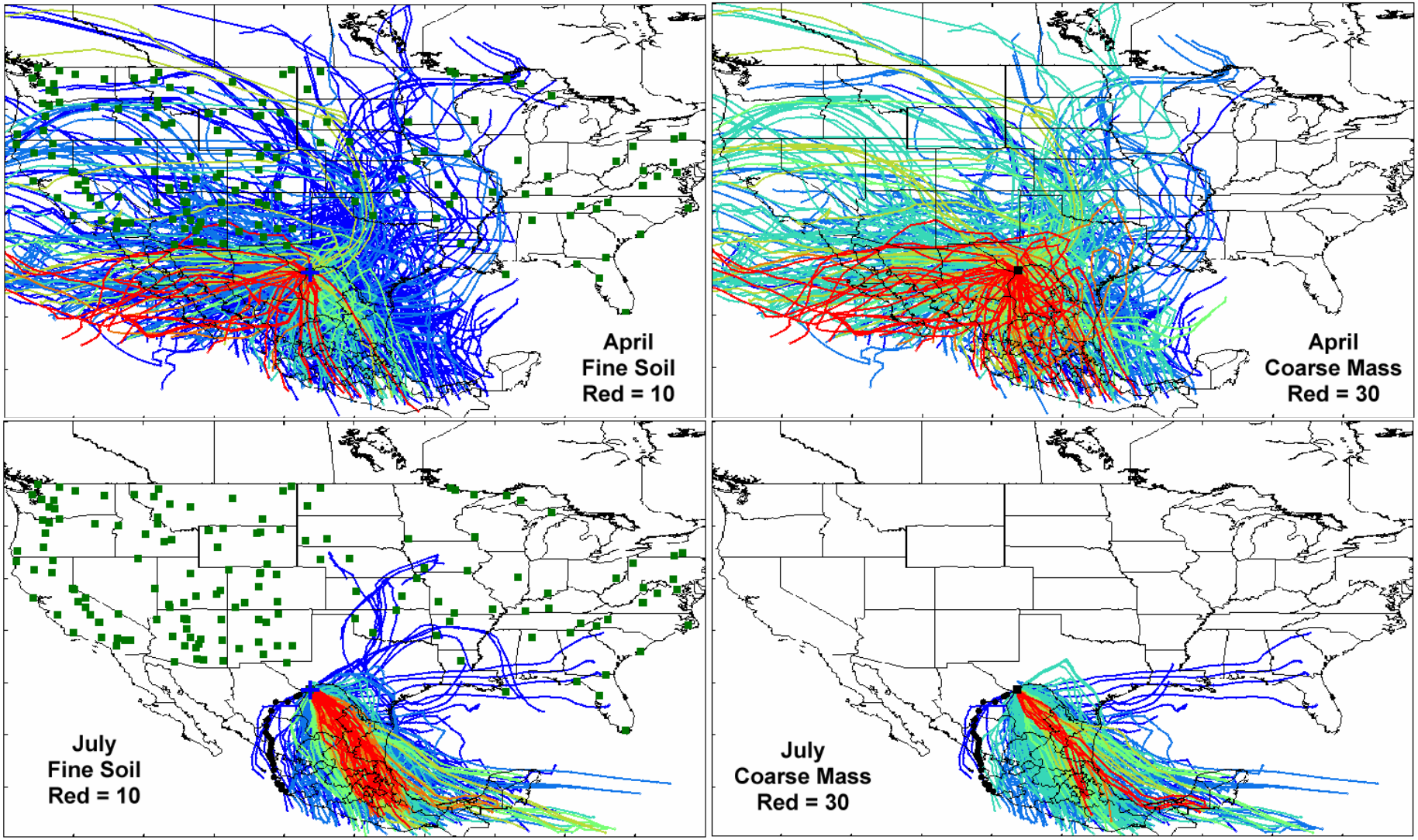
Avg. Conc. 'Kenski'



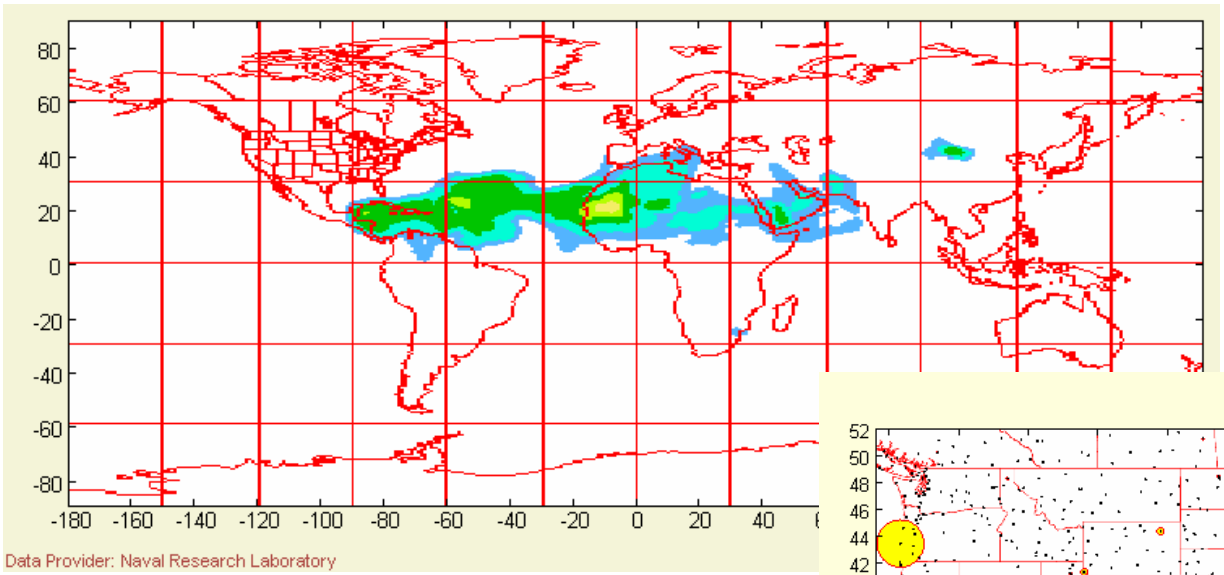
Weighed Prob.'Green'

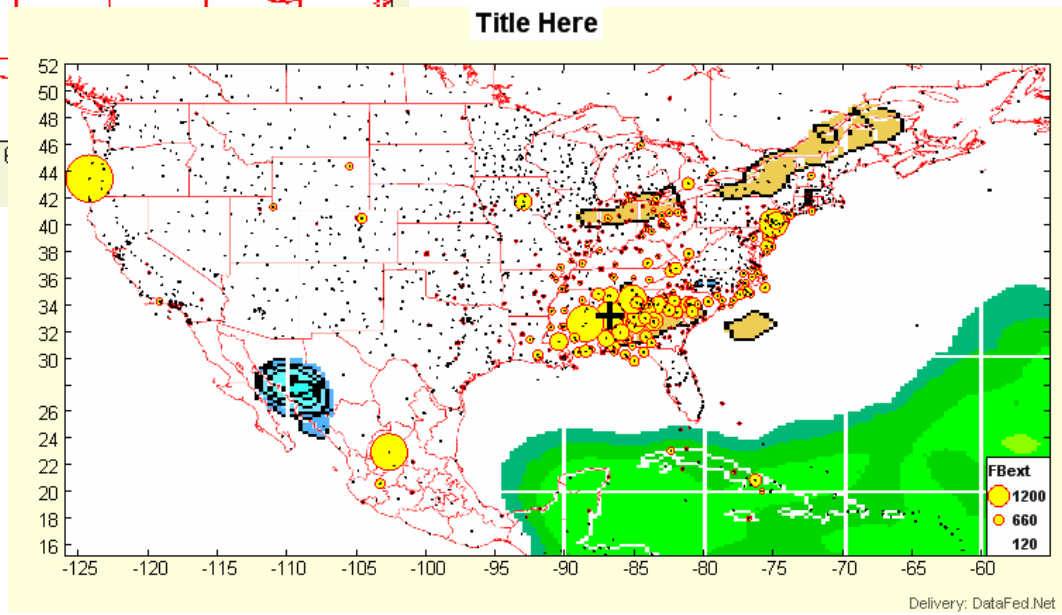


Fine Soil (Left, Red = 10) and Coarse Mass (Right, Red = 30) for April (Top) and July (Bottom) at BIBE, 1989-03



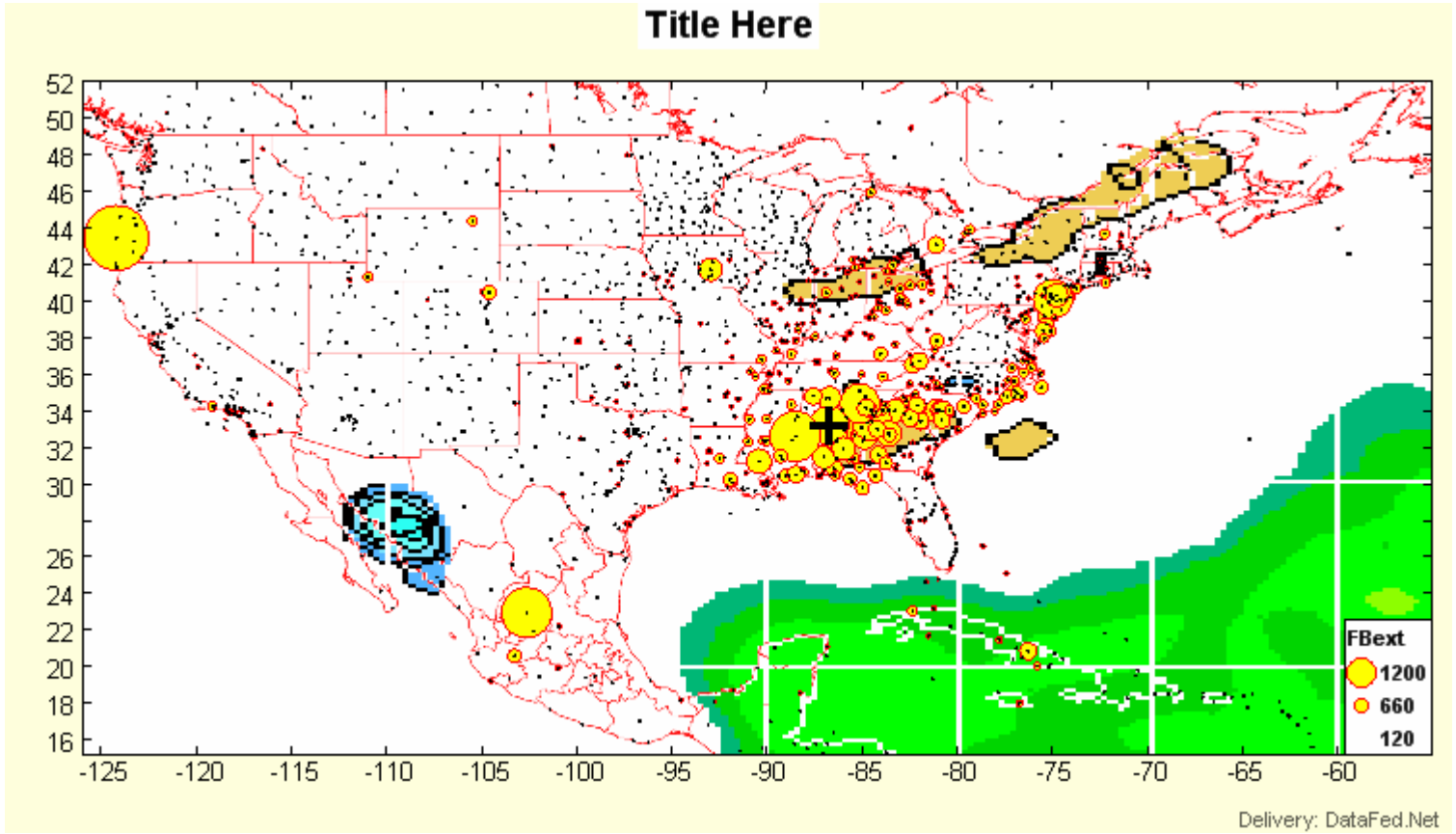
NAAPS Aerosol Forecast Dust AOT for 07/27/05 18:00Z

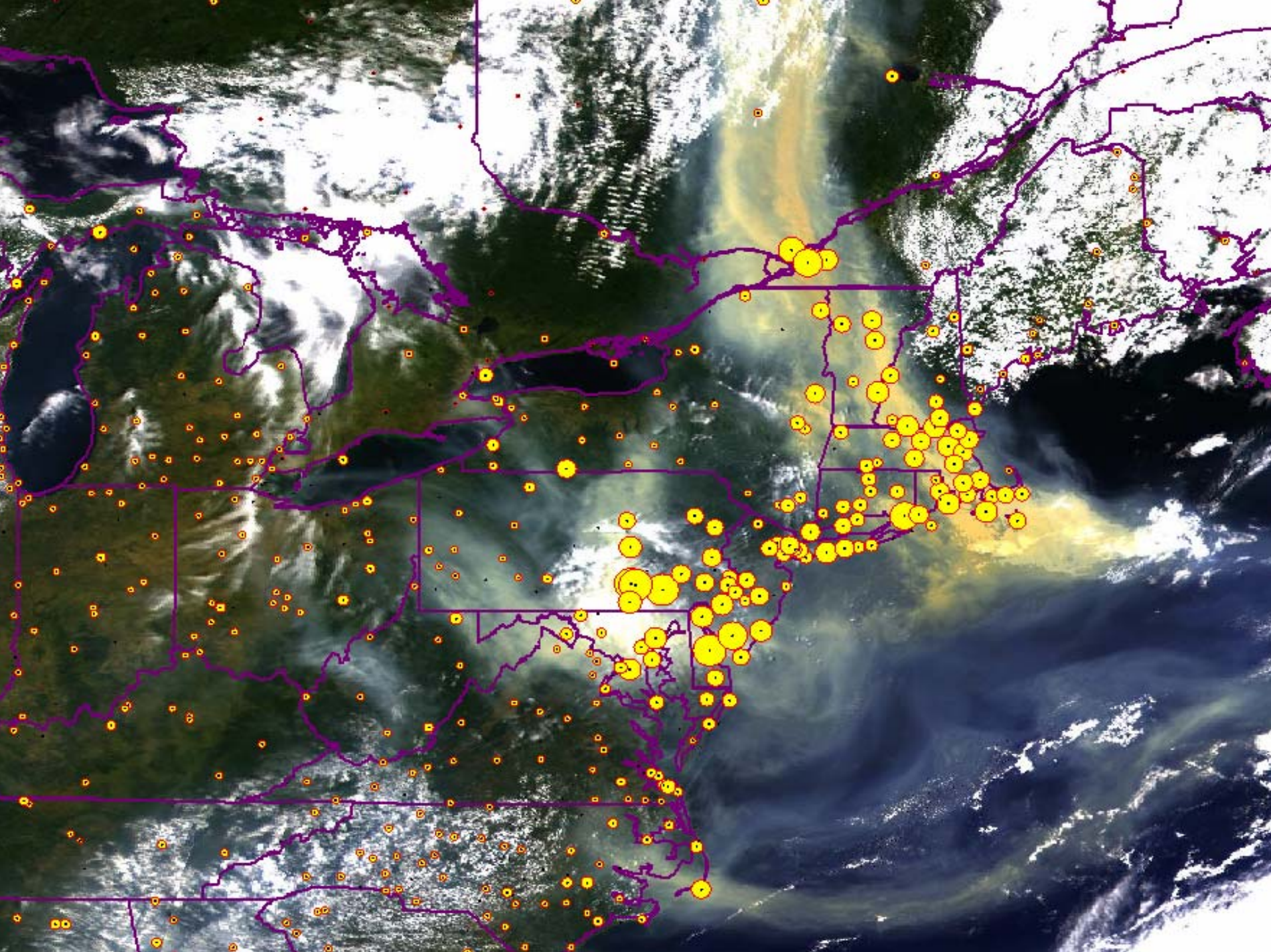


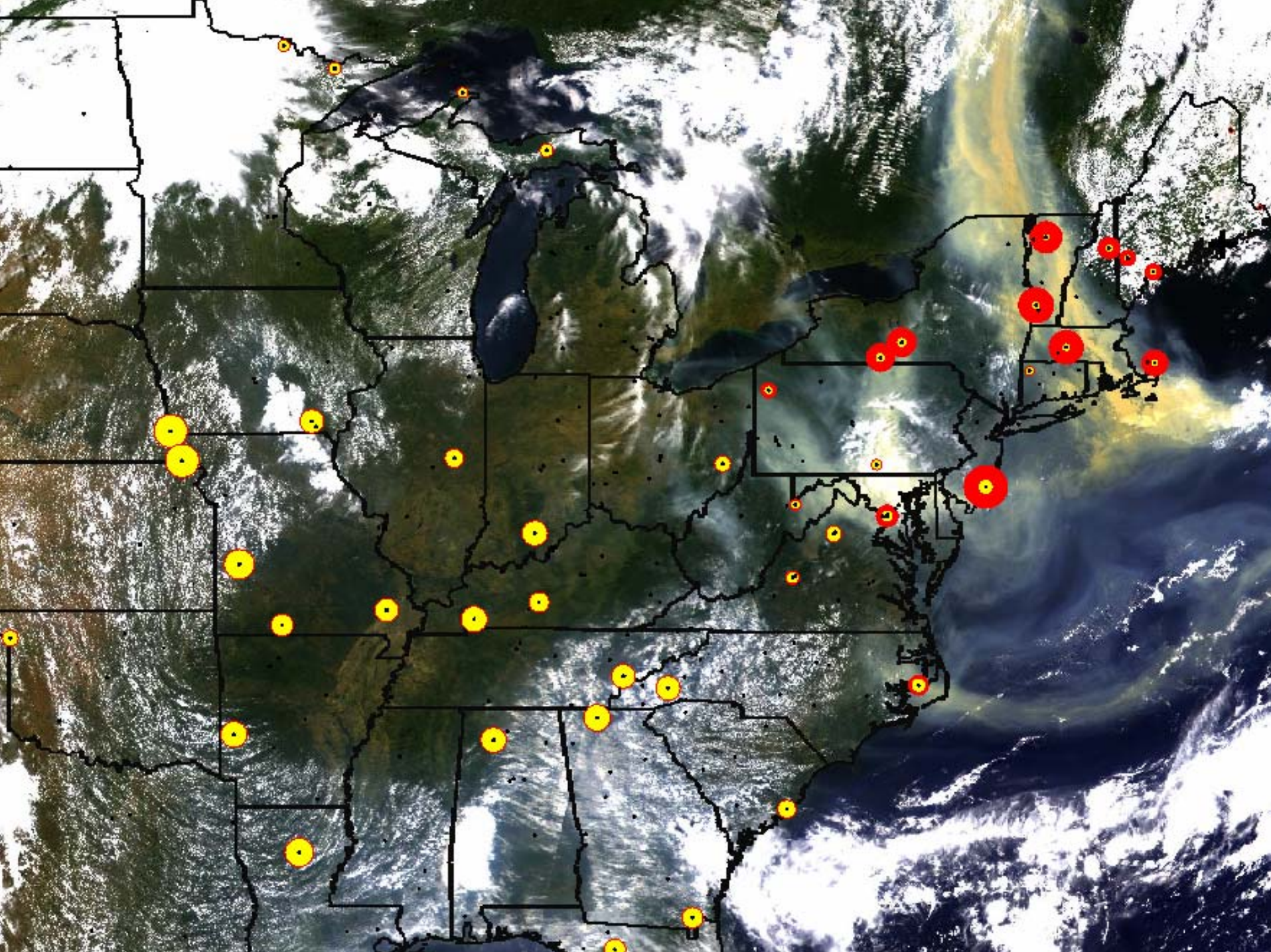


Can We See Sahara Dust (at Surface) First at Virgin Islands Nephelometer?

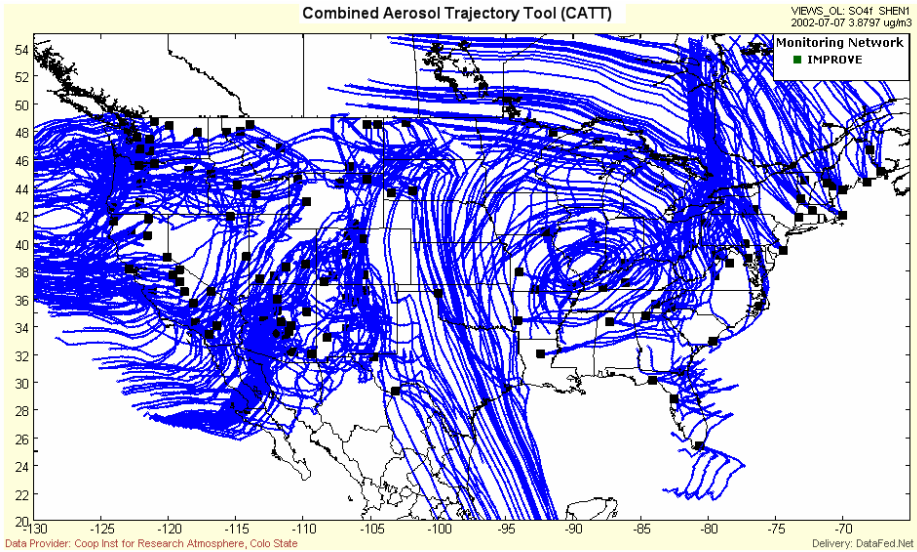
Can we report it in Near-Real-Time?

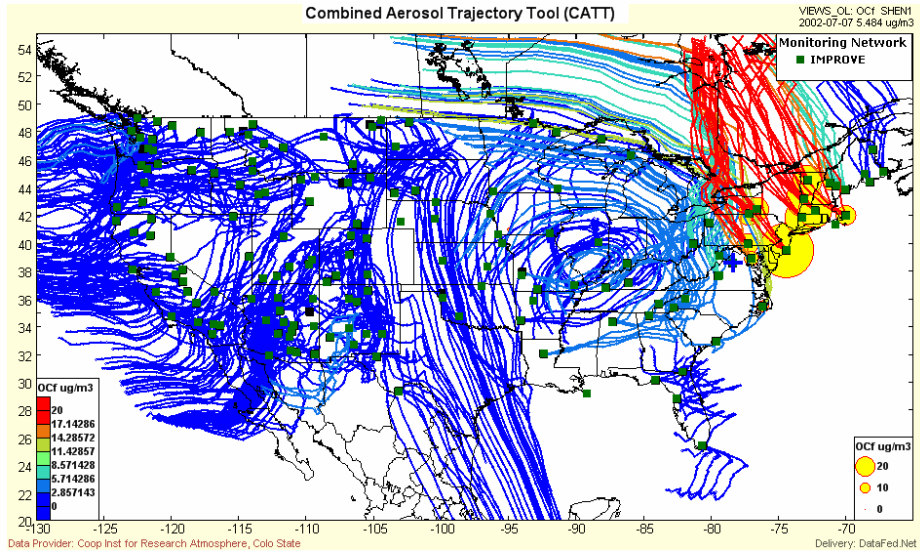

Title Here
52
50
48
46
44
42
40
38
36
34
32
30
26
24
22
20
18
16
-125
-120
-115
-110
-105
-100
-95
-90
-85
-80
-75
-70
-65
-60
FBext
1200
660
120
Delivery: DataFed.Net

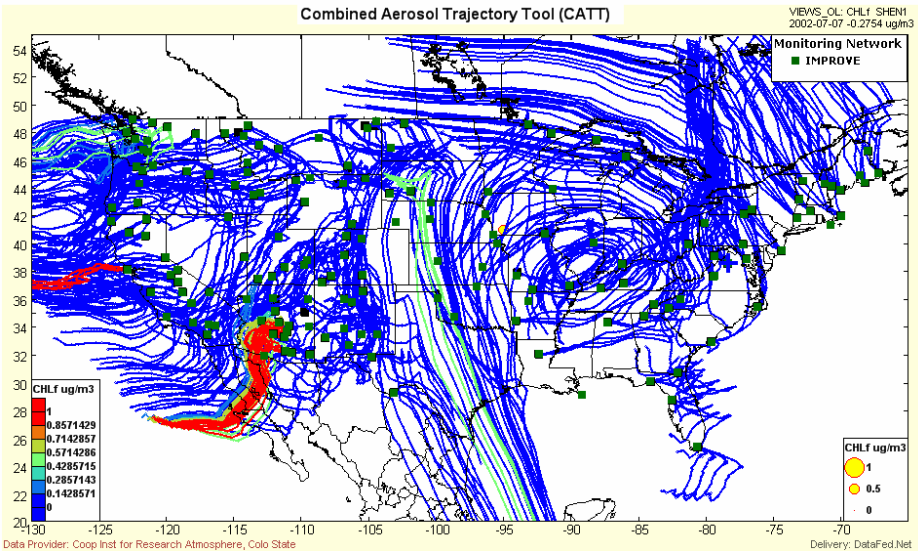


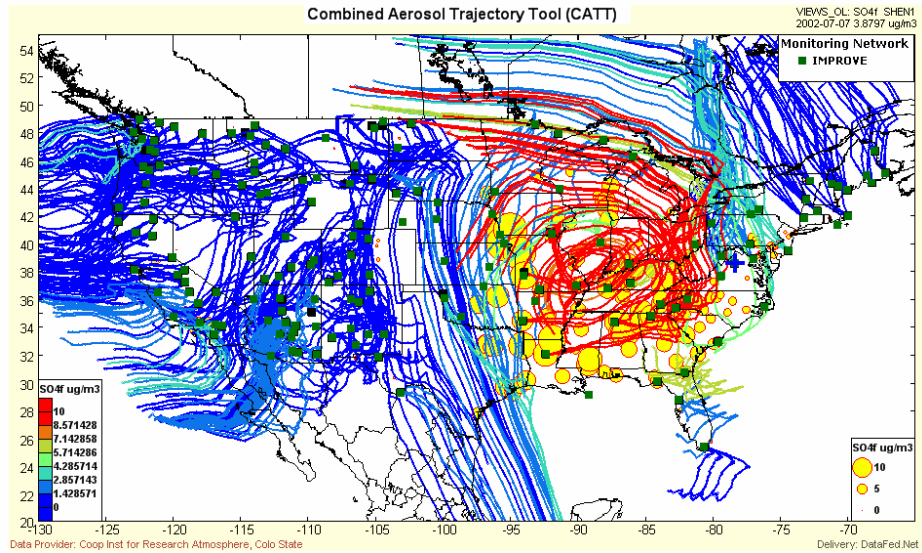


Back Trajectories for All IMPROVE Sites on 7/7/02 Unweighted (top left), & color-weighted for OC (top right), SO4 lower right & Cl (lower left)





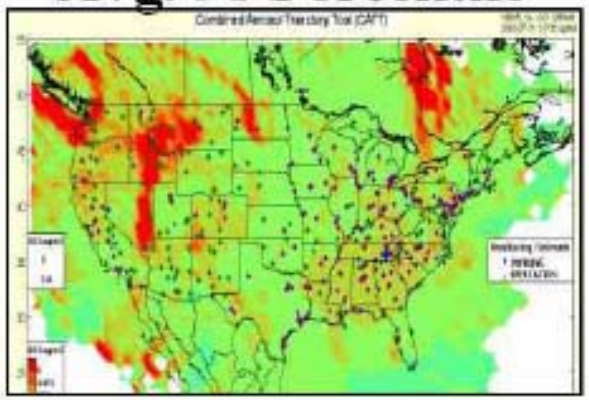




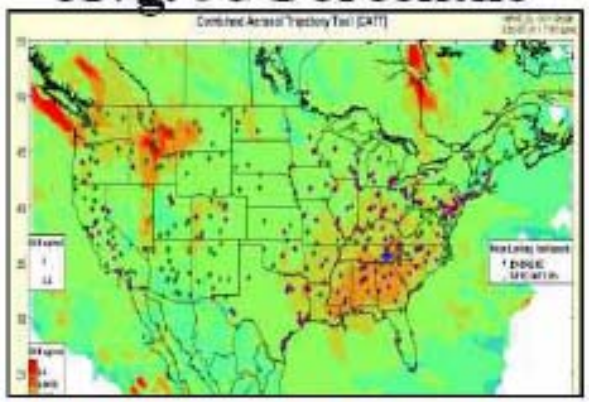
2001-03 Average Upwind Organic Carbon with “Percentile Screens” Imposed – i.e. Average Upwind OC above X percentile

…And with No Percentile Screen

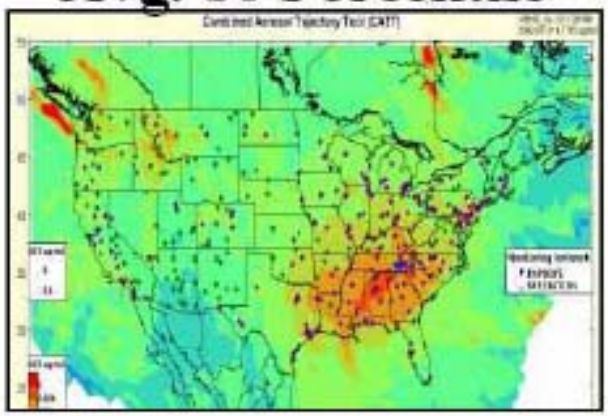
Avg. 98 Percentile



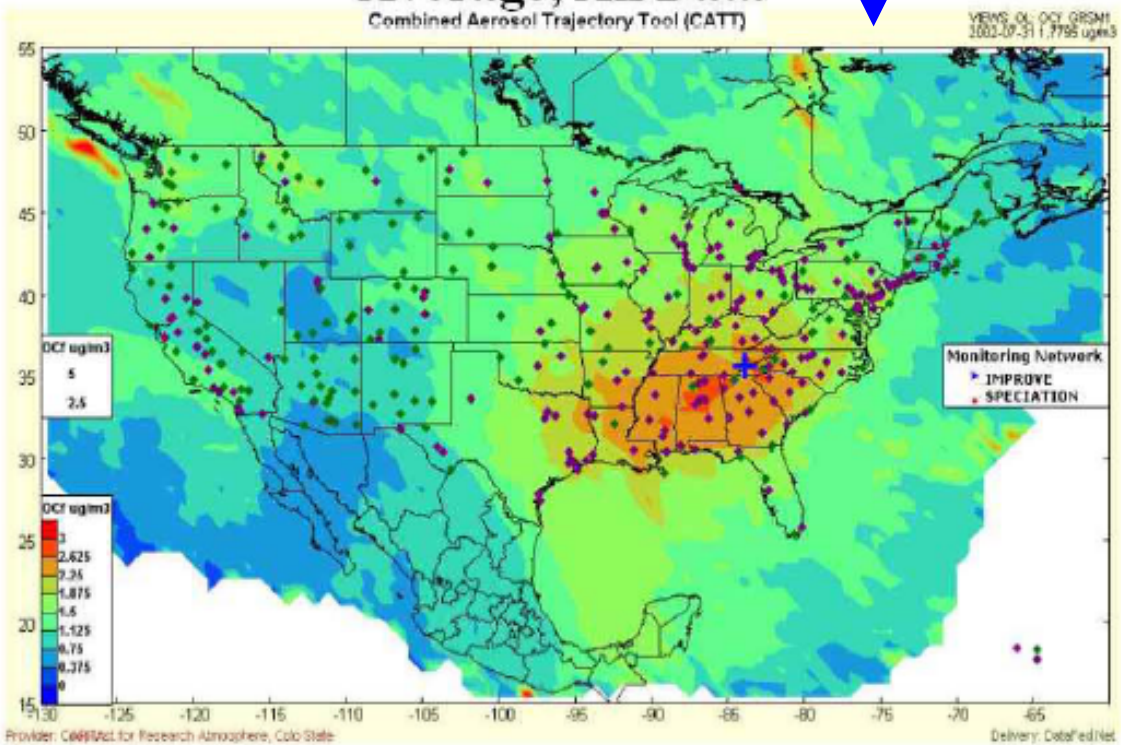
Avg. 95 Percentile

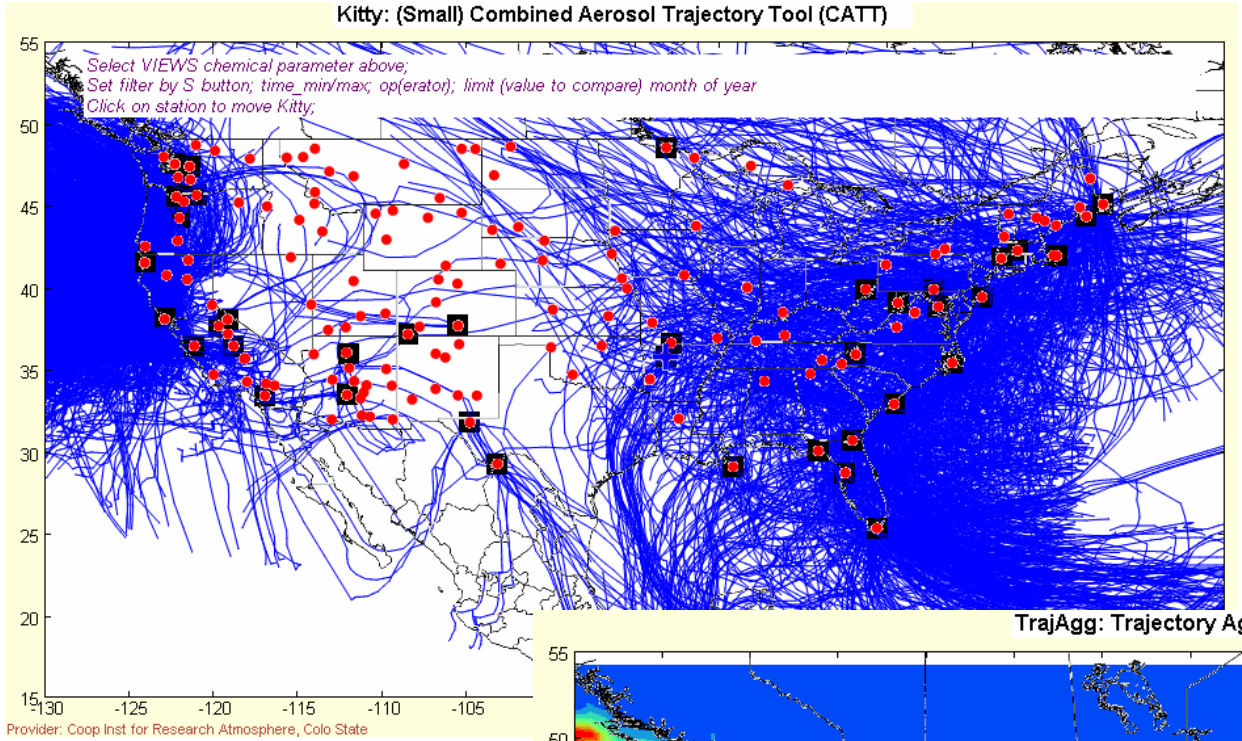


Avg. 80 Percentile



Average, All Data

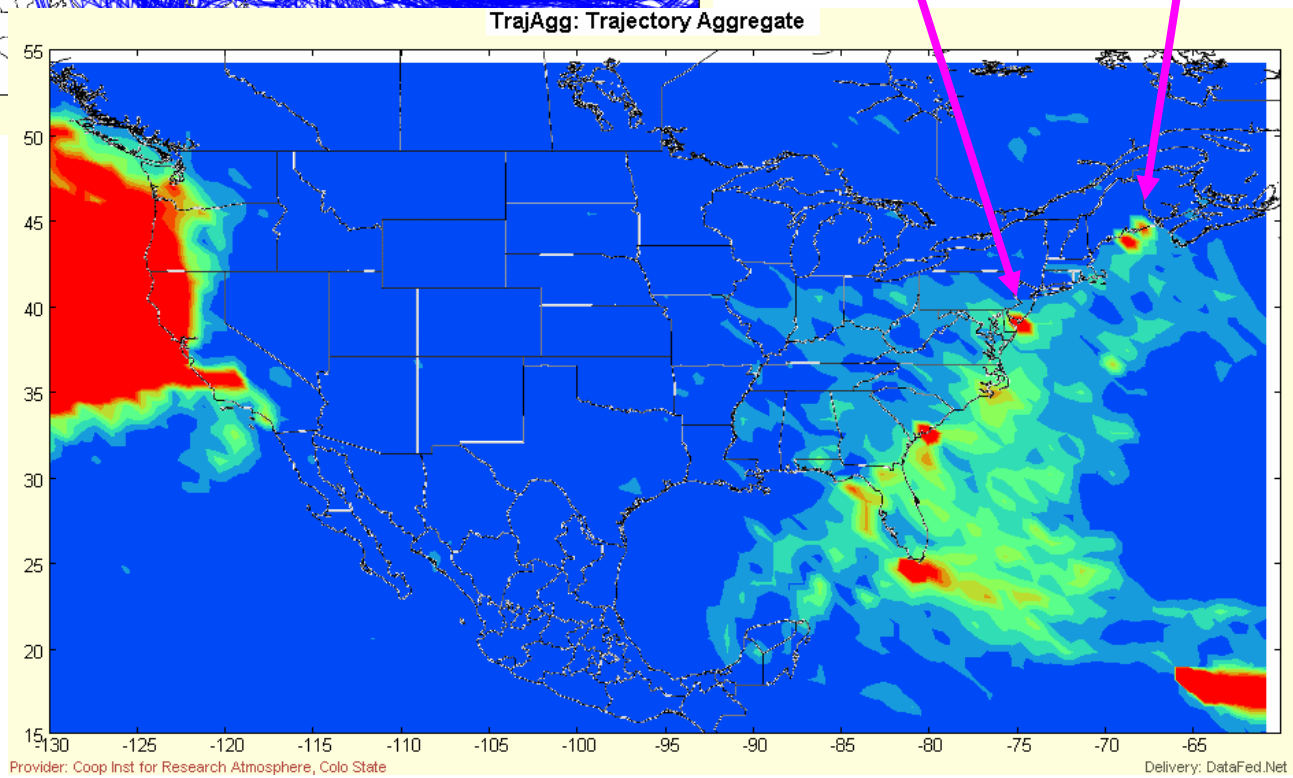




Na >= 1.5 ug/m3

Sea Salt Comes from the Sea, as She Should.

BRIG & ACAD



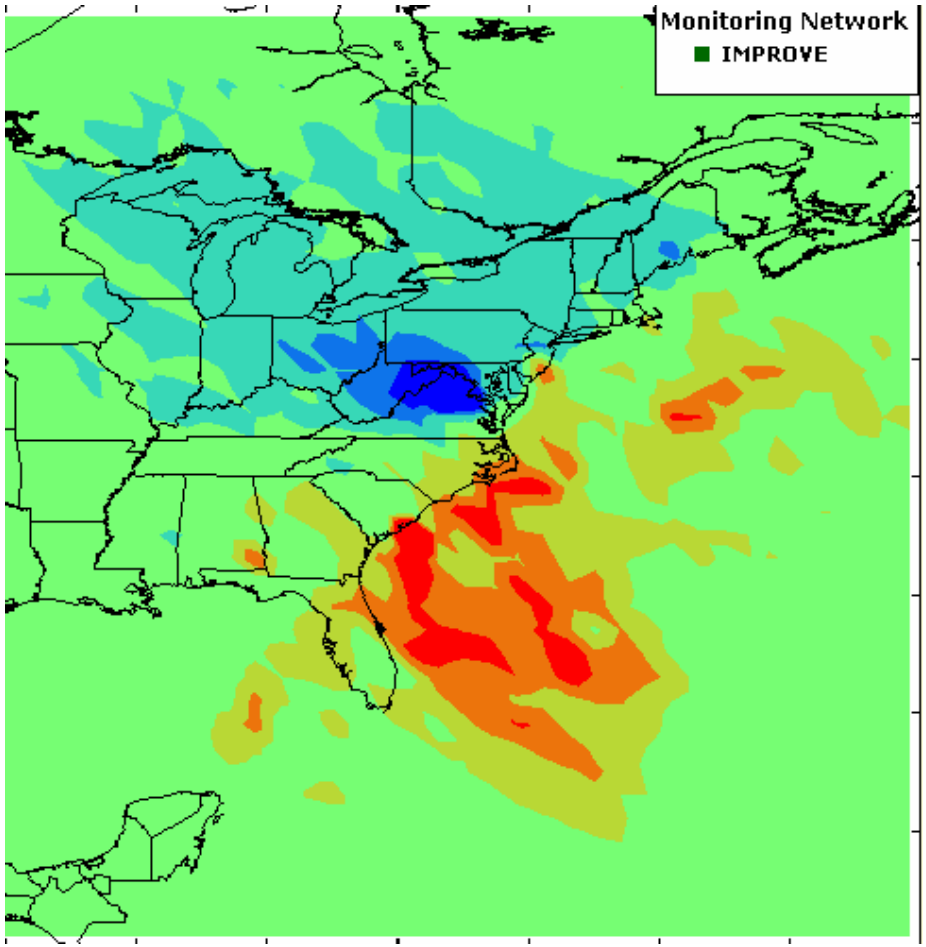
Battelle PMF/Unmix modeling indicated a Sea Salt source at 6 MANE-VU sites, Increasing over time. Why?

Is West Coast Sea Salt Increasing?

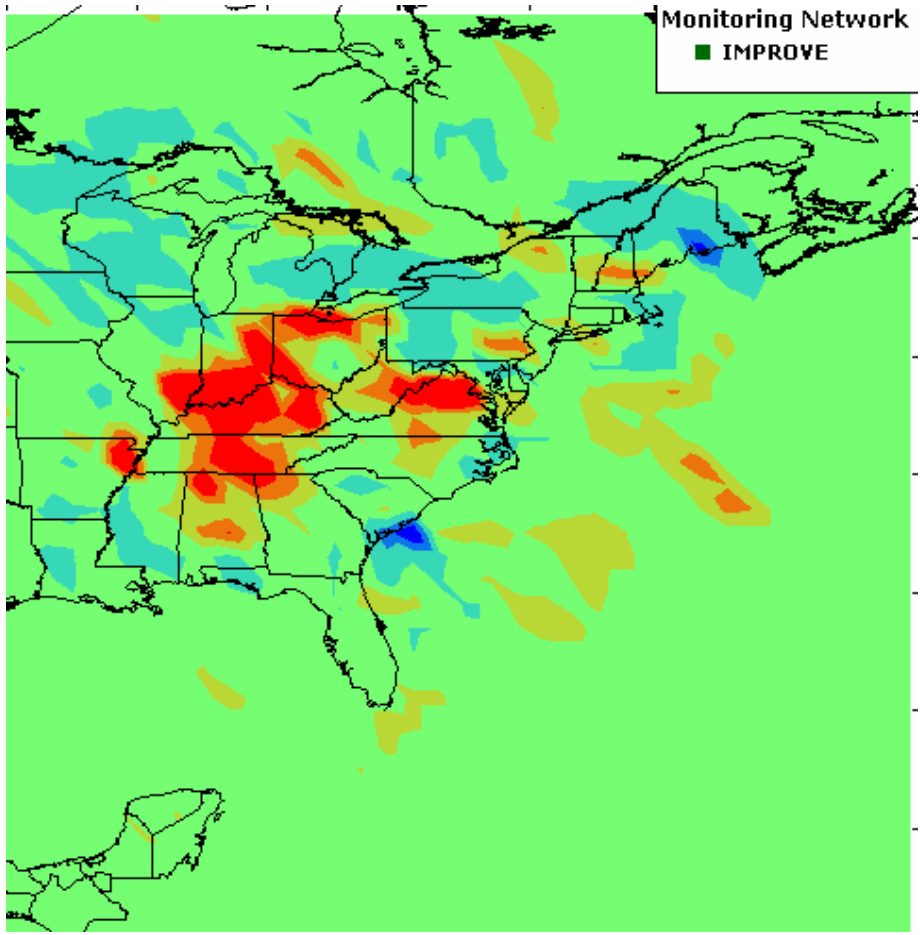
CATT as a QA Tool: Incremental Probabilities for Na > 1.5

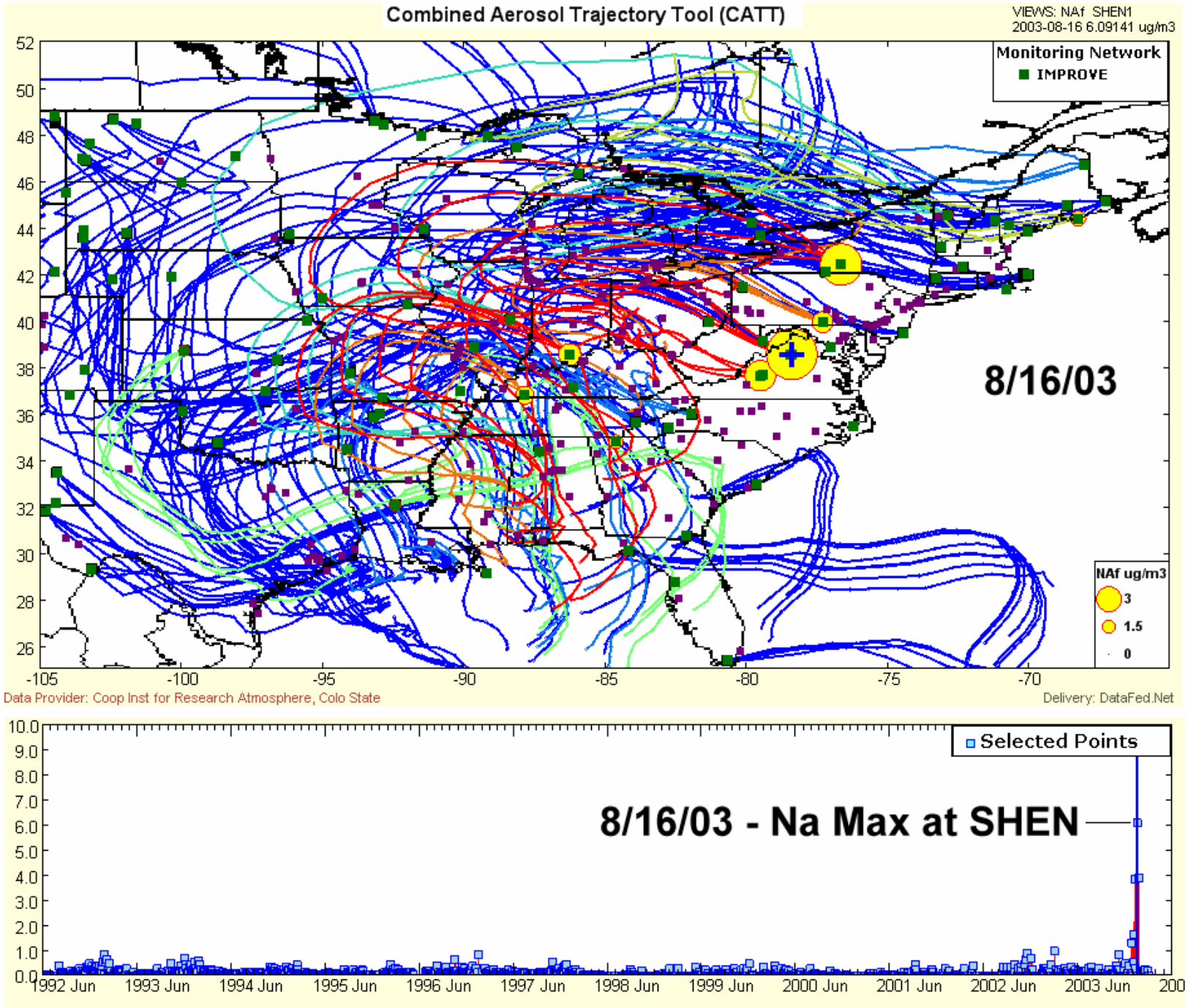
at 5 East Coast Sites: ACAD, BRIG, WASH SHEN & ROMA

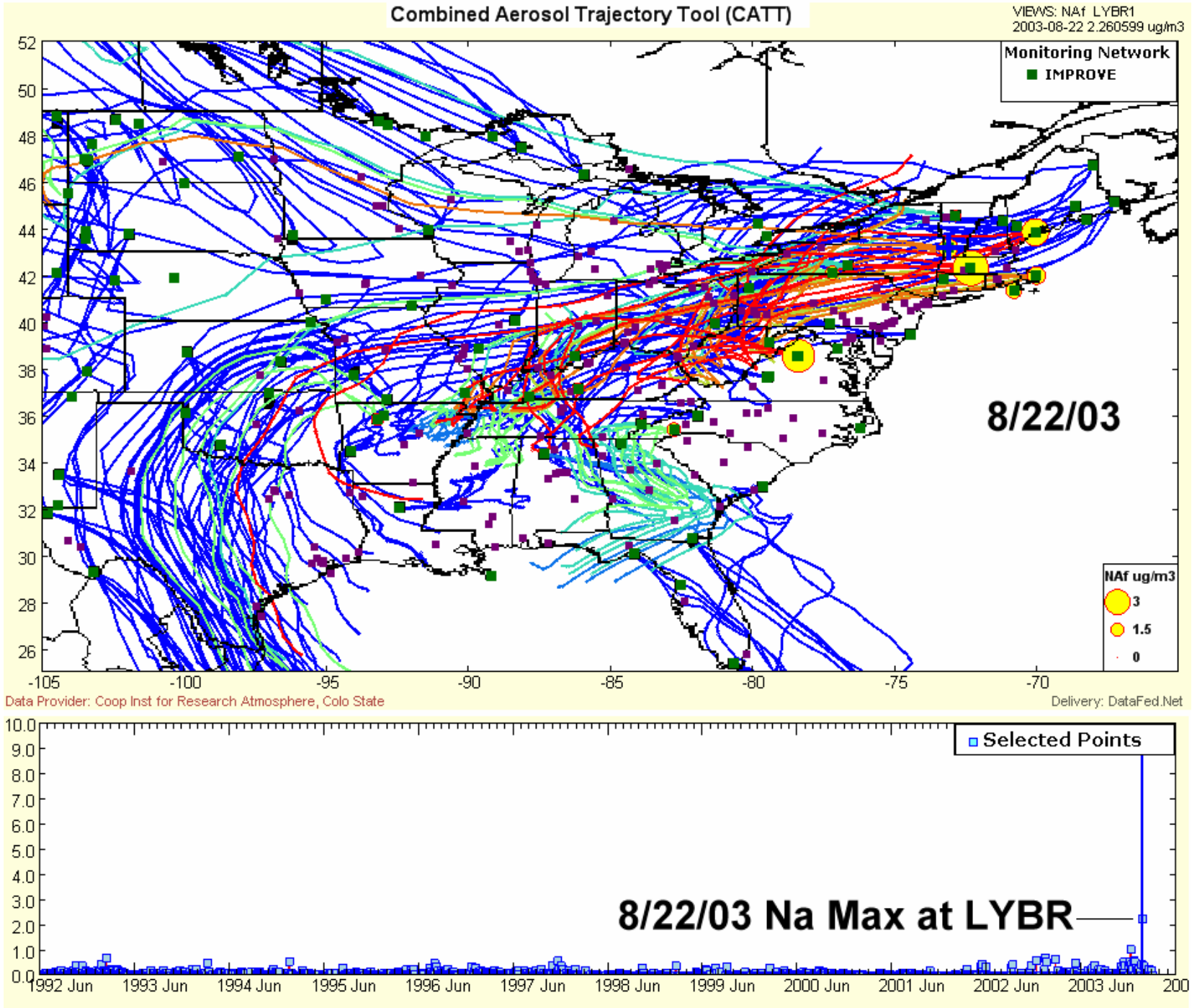
1992-2000

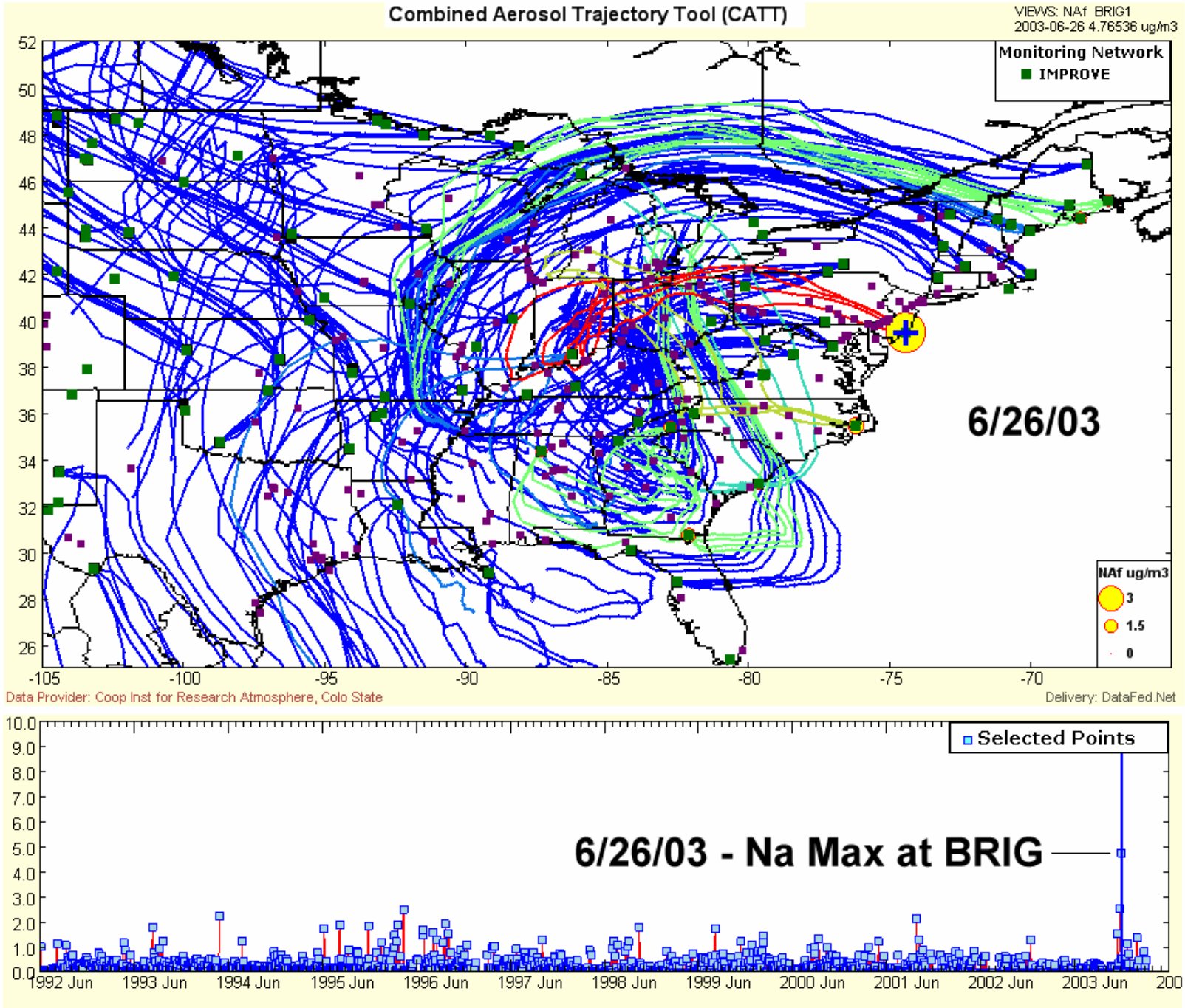


2001-2003

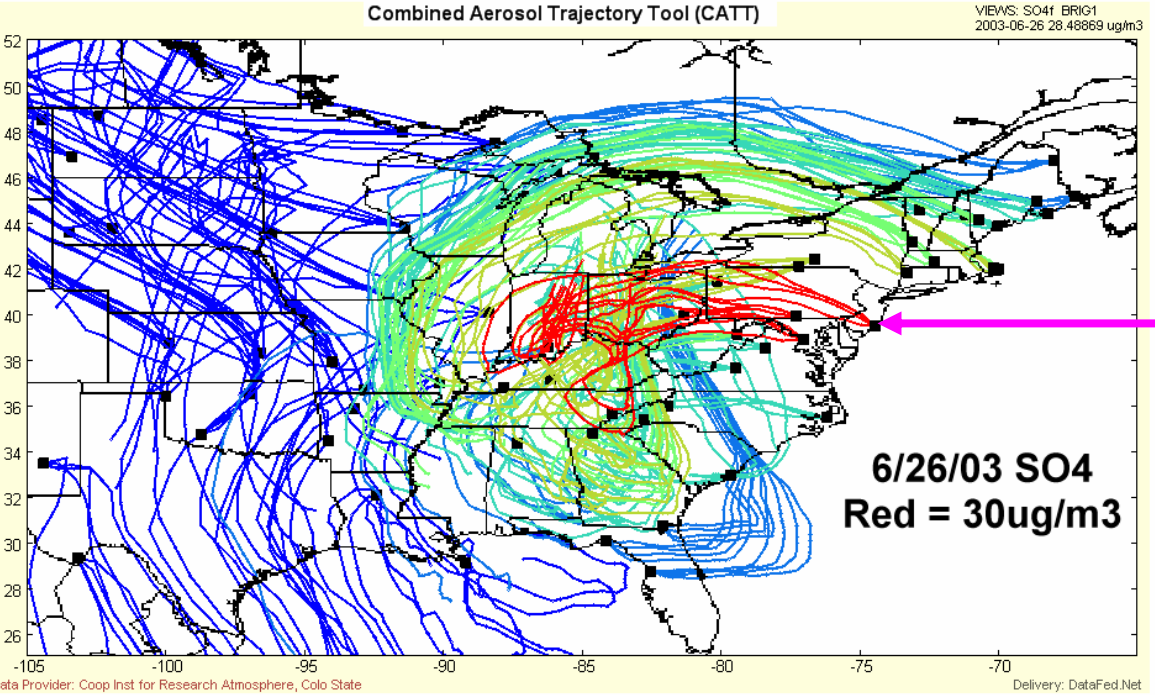



Combined Aerosol Trajectory Tool (CATT)
VIEWS: NAf SHEN1
2003-08-16 6.09141 ug/m3
Monitoring Network
IMPROVE
8/16/03
NAf ug/m3
3
1.5
0
52
50
48
46
44
42
40
38
36
34
32
30
28
26
-105
-100
-95
-90
-85
-80
-75
-70
Data Provider: Coop Inst for Research Atmosphere, Colo State
Delivery: DataFed.Net
Selected Points
8/16/03 - Na Max at SHEN
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
1992 Jun
1993 Jun
1994 Jun
1995 Jun
1996 Jun
1997 Jun
1998 Jun
1999 Jun
2000 Jun
2001 Jun
2002 Jun
2003 Jun
200


Combined Aerosol Trajectory Tool (CATT)
VIEWS: NAf LYBR1
2003-08-22 2.260599 ug/m3
Monitoring Network
IMPROVE
8/22/03
NAf ug/m3
3
1.5
0
52
50
48
46
44
42
40
38
36
34
32
30
28
26
-105
-100
-95
-90
-85
-80
-75
-70
Data Provider: Coop Inst for Research Atmosphere, Colo State
Delivery: DataFed.Net
Selected Points
8/22/03 Na Max at LYBR
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
1992 Jun
1993 Jun
1994 Jun
1995 Jun
1996 Jun
1997 Jun
1998 Jun
1999 Jun
2000 Jun
2001 Jun
2002 Jun
2003 Jun
200


Combined Aerosol Trajectory Tool (CATT)
VIEWS: NAf BRIG1
2003-06-26 4.76536 ug/m3
Monitoring Network
IMPROVE
6/26/03
NAf ug/m3
3
1.5
0
52
50
48
46
44
42
40
38
36
34
32
30
28
26
-105
-100
-95
-90
-85
-80
-75
-70
Data Provider: Coop Inst for Research Atmosphere, Colo State
Delivery: DataFed.Net

Selected Points
6/26/03 - Na Max at BRIG
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
1992 Jun
1993 Jun
1994 Jun
1995 Jun
1996 Jun
1997 Jun
1998 Jun
1999 Jun
2000 Jun
2001 Jun
2002 Jun
2003 Jun
200

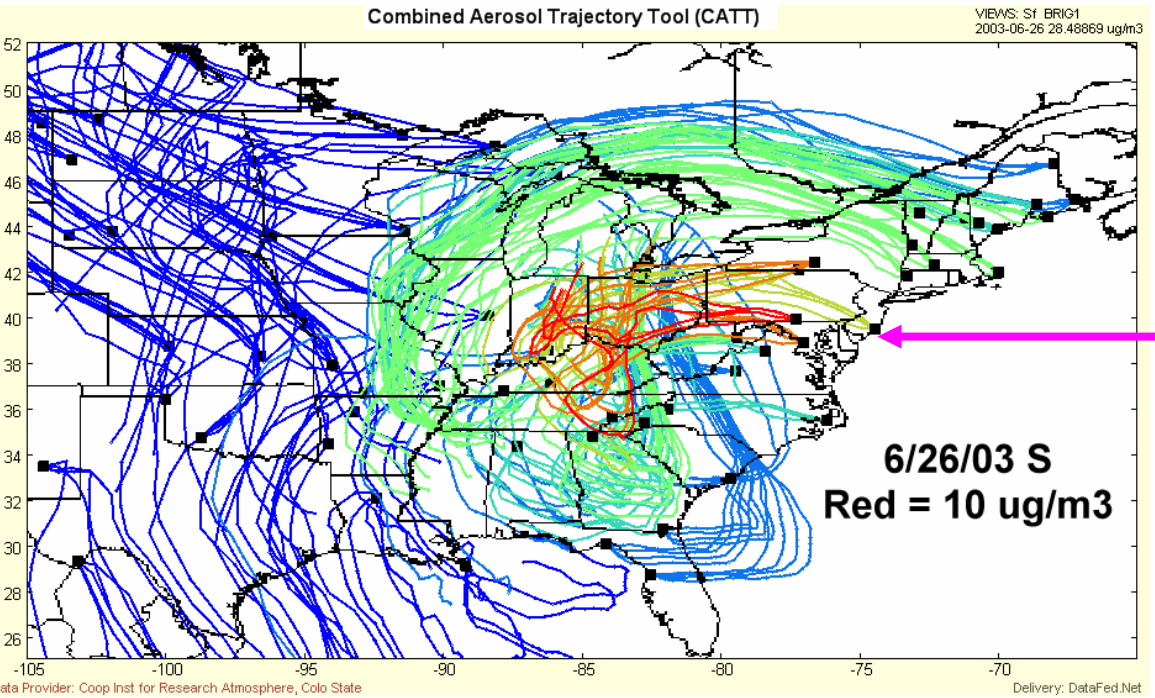


6/26/03, Day of

Max BRIG Na (4.8 ug/m3)

Was a Very High SO4 Day

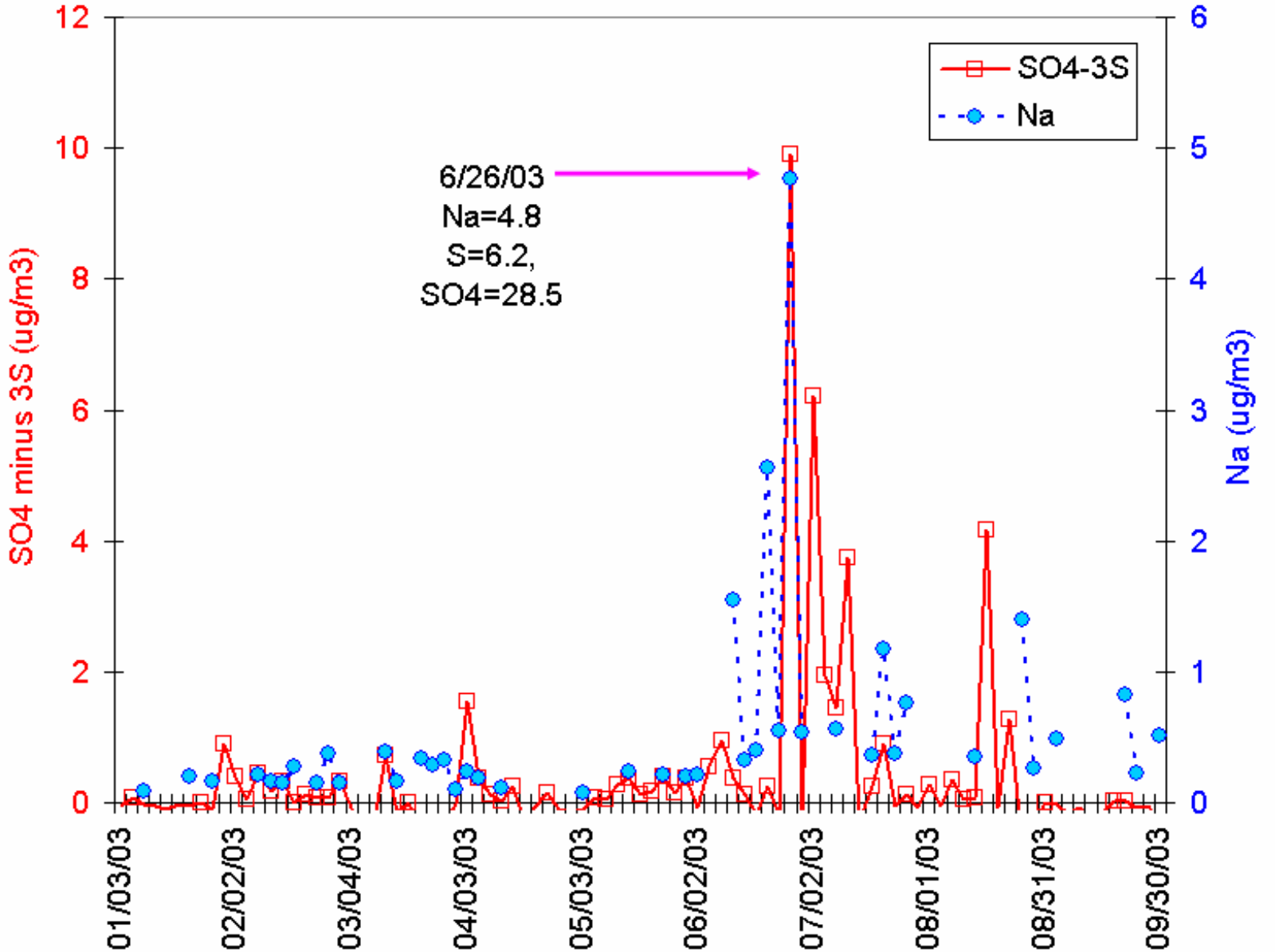
(28.5 ug/m3 at BRIG)

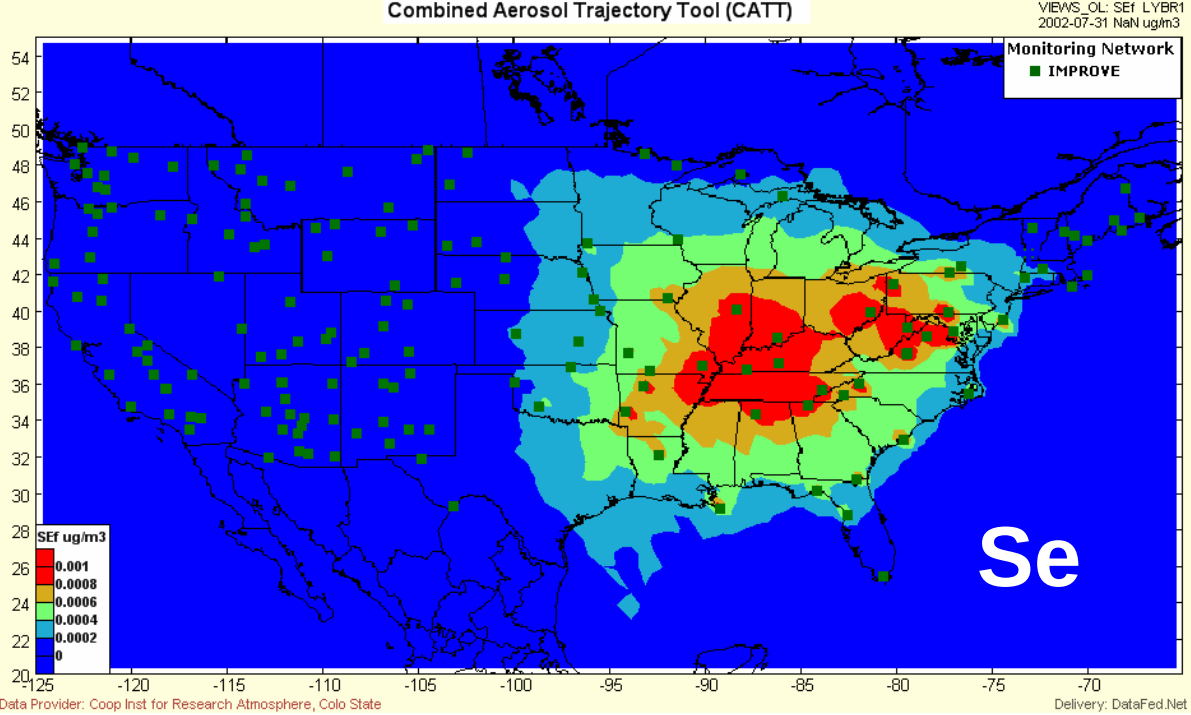


But was only a

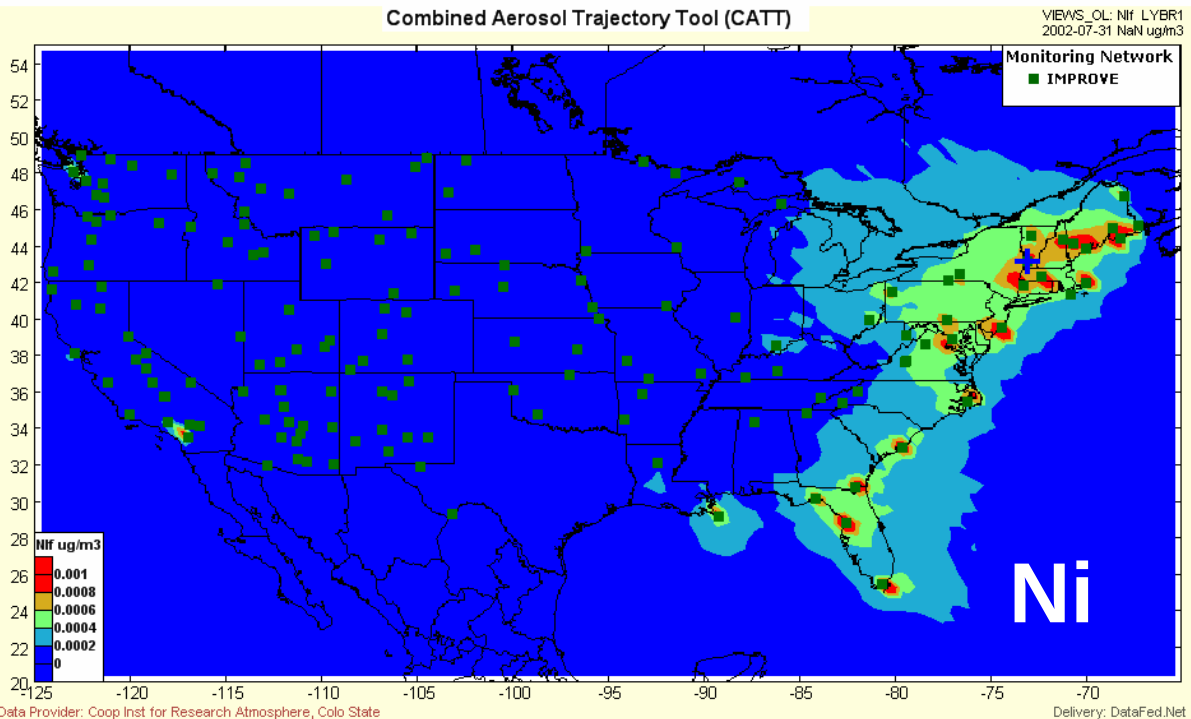
Moderately High S Day

(6.2 ug/m3 at BRIG)


SO4-3S
Na
6/26/03
Na=4.8
S=6.2,
SO4=28.5
SO4 minus 3S (ug/m3)
Na (ug/m3)
12
10
8
6
4
2
0
6
5
4
3
2
1
0
01/03/03
02/02/03
03/04/03
04/03/03
05/03/03
06/02/03
07/02/03
08/01/03
08/31/03
09/30/03

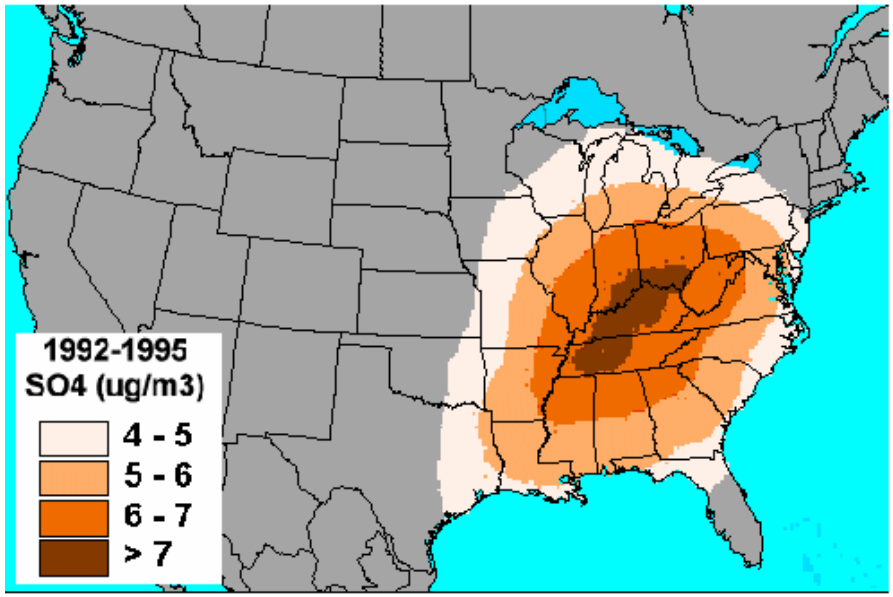


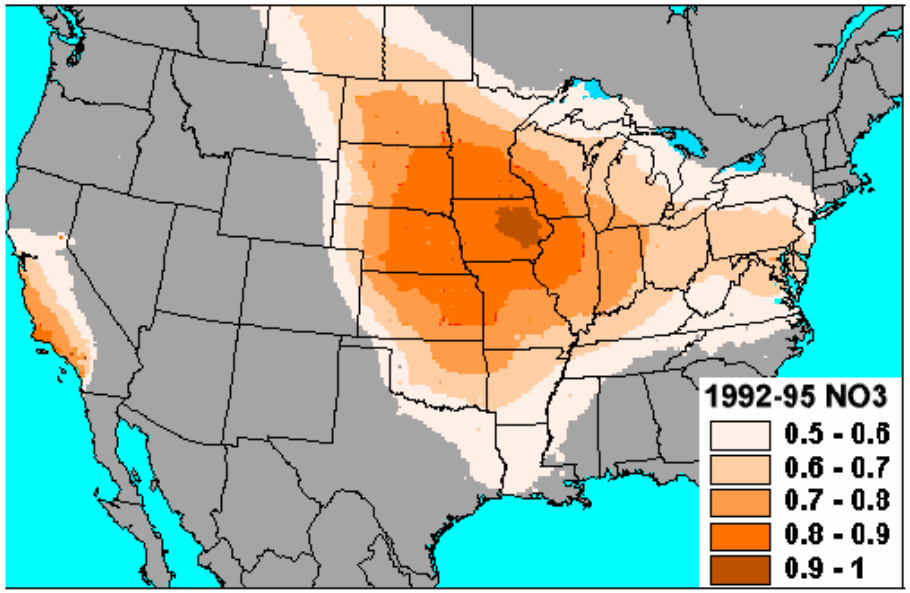
Incremental Probability for High Selenium 2000-2002 (using only 42 IMPROVE sites with data since 1992)

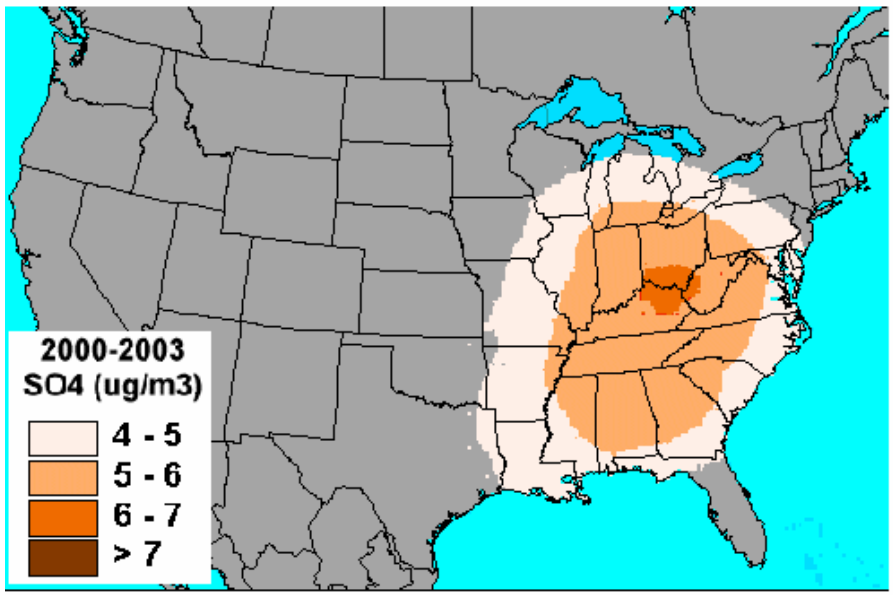


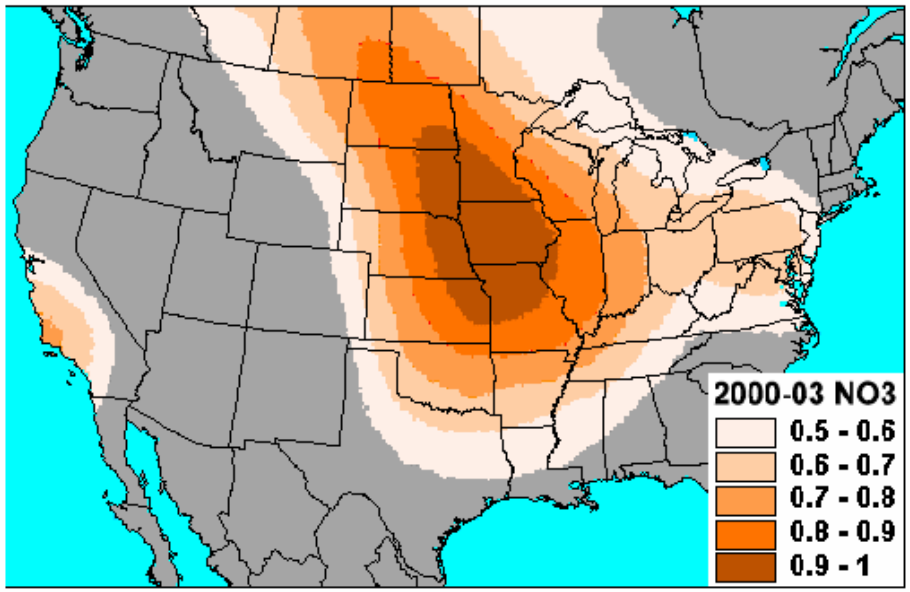
Incremental Probability for High Nickel 2000-2002 (using only 42 IMPROVE sites with data since 1992)

Changes In Average Upwind SO4 (left) & NO3 (right) from 1992-95 (top) to 2000-03 (bottom), based on 42 long-term IMPROVE sites

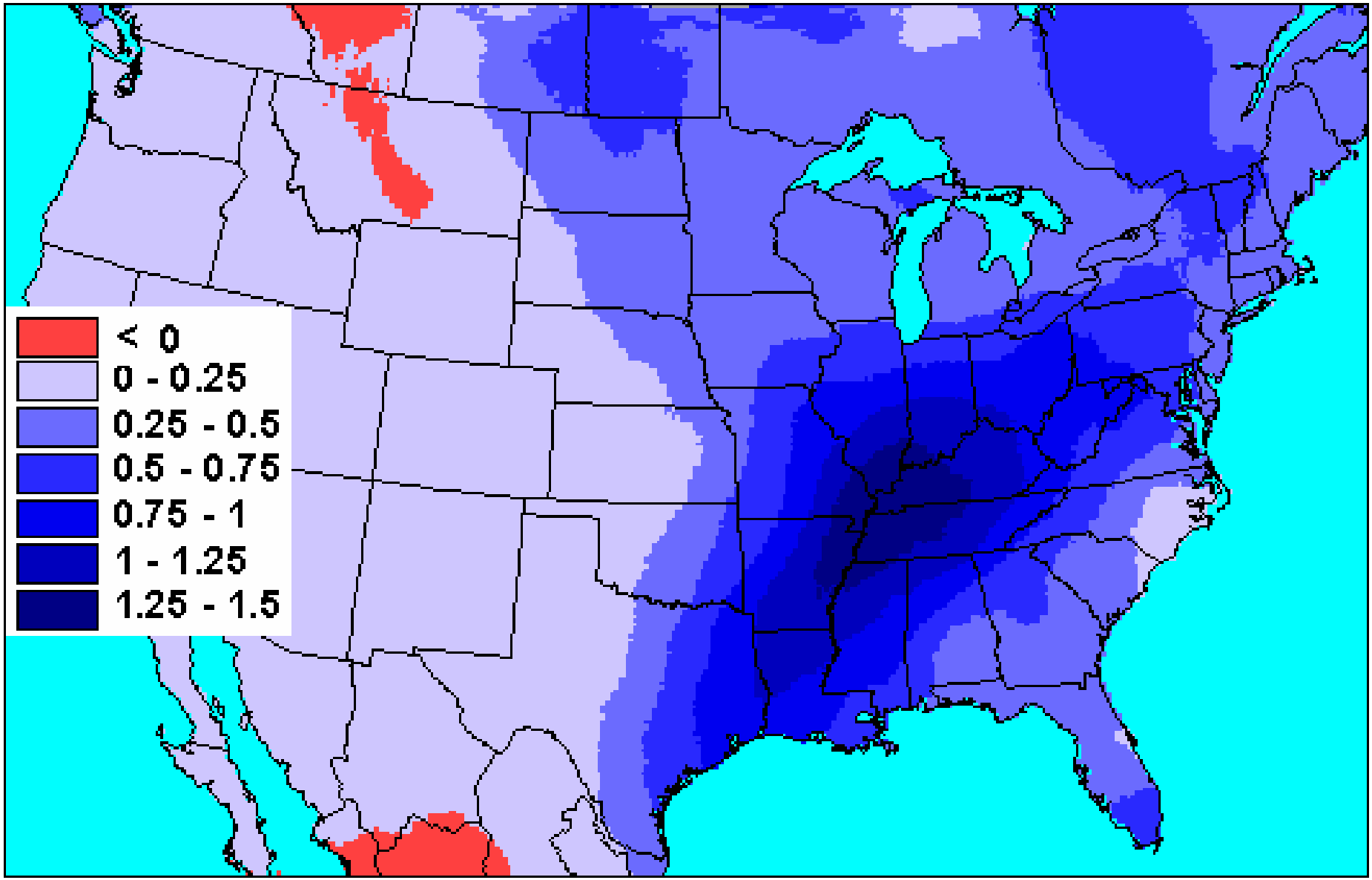








Reduction in Average Upwind Sulfate 1992-95 to 2000-03 in ug/m3

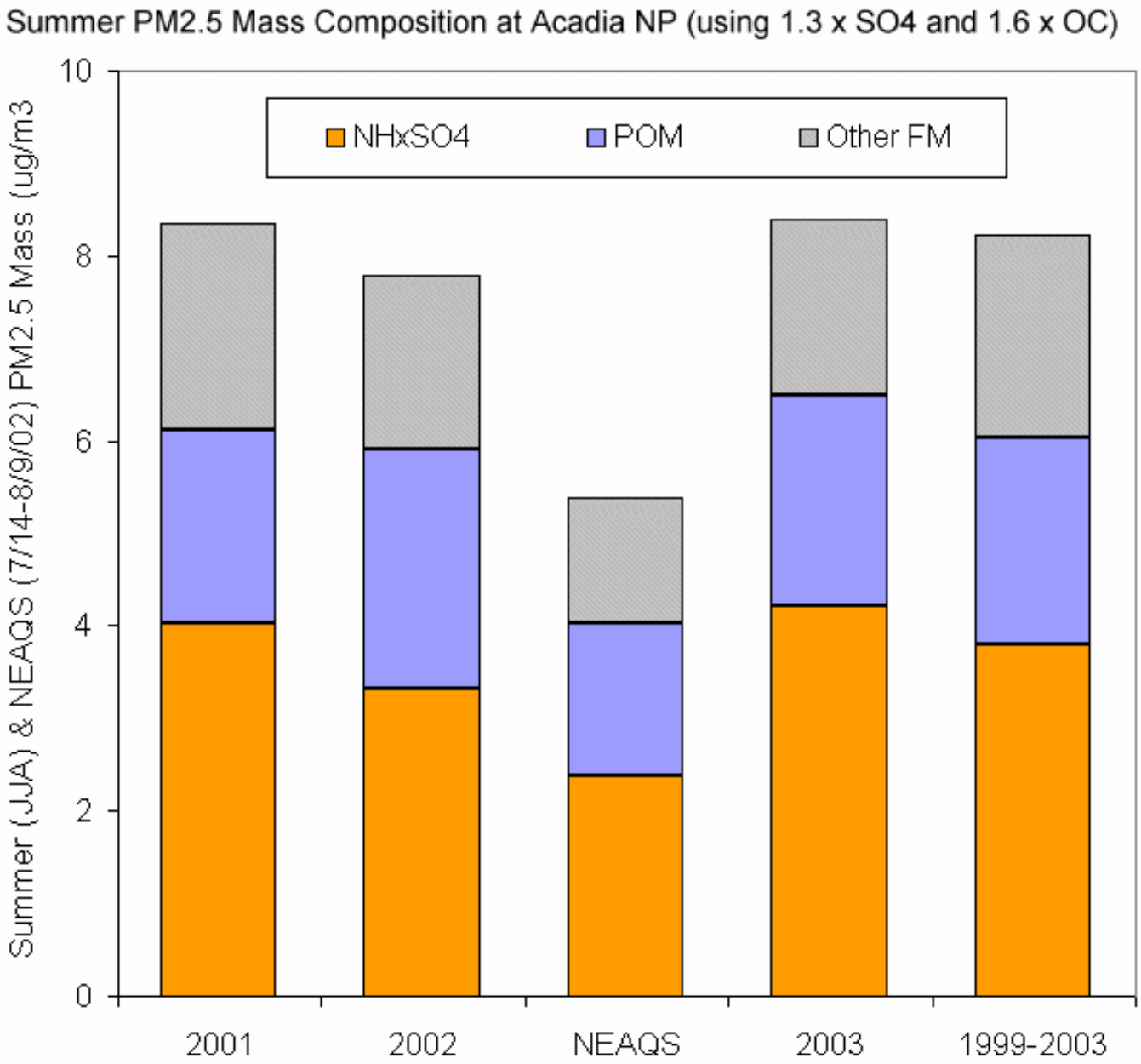


Preliminary (draft) Conclusions from NEAQS 2002:

Organic aerosols dominated the total sub-micron aerosol mass and light scattering in the marine boundary layer off the New England coast during the summer of 2002.

The reduction in sulfate aerosol concentrations across the United States [*Malm et al.*, 2002] during the past decade may have led to the dominance of the organic aerosol.

Was the 7/18/02 – 8/8/02 NEAQS study period representative of recent summers in coastal New England?

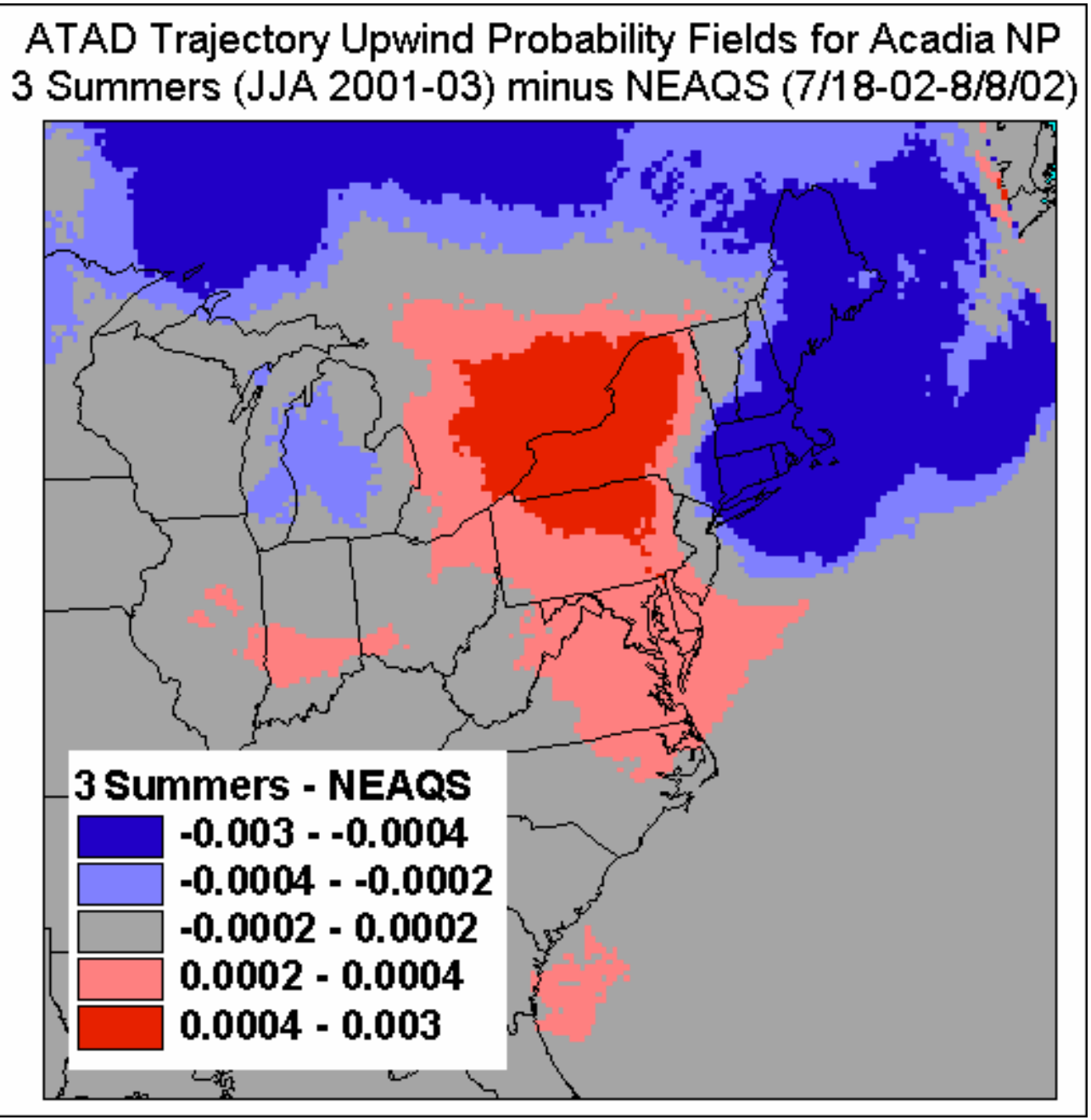


2002 NEAQS study period (7/14-8/9/02)

Was atypically Clean at Acadia (especially for Sulfates)

Compared to Summers of 2001-2003

How Come?

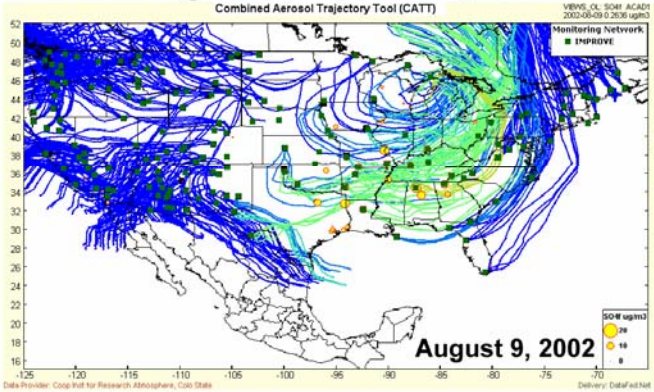


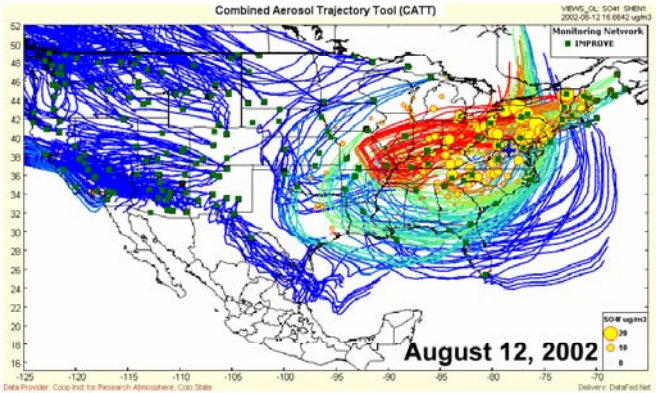
Acadia NP Everyday Upwind Probability Fields for Summers 2001-2003, Minus 2002 NEAQS

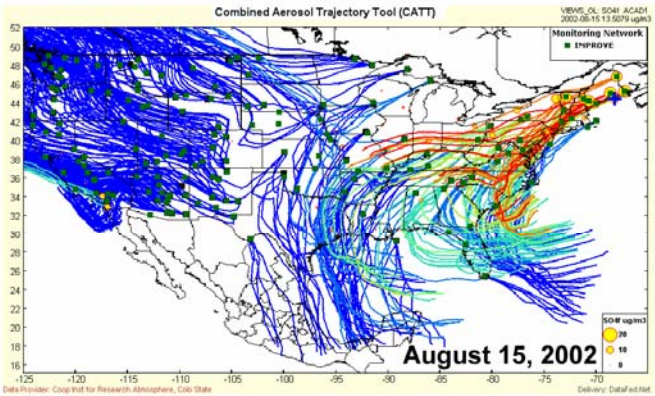
NEAQS characterized by atypically frequent Canadian flows and local Stagnation over Northeast Coast

And a relative absence of flows from the interior US

IMPROVE Sulfate Concentrations and CATT Sulfate-Weighted Trajectories, August 9, 12, and 15, 2002







MODIS Terra, Northeast US (SSEC/DB)
9 August 2002, 1540 UTC (clear):
14 August 2002, 1815 UTC (hazy);

8/9/02 (last day of NEAQS) was featured in MODIS Gallery as a clean day in Northeast

(CATT flows from Canada)

But a few days later…

Aerosol Data from IMPROVE, ATAD Trajectories from K. Gebhart, NPS, Delivery via CATT, Washington University

MODIS Gallery Images Created By Liam Gumley, Space Science and Engineering Center, University of Wisconsin-Madison.

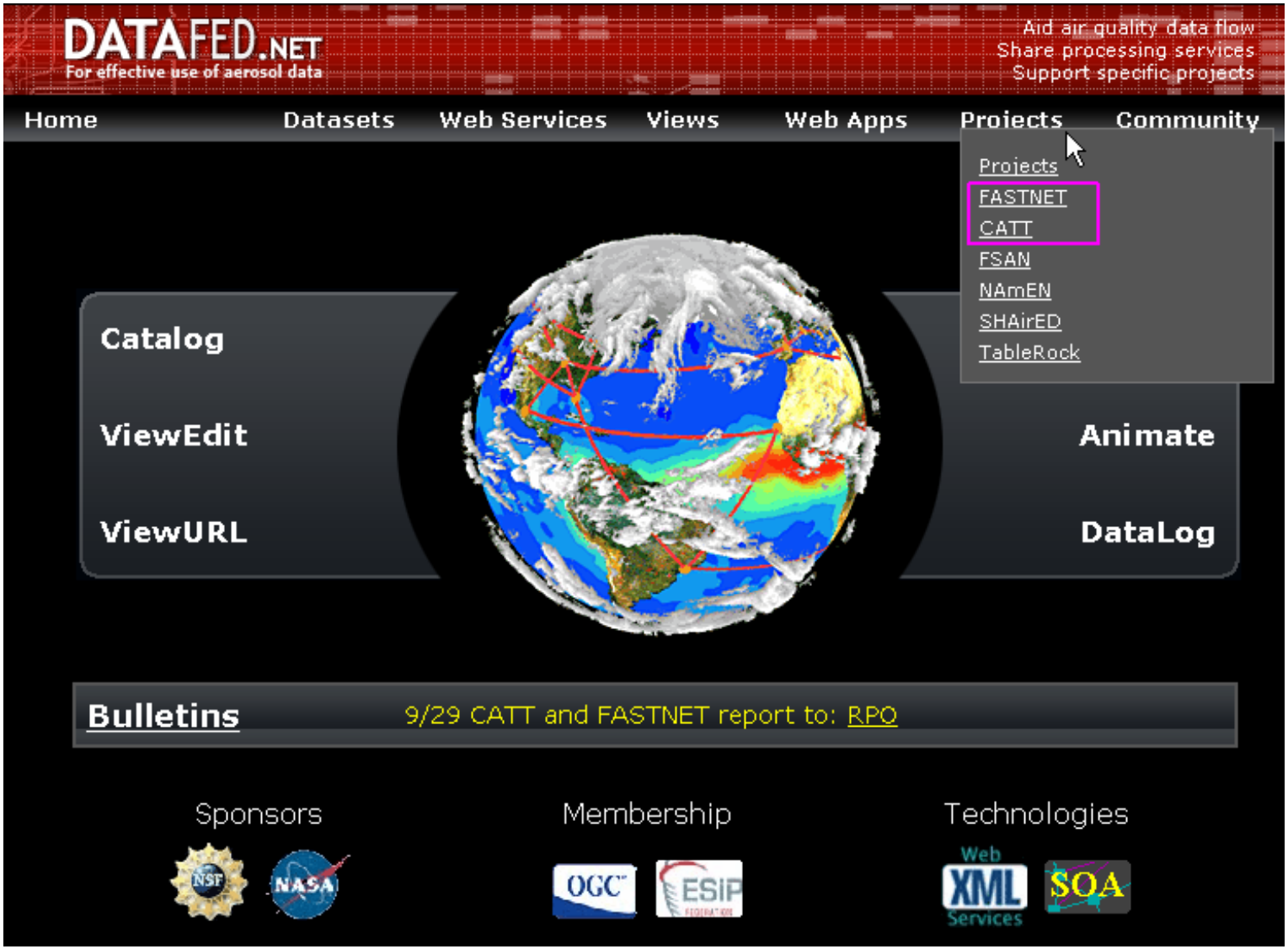
FAST-CAT Plans: 2005

MANE-VU Funding for Continuation & Enhancements

- Update IMPROVE & ATAD data to CATT, as available
- Add STN data & ATADs to CATT
- Add “User File Submittal” Options to CATT & FASTNET
- “User-Friendly” Screening/Aggregation tools to FASTNET
- Add NASA Satellite Images & Data Products to FASTNET

EPA Support for “Advanced User Training” (train the trainers)

Have Tools; Need Users



http://datafed.net