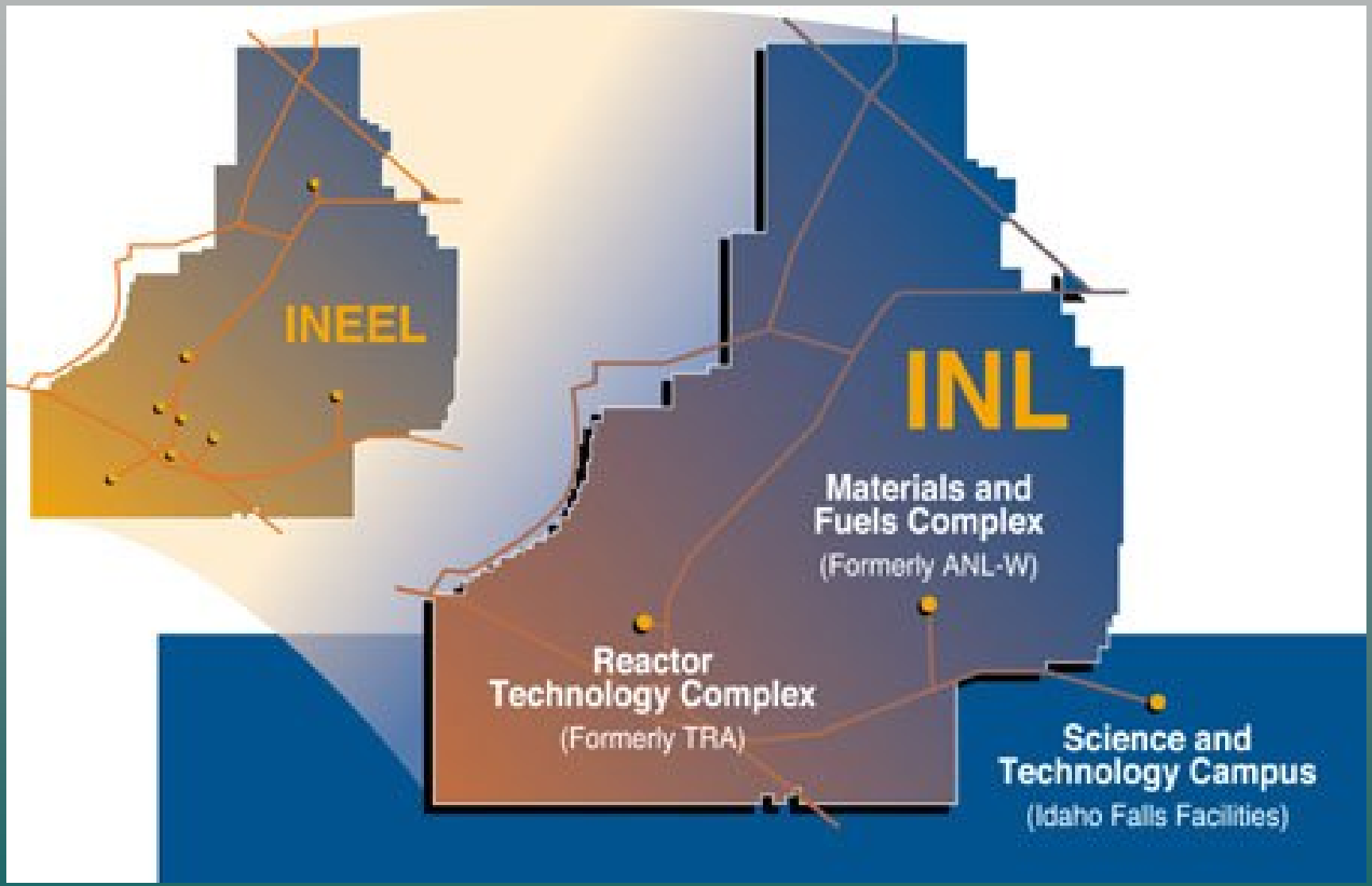
NOAA/FRD's INL Meteorological Partnership Status

DMCC 13th Meeting
Las Vegas, NV
May 1, 2006

1750 Foote Dr.
Idaho Falls, ID 83402
(208) 526-2329
(208) 526-2549 (fax)
http://www.noaa.inel.gov

Idaho National Engineering and Environment Laboratory became the Idaho National Laboratory



INL Vision Statement

Idaho National Laboratory will:

- Become the preeminent nuclear Research, Development and Demonstration laboratory in 10 years.
- Be a major center for national security technology development and demonstration.
- Be a multi-program national laboratory.
- Foster academic, industry, government, international collaborations to produce the investment, programs and expertise to assure the vision.

(Managed by Battelle Energy Alliance—BEA)

Idaho National Engineering and Environmental Laboratory also became the Idaho Cleanup Project

Activities will be completed by 2012. These include:

- Decommissioning and dismantlement of 215 excess facilities.
  - Includes 3 reactors.
- Management of spent nuclear fuel.
- Treatment and disposal of sodium-bearing waste.
- Empty and dispose of all tank farm facility waste tanks.
- Remediation of the Subsurface Disposal Area at the Radioactive Waste Management Complex.

(Managed by CH2M-WG Idaho—CWI)

FRD Core Competencies

1. Provide meteorological expertise and consultation to DOE's Idaho National Laboratory (INL).
2. Conduct atmospheric tracer experiments for atmospheric transport & diffusion model improvement and verification.
3. Conduct air-surface exchange studies in issues related to air quality and hurricane research.

2005 Major Activities & Accomplishments

- Division of INEEL into INL and ICP
  - Subsequent renaming of facilities
- Mesonet equipment modernization
- New data acquisition software and hardware; New database software
- Mesoscale modeling
- INL Climatology
- Web Page Facelift
- Urban Dispersion Program (NYC)

Mesonet Equipment Modernization

- Replaced all telemetry wide band radios with narrow band radios.
  - Necessitated by a regulation affecting all federal agencies.
  - Issued by the National Telecommunications and Information Administration (NTIA).
  - Transition deadline of January 1, 2005.
- Replaced all CR-10 data loggers with CR-23 data loggers.
  - CR-10 data loggers were obsolete and no longer supported.
  - Only half-dozen failed in 12 years!
  - Note: CR-23 data loggers are now obsolete.

New Data Acquisition Software and Hardware; New Database Software

- Replaced RTMS with LoggerNet.
  - RTMS was obsolete and no longer supported.
  - RTMS was designed for OS/2; Loggernet is designed for Windows XP.
  - Faster and more robust data collection software.
  - Maintained old system during transition.
- Replaced computers.
  - Old: 2 Pentium 200 MHz computers running OS/2.
    - 9 years old.
  - New: 2 P-4 2.4 GHz computers running Windows XP.
- Installed new database software.
  - Will be adopting a data “push” standard to MADIS.

Mesoscale Modeling

Goal: to provide short-range, high-resolution weather and dispersion forecasts for the INL at modest cost.

- MM5 current configuration uses 2 grids at 12 and 4 km horizontal spacing.
- Initialized from 12 km Eta model output.
- Restarts every 3 hours using data assimilation from INL Mesonet and satellite-derived winds.
- Forecasts out to 6—12 hours.
- Runs on a 2-processor Dell PC using Linux.
- Forecasts are available on our web site.
- Plan to transition to WRF.
  - Have download and compiled WRF-ARW.

Web Access to MM5 Forecasts

MM5 Products - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address http://www.noaa.inel.gov/MM5/index.html

MM5 Forecast Products

New model configuration based on tiled output from 12 km Eta model runs

Runs for 04/21/2006

Type	Start Date UTC	End Date UTC	Status
Initial run	0300 04/21/2006	1800 04/21/2006	Completed
Restart 1	0600 04/21/2006	2100 04/21/2006	Completed
Restart 2	0900 04/21/2006	0000 04/22/2006	Completed
Restart 3	1200 04/21/2006	0300 04/22/2006	Completed
Restart 4	1500 04/21/2006	0600 04/22/2006	Scheduled
Restart 5	1800 04/21/2006	0900 04/22/2006	Scheduled
Restart 6	2100 04/21/2006	1200 04/22/2006	Scheduled
Restart 7	0000 04/22/2006	1500 04/22/2006	Scheduled

Nested Grid Covering Intermountain West (12 km grid)

total precipitation	clouds & precip	700 mb
	surface conditions	

Nested Grid Covering Eastern Idaho (4 km grid)

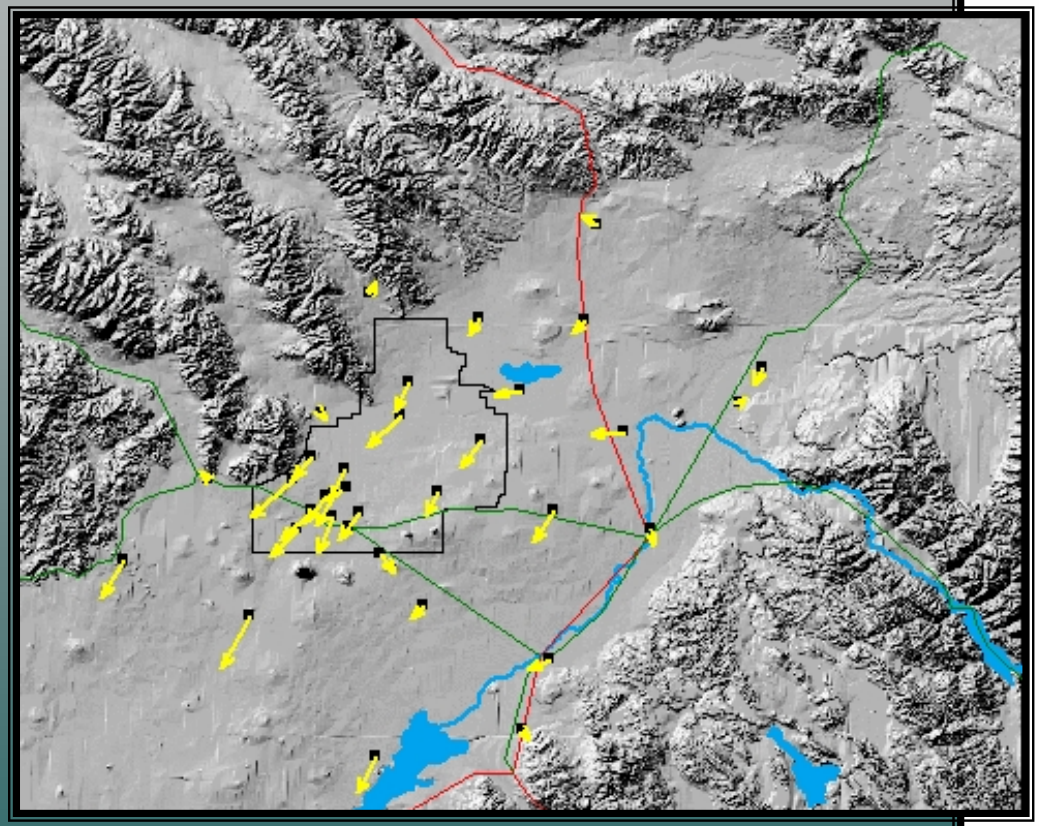
36m AGL wind field	skew T log P for IDA	total precipitation
surface conditions	36m AGL relative humidity	forward trajectories

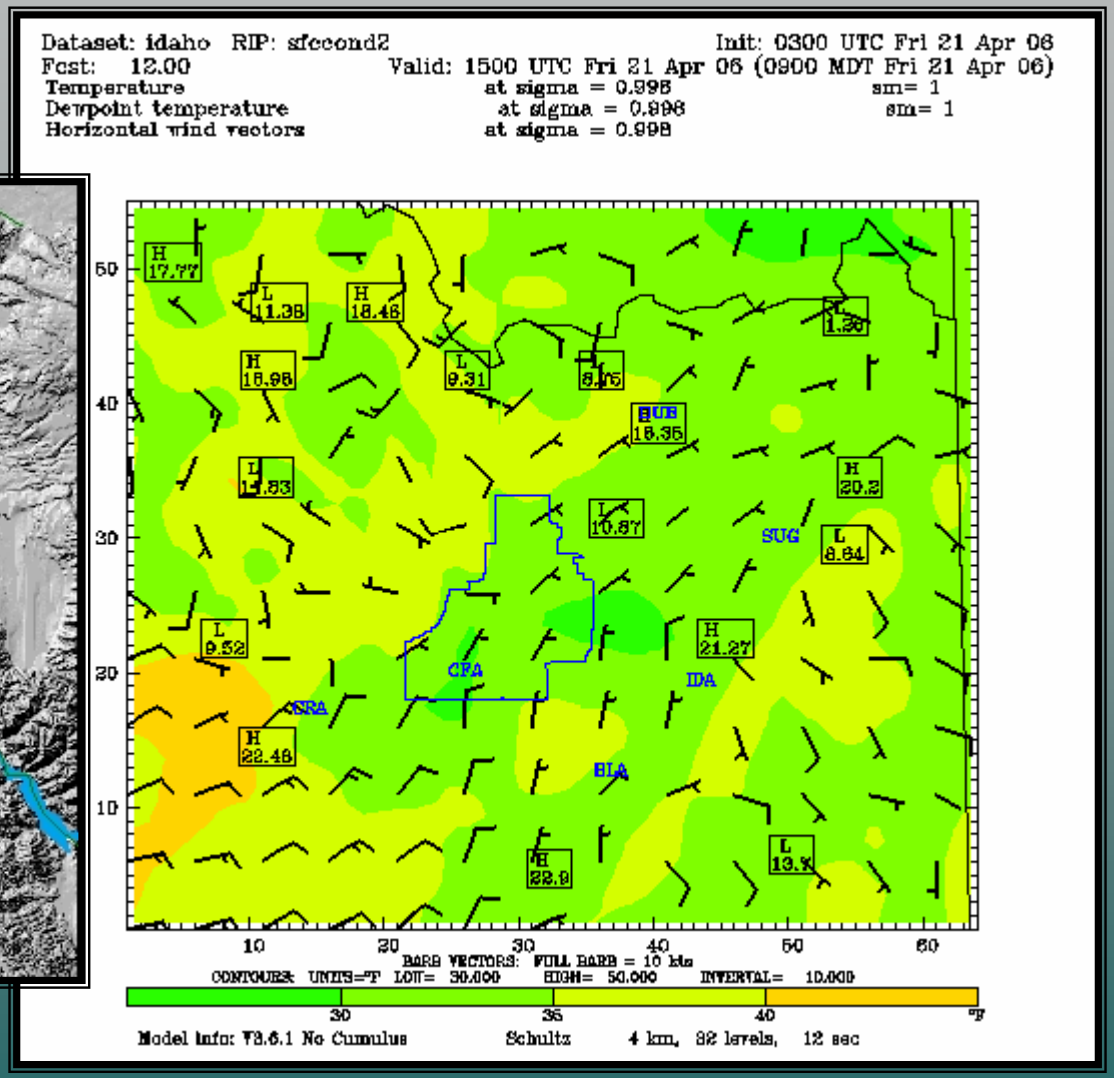
Time Series for Selected Sites

CFA	EBR	IDA
	TAN	

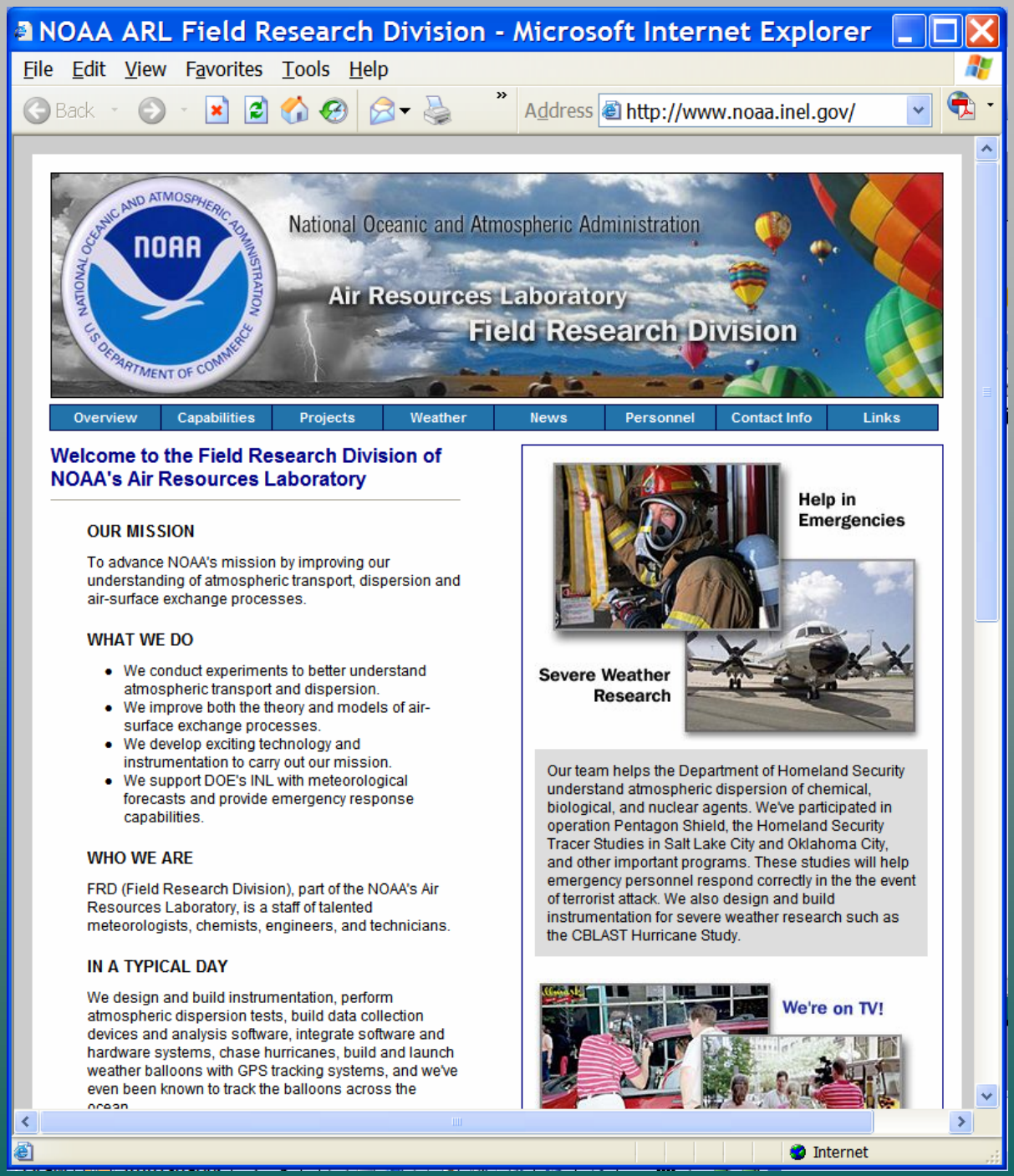
Internet

Mesonet Actual and MM5 Forecast Winds



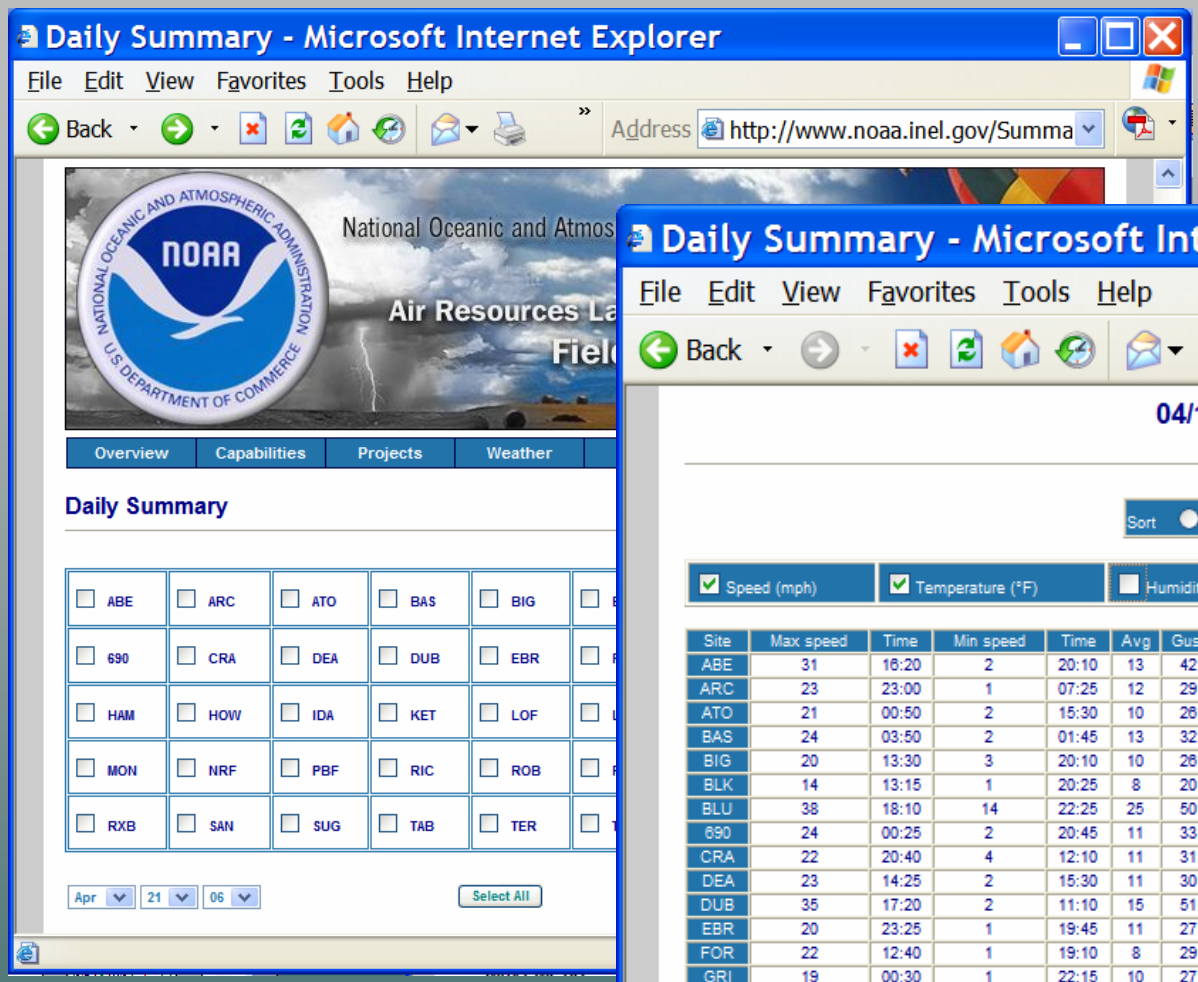


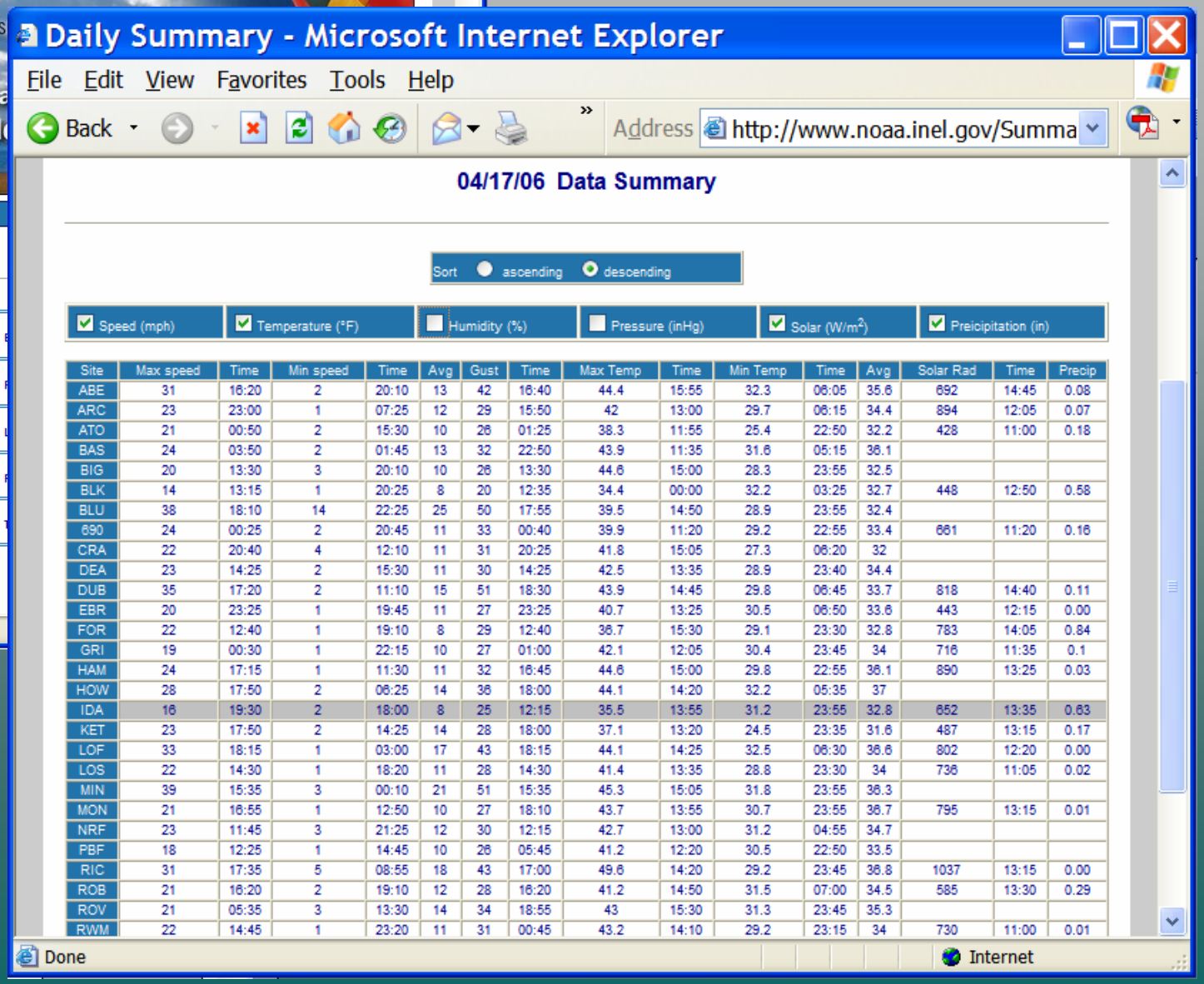
Web Page Facelift



INL Mesonet Data Access

INL Mesonet Daily Summary

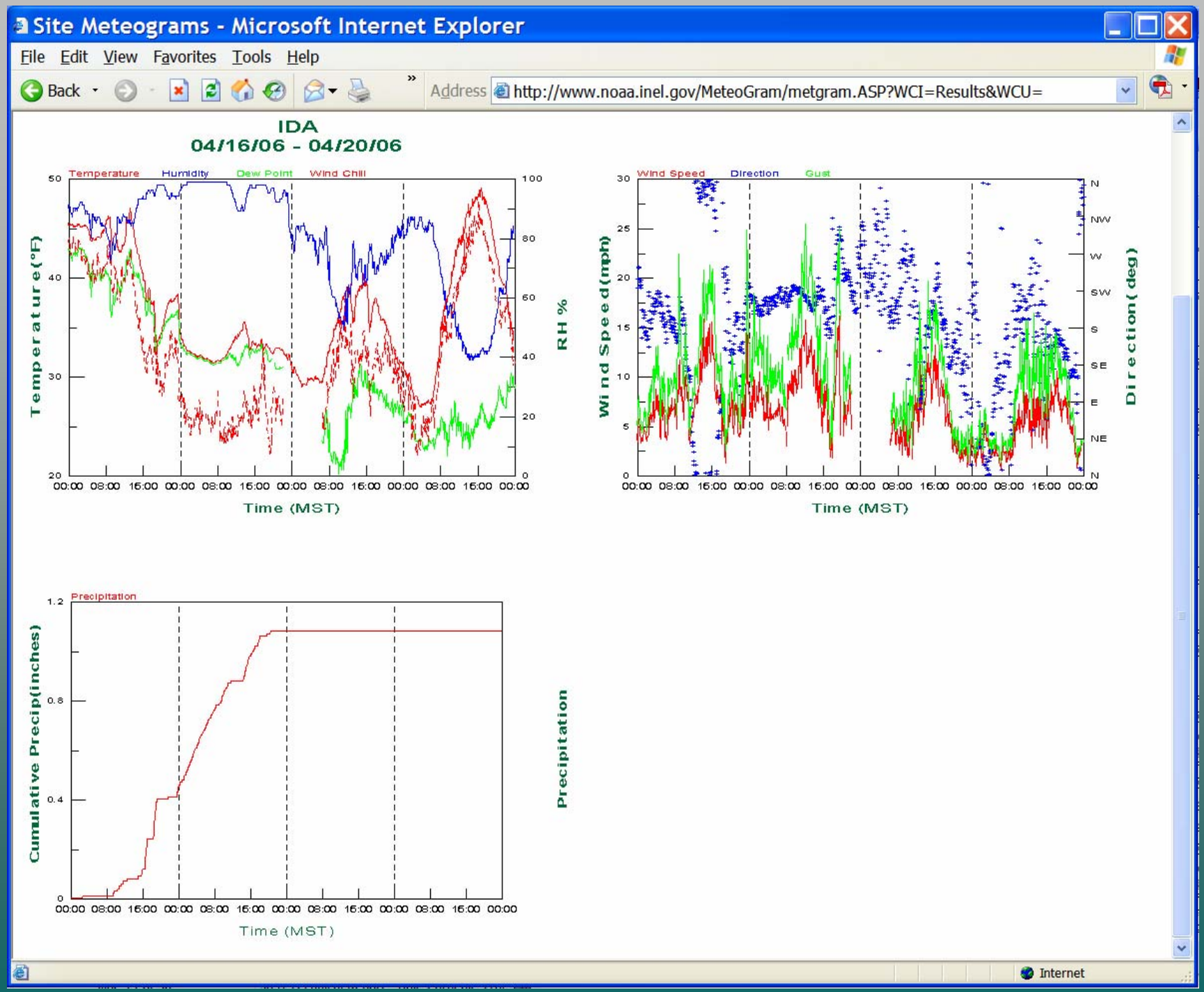




04/17/06 Data Summary

Site	Max speed	Time	Min speed	Time	Avg	Gust	Time	Max Temp	Time	Min Temp	Time	Avg	Solar Rad	Time	Precip
ABE	31	16:20	2	20:10	13	42	16:40	44.4	15:55	32.3	06:05	35.6	692	14:45	0.08
ARC	23	23:00	1	07:25	12	29	15:50	42	13:00	29.7	06:15	34.4	894	12:05	0.07
ATO	21	00:50	2	15:30	10	26	01:25	38.3	11:55	25.4	22:50	32.2	428	11:00	0.18
BAS	24	03:50	2	01:45	13	32	22:50	43.9	11:35	31.6	05:15	36.1			
BIG	20	13:30	3	20:10	10	26	13:30	44.6	15:00	28.3	23:55	32.5			
BLK	14	13:15	1	20:25	8	20	12:35	34.4	00:00	32.2	03:25	32.7	448	12:50	0.58
BLU	38	18:10	14	22:25	25	50	17:55	39.5	14:50	28.9	23:55	32.4			
690	24	00:25	2	20:45	11	33	00:40	39.9	11:20	29.2	22:55	33.4	661	11:20	0.16
CRA	22	20:40	4	12:10	11	31	20:25	41.8	15:05	27.3	06:20	32			
DEA	23	14:25	2	15:30	11	30	14:25	42.5	13:35	28.9	23:40	34.4			
DUB	35	17:20	2	11:10	15	51	18:30	43.9	14:45	29.8	06:45	33.7	818	14:40	0.11
EBR	20	23:25	1	19:45	11	27	23:25	40.7	13:25	30.5	06:50	33.6	443	12:15	0.00
FOR	22	12:40	1	19:10	8	29	12:40	36.7	15:30	29.1	23:30	32.8	783	14:05	0.84
GRI	19	00:30	1	22:15	10	27	01:00	42.1	12:05	30.4	23:45	34	716	11:35	0.1
HAM	24	17:15	1	11:30	11	32	16:45	44.6	15:00	29.8	22:55	36.1	890	13:25	0.03
HOW	28	17:50	2	06:25	14	36	18:00	44.1	14:20	32.2	05:35	37			
IDA	16	19:30	2	18:00	8	25	12:15	35.5	13:55	31.2	23:55	32.8	652	13:35	0.63
KET	23	17:50	2	14:25	14	28	18:00	37.1	13:20	24.5	23:35	31.6	487	13:15	0.17
LOF	33	18:15	1	03:00	17	43	18:15	44.1	14:25	32.5	06:30	36.6	802	12:20	0.00
LOS	22	14:30	1	18:20	11	28	14:30	41.4	13:35	28.8	23:30	34	736	11:05	0.02
MIN	39	15:35	3	00:10	21	51	15:35	45.3	15:05	31.8	23:55	36.3			
MON	21	16:55	1	12:50	10	27	18:10	43.7	13:55	30.7	23:55	36.7	795	13:15	0.01
NRF	23	11:45	3	21:25	12	30	12:15	42.7	13:00	31.2	04:55	34.7			
PBF	18	12:25	1	14:45	10	26	05:45	41.2	12:20	30.5	22:50	33.5			
RIC	31	17:35	5	08:55	18	43	17:00	49.6	14:20	29.2	23:45	36.8	1037	13:15	0.00
ROB	21	16:20	2	19:10	12	28	16:20	41.2	14:50	31.5	07:00	34.5	585	13:30	0.29
ROV	21	05:35	3	13:30	14	34	18:55	43	15:30	31.3	23:45	35.3			
RWM	22	14:45	1	23:20	11	31	00:45	43.2	14:10	29.2	23:15	34	730	11:00	0.01

Single Station Meteogram



INL Climatology

- Last printed update in 1989.
  - Current statistics are available online.
- Including upper air profiler climatology.
- Dividing INL into 3 microclimatological zones.
  - Based primarily on wind patterns.
- State of the science treatise on dispersion.
  - Update of atmospheric stability.

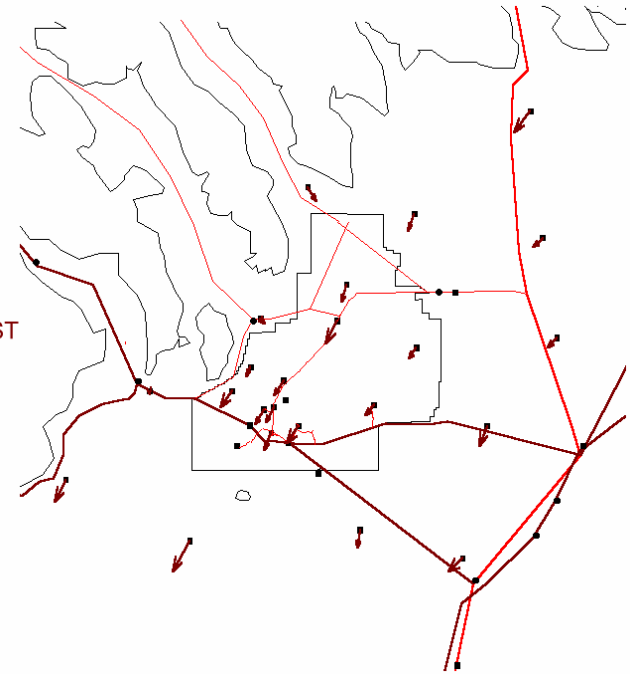
Wind Pattern #1

Relative Frequency:
25.6 percent

Direction: NE

Speed:
Less than 10 MPH

Most Common:
Jul-Sep 0300-0900 MST
(45-66 percent)



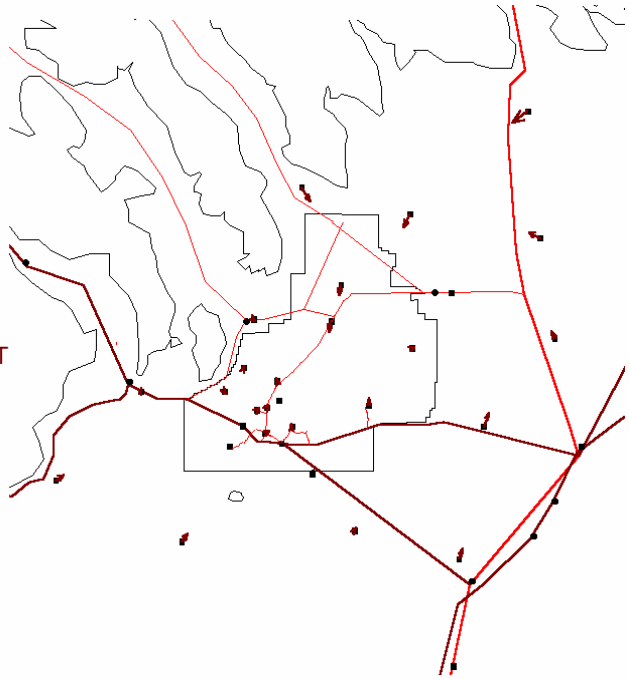
Wind Pattern #2

Relative Frequency:
24.8 percent

Direction: Variable

Speed:
Less than 8 MPH

Most Common:
Oct-Jan 0000-1000 MST
May-Aug 0000-0500 MST
(33-43 percent)



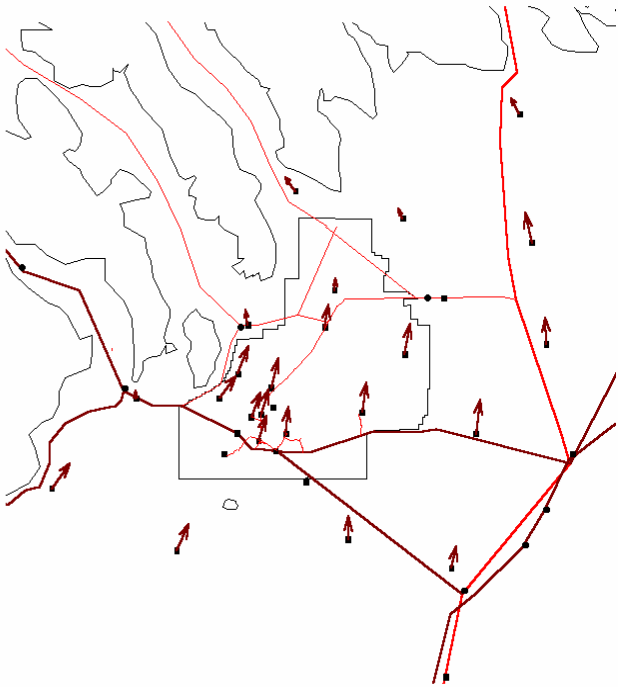
Wind Pattern #3

Relative Frequency:
13.1 percent

Direction: S-SSW

Speed: 7-11 MPH

Most Common:
Jul-Sep 1100-2100 MST
(25-39 percent)



Wind Pattern #4

Relative Frequency:
11.1 percent

North Group

Direction: Variable

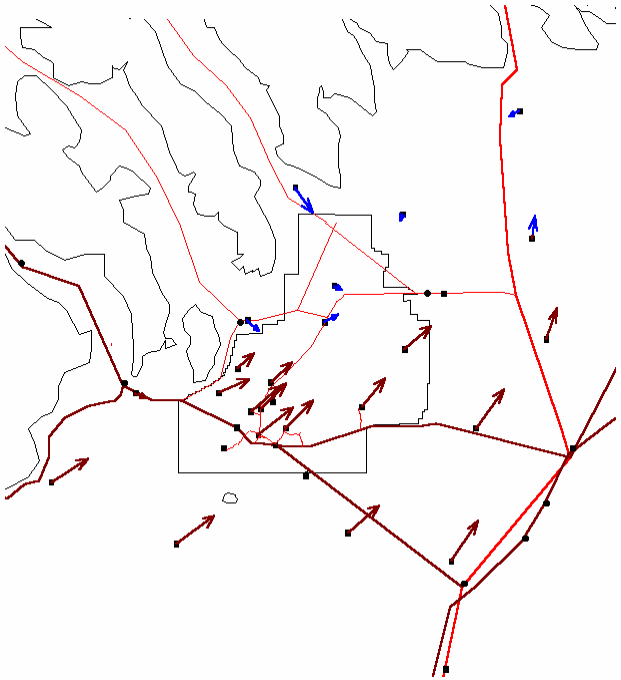
Speed: 6-11 MPH

Others

Direction: SW

Speed: 12-16 MPH

Most Common:
Jan-Feb 1500-2100 MST
Apr-Jun 1800-2200 MST
(15-22 percent)



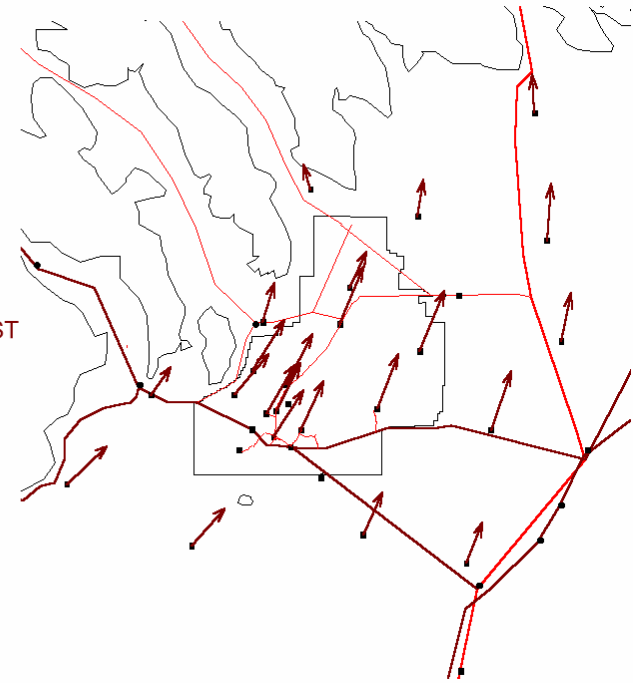
Wind Pattern #5

Relative Frequency:
8.9 percent

Direction: SSW

Speed: 11-18 MPH

Most Common:
May-Sep 1300-1800 MST
(23-29 percent)



Wind Pattern #6

Relative Frequency:
6.7 percent

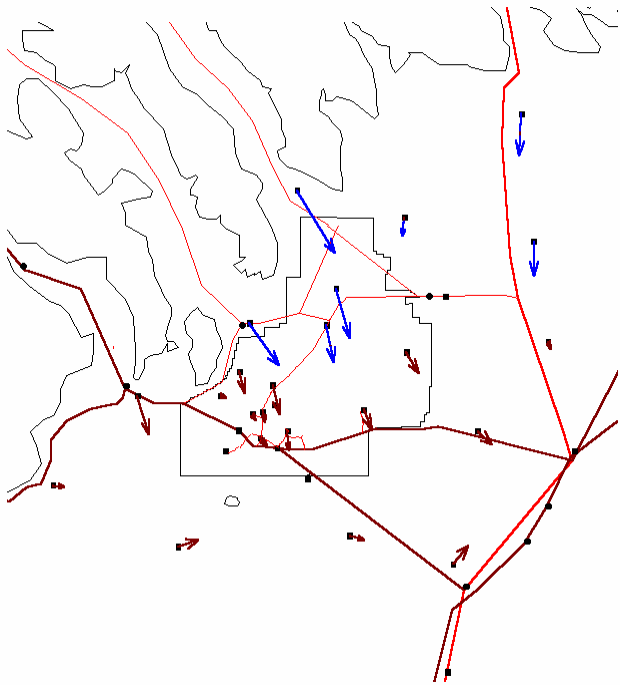
North Group

Direction: N-NW
Speed: 10-20 MPH

Others

Direction: W-NW
Speed: 5-15 MPH

Most Common:
Apr 2200-0400 MST
Oct 1600-2400 MST
(13-18 percent)



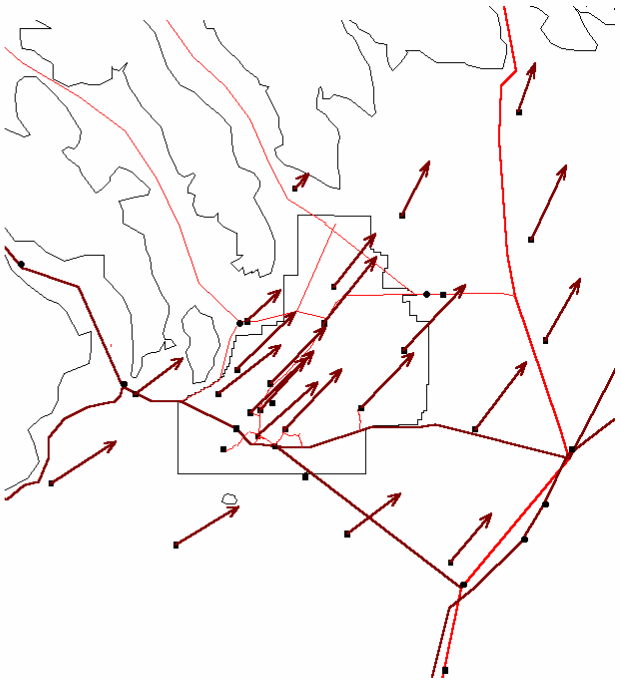
Wind Pattern #7

Relative Frequency:
5.2 percent

Direction: SW

Speed: 15-30 MPH

Most Common:
Mar-Aug 1400-1800 MST
(15-25 percent)



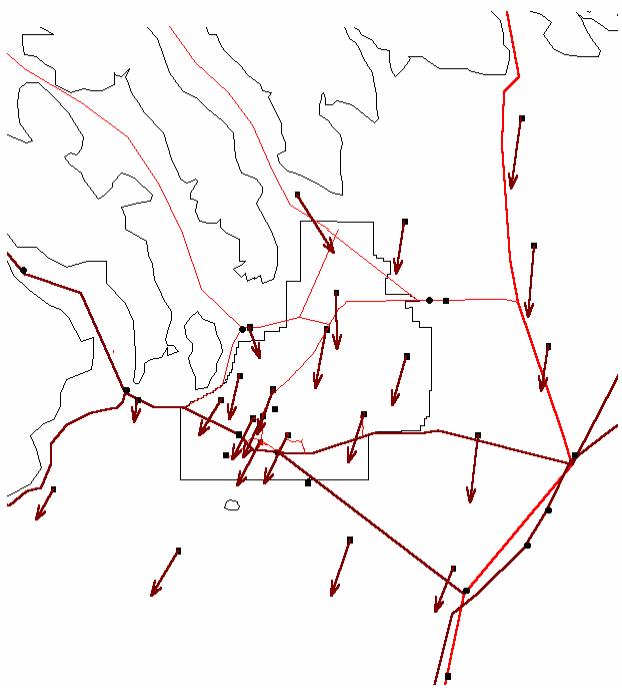
Wind Pattern #8

Relative Frequency:
4.7 percent

Direction: N-NNE

Speed: 10-20 MPH

Most Common:
Apr 1700-1200 MST
Oct 2200-0100 MST
(9-12 percent)



Monthly & Hourly Cluster Frequencies

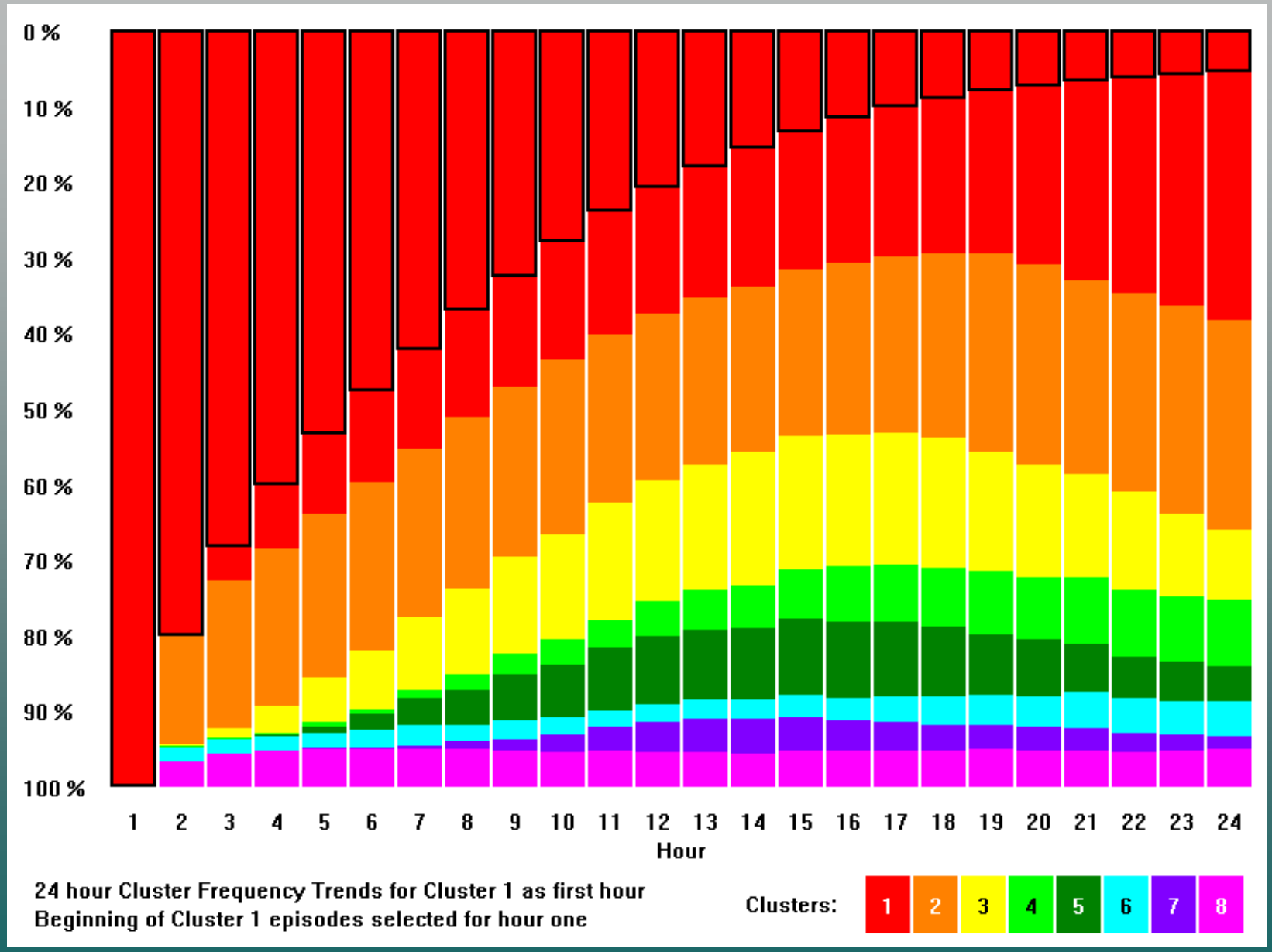
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Jan	33	35	35	35	35	36	34	33	31	32	33	31	30	31	32	32	36	35	37	37	36	35	34	34
Feb	38	37	38	37	40	44	43	43	43	41	40	38	35	34	31	32	34	36	38	38	40	39	38	38
Mar	27	28	31	32	33	34	32	33	33	29	25	18	15	13	12	12	12	14	18	20	22	23	25	25
Apr	19	22	24	27	29	32	32	31	27	20	12	10	7	4	4	4	3	3	4	7	10	13	14	16
May	24	25	29	32	34	34	37	36	29	21	12	10	6	7	7	6	6	6	8	11	11	13	17	20
Jun	26	31	35	37	39	42	43	43	36	25	15	8	5	5	4	3	5	6	7	11	16	19	22	26
Jul	37	42	43	47	49	50	54	53	46	33	20	10	6	3	3	3	4	6	8	10	13	19	26	29
Aug	37	43	47	54	56	60	60	62	55	42	23	11	5	2	3	3	3	5	7	11	15	19	23	26
Sep	30	36	40	44	47	52	51	51	47	39	25	14	9	6	6	5	6	7	10	13	14	17	20	24
Oct	24	26	30	33	35	37	38	36	40	35	24	17	11	9	8	7	8	11	12	14	17	19	20	22
Nov	34	33	35	35	36	39	40	39	40	38	35	29	25	22	19	21	26	28	30	31	32	33	33	34
Dec	30	32	34	34	35	39	37	35	36	37	36	35	34	34	34	36	39	39	37	36	34	32	31	31

Hour of Day (MST)

Cluster 1 Frequencies (percent) by Month and Hour of Day
April 1993 through March 2006

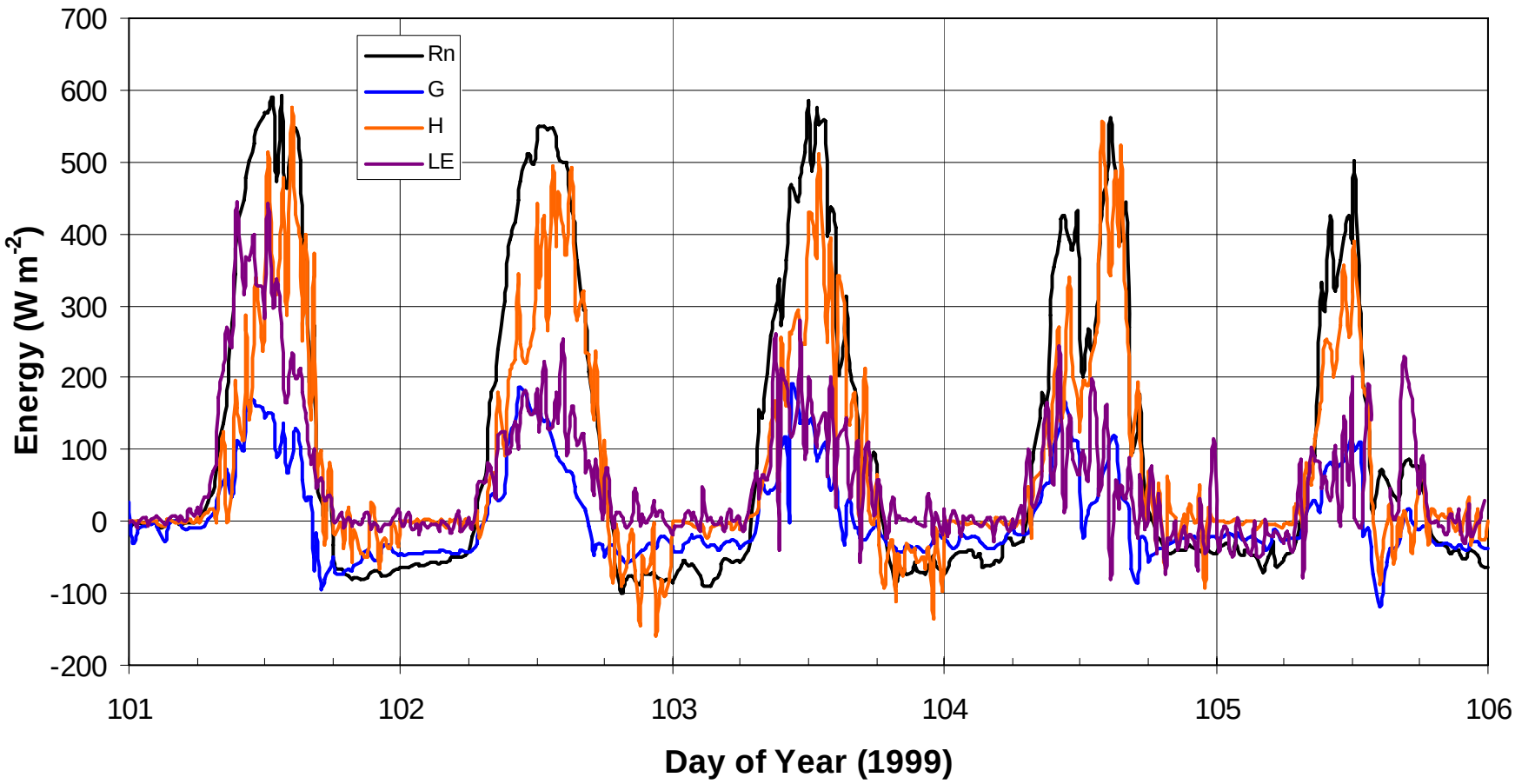
Cluster 1:								
	7	14	23	31	34	36	40	62
	2	8	15	24	32	35	37	41

24-hour Cluster Frequency Trends



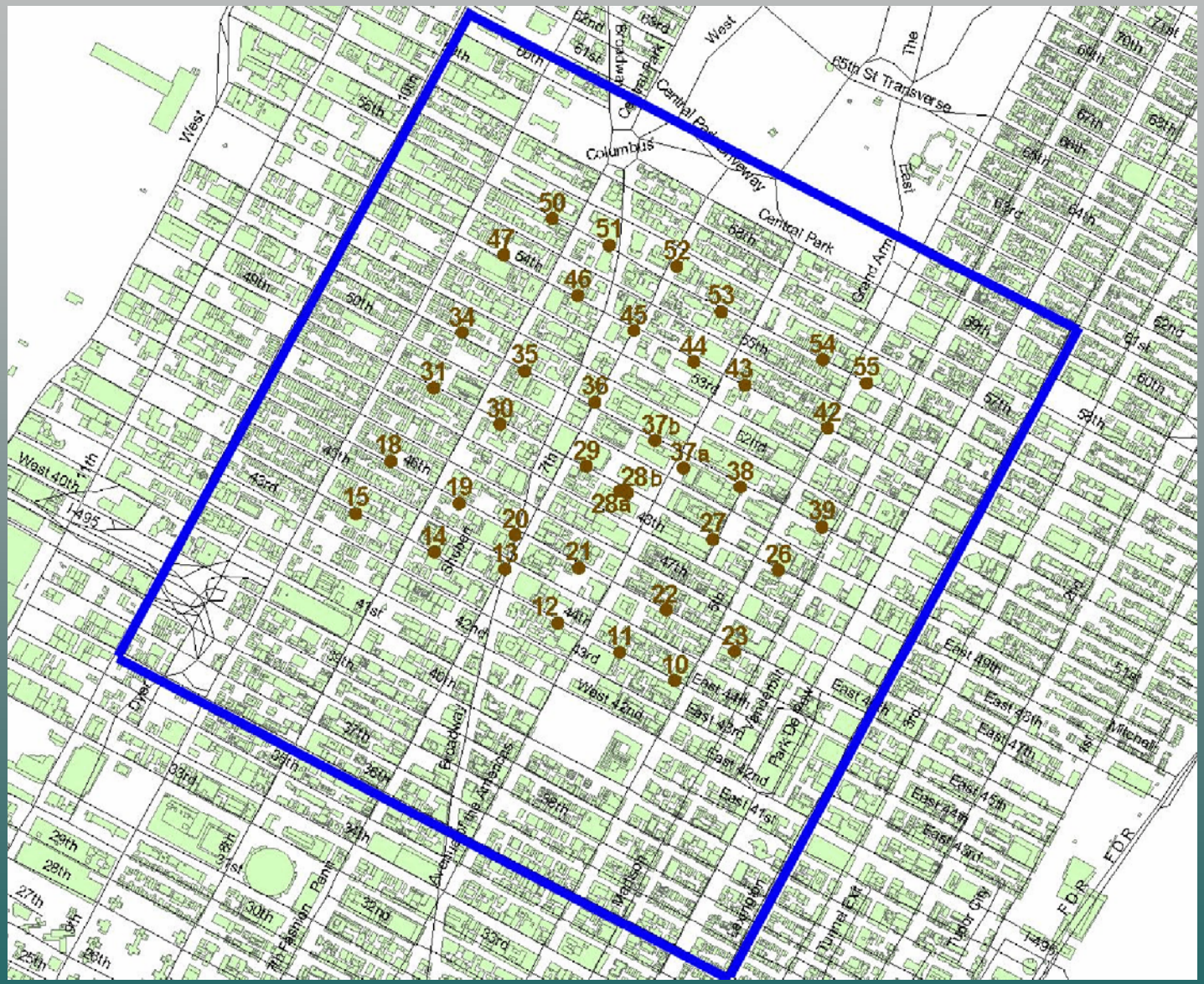
Eddy Correlation Carbon and Water Flux System

EC Energy Balance (10-14 April)



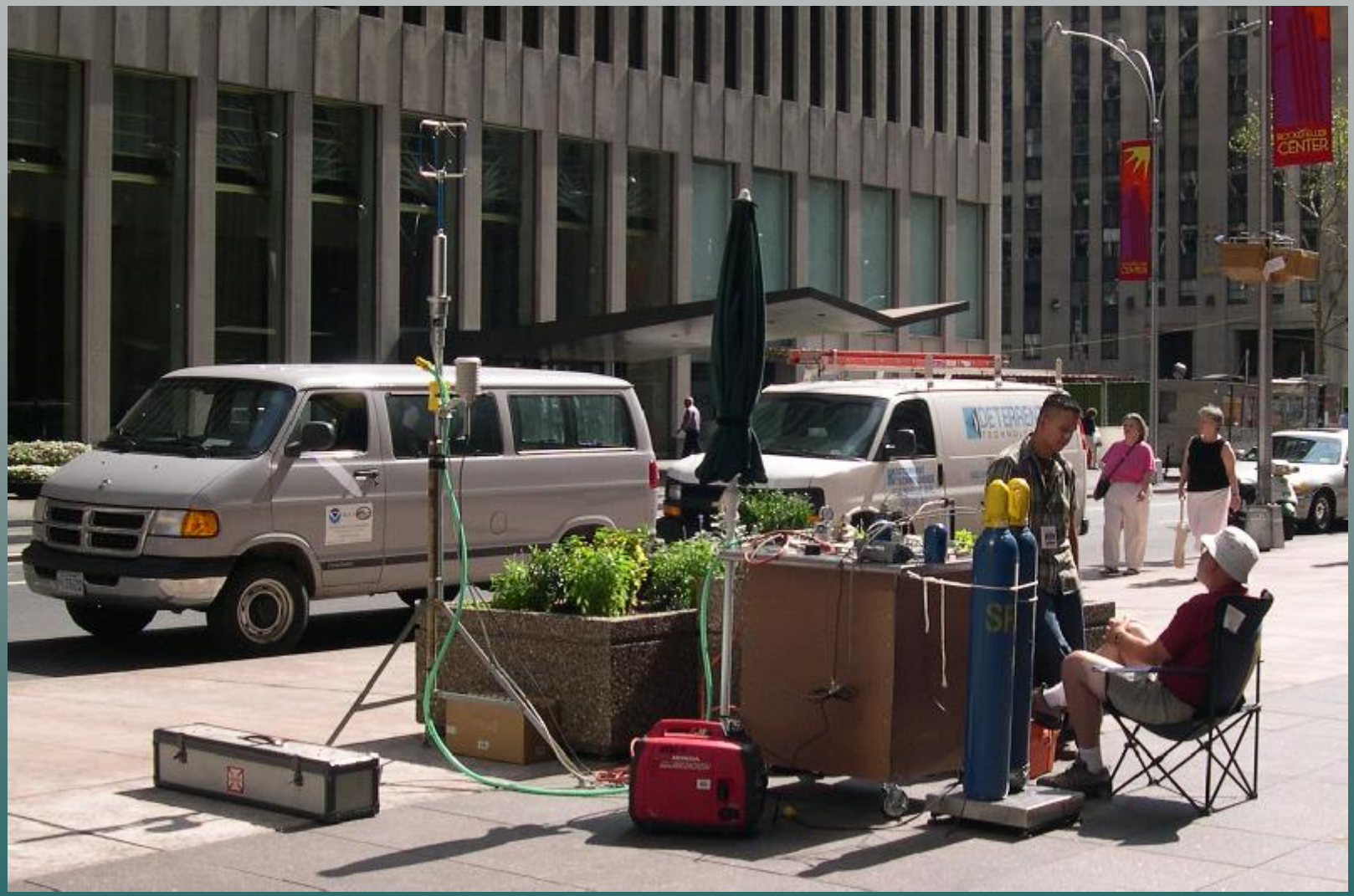
UDP Study Area—Midtown Manhattan

UDP Experimental Domain



UDP Sampler Installation

UDP Tracer Release & Sampling Site



UDP Staging Area:
Under the Brooklyn Bridge

UDP Staging Area:
Empire State Building & Manhattan Br.

UDP Staging Area:
Lower Manhattan & Statue of Liberty