



The Kentucky Mesonet: Overview and Strategic Vision

Stuart Foster

State Climatologist for Kentucky

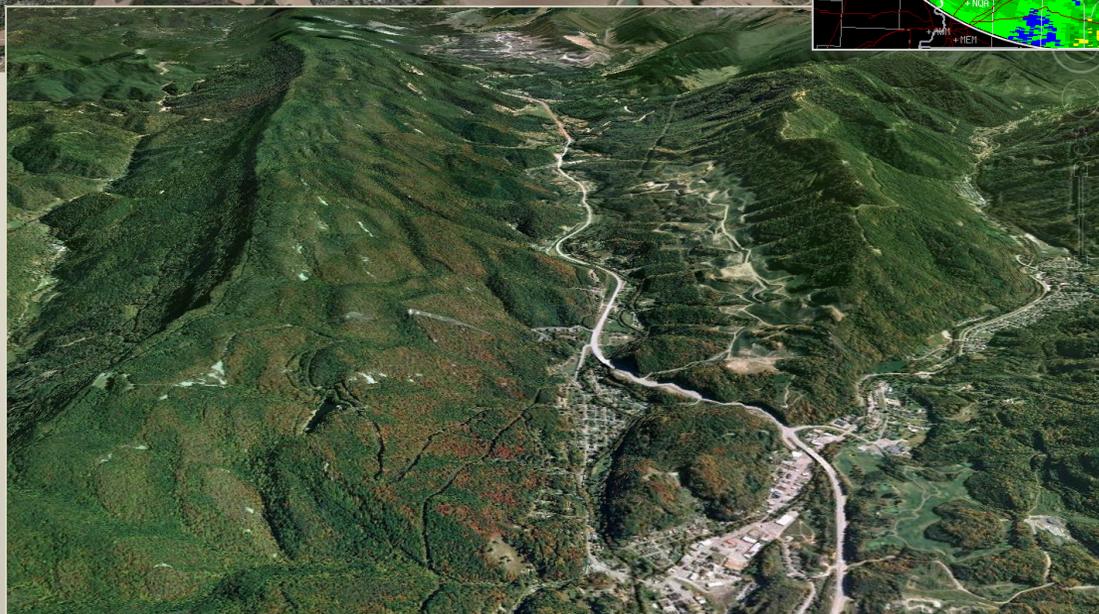
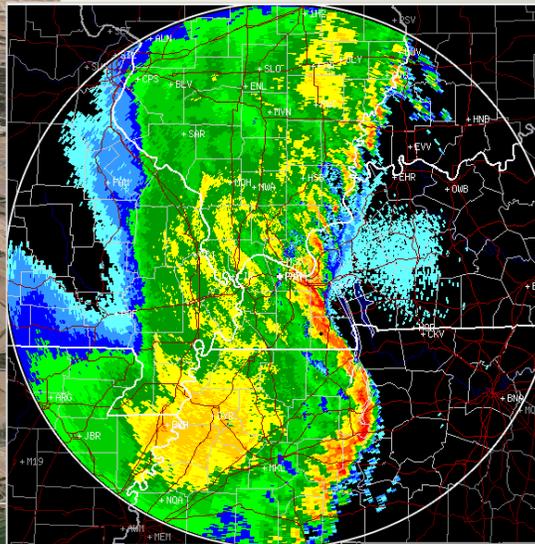
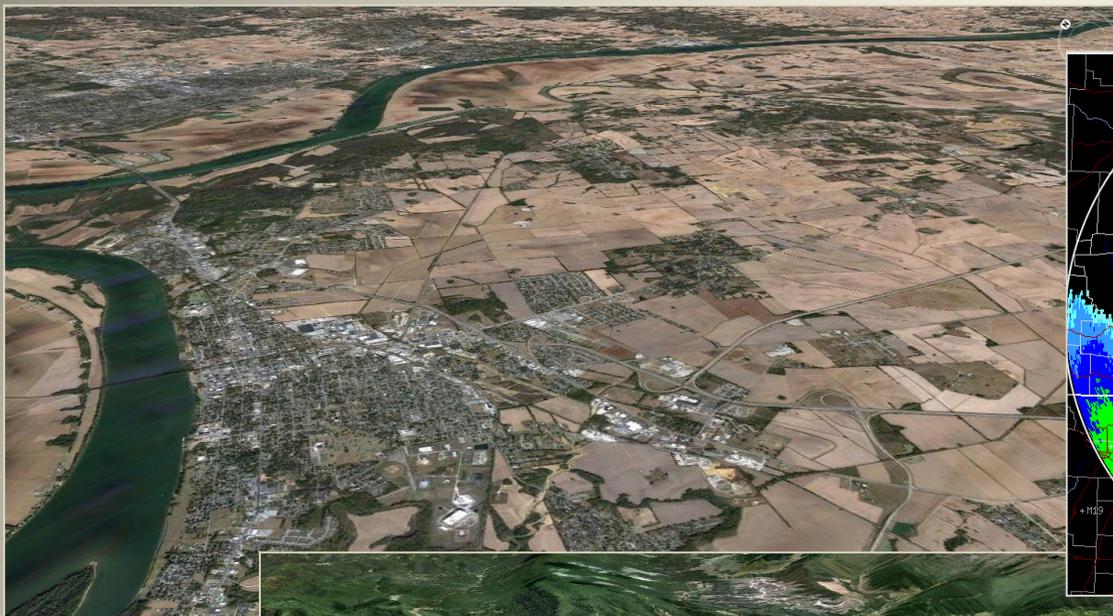
Kentucky Climate Center

Western Kentucky University

Kentucky Agriculture Science and Monitoring Committee

Louisville, KY

December 9, 2015



Kentucky's diverse terrain creates distinct local vulnerabilities to weather and climate





Mitch McConnell
SENATE MAJORITY WHIP - UNITED STATES SENATOR FOR KENTUCKY

- ABOUT THE SENATOR
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PRESS RELEASES

Senator McConnell Secures \$1.5 Million In Funding For Western Kentucky University

from the Office of Senator Mitch McConnell

[AUDIO STATEMENTS](#)

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approve McConnell's requests*

U.S. Senate Majority Whip Mitch McConnell and the Senate Appropriations Committee has secured \$1.5 million in funding for Western Kentucky University's Environmental Monitoring Network. The funding is included in the FY'07 Commerce, Justice, and Education appropriations bill, which must now be approved by the full Senate.



WESTERN KENTUCKY UNIVERSITY

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Kentucky Mesonet Recognized As Official Climate Data Source

April 06, 2006

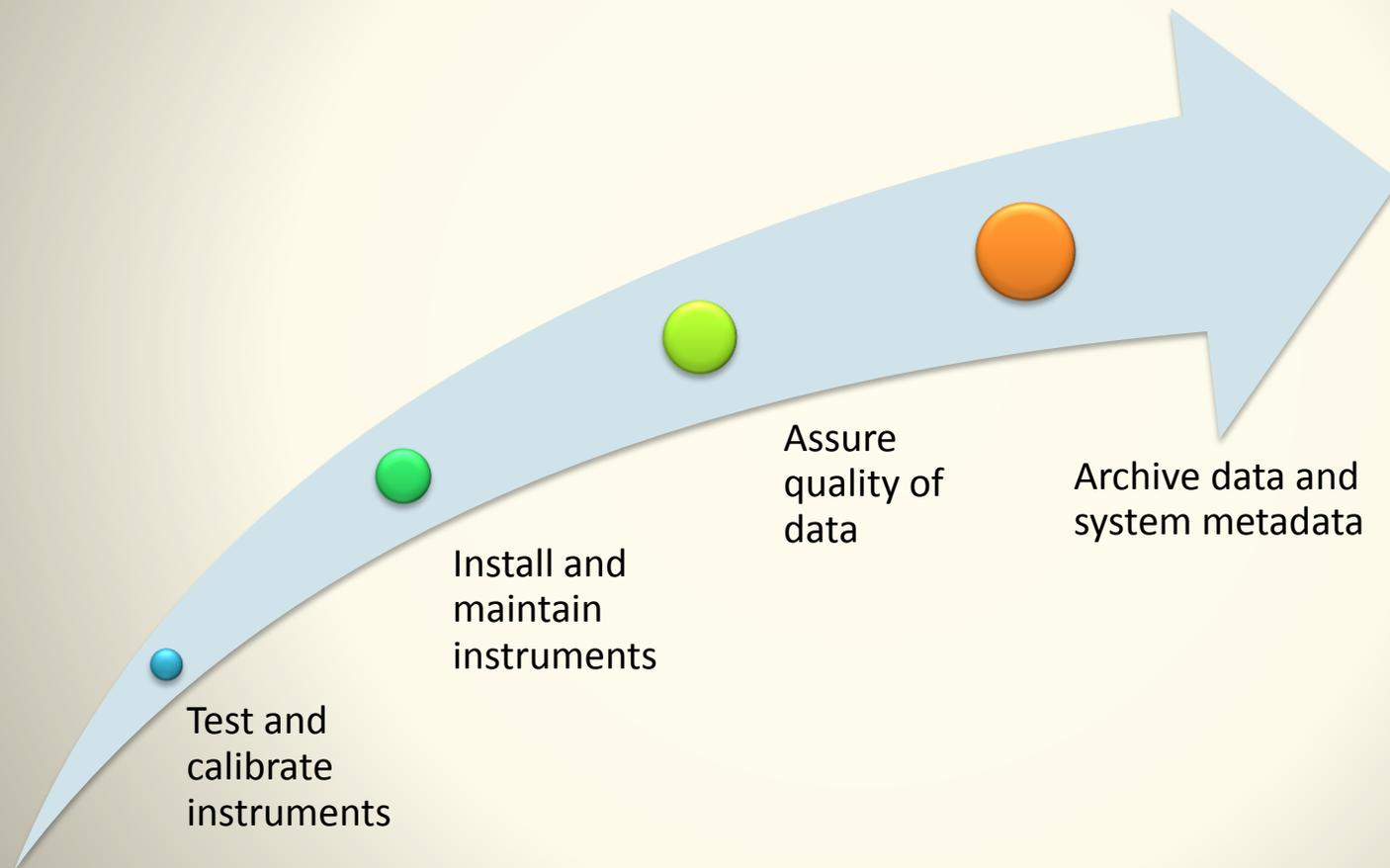
Bowling Green, Ky. - Gov. Ernie Fletcher has signed a resolution recognizing the Kentucky Mesonet as the official source of climatological observations for the state.



It's Local ... All Across the Commonwealth

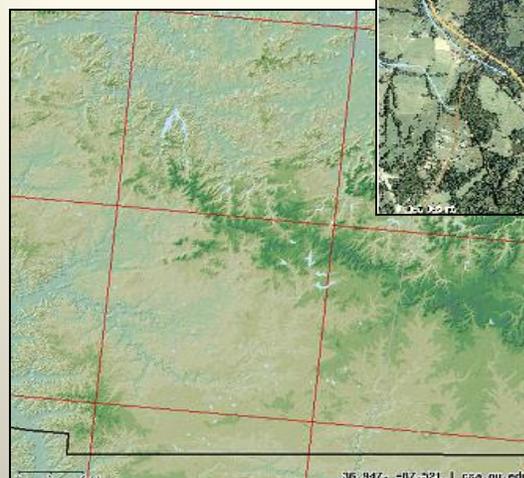


Vertically Integrated System



High-Quality Sites for High-Quality Data

- Work with local stakeholders to find the best available sites
- Sites are representative of their surrounding areas



Survey Scores	
Temperature	40
Precipitation	30
Wind	12
Soil	15
Total	97

Elements of Spatial Metadata



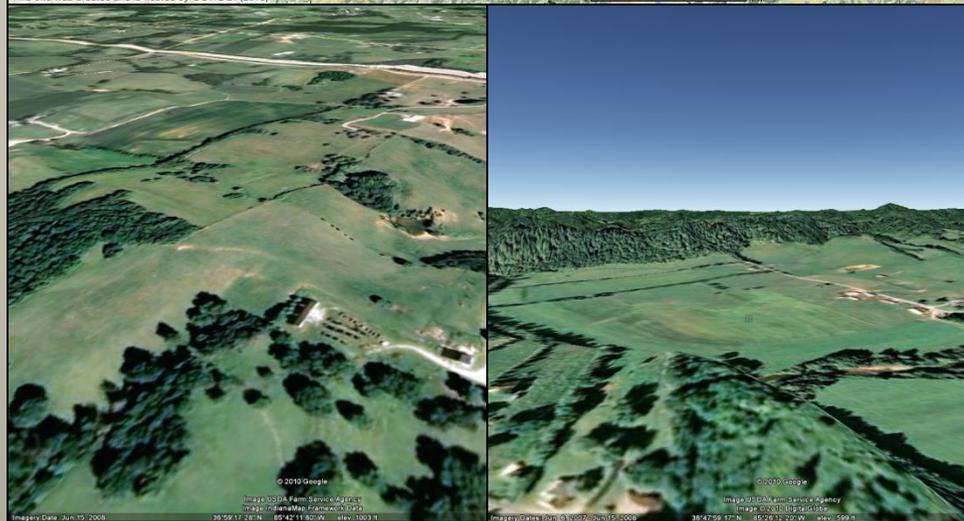
- Micro scale
 - Obstructions *
 - Relief

- Local scale
 - Relief
 - Slope and Aspect
 - Land use / land cover *
 - Urbanization *

* *Dynamic influences*

Paired-Sites

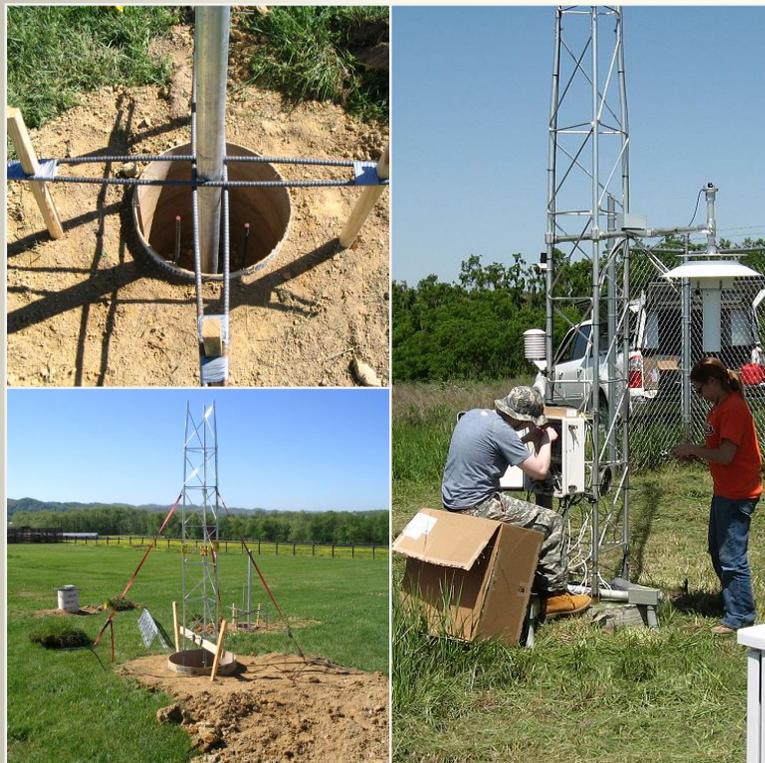
- Areas of complex topography cannot be well represented by a single site
- The most representative site may not be the nearest site
- An example is provided by the paired stations in Metcalfe County (plateau) and Cumberland County (valley)



Plateau , 1003'

Valley, 554'

Station Installation and Maintenance



- Install and test meteorological instrumentation before bringing station online
- Complete scheduled spring, summer, and winter site maintenance passes
- Respond to “trouble tickets” when QA processes require unscheduled site maintenance visits

Design Criteria Emphasize Quality and Reliability



Temperature

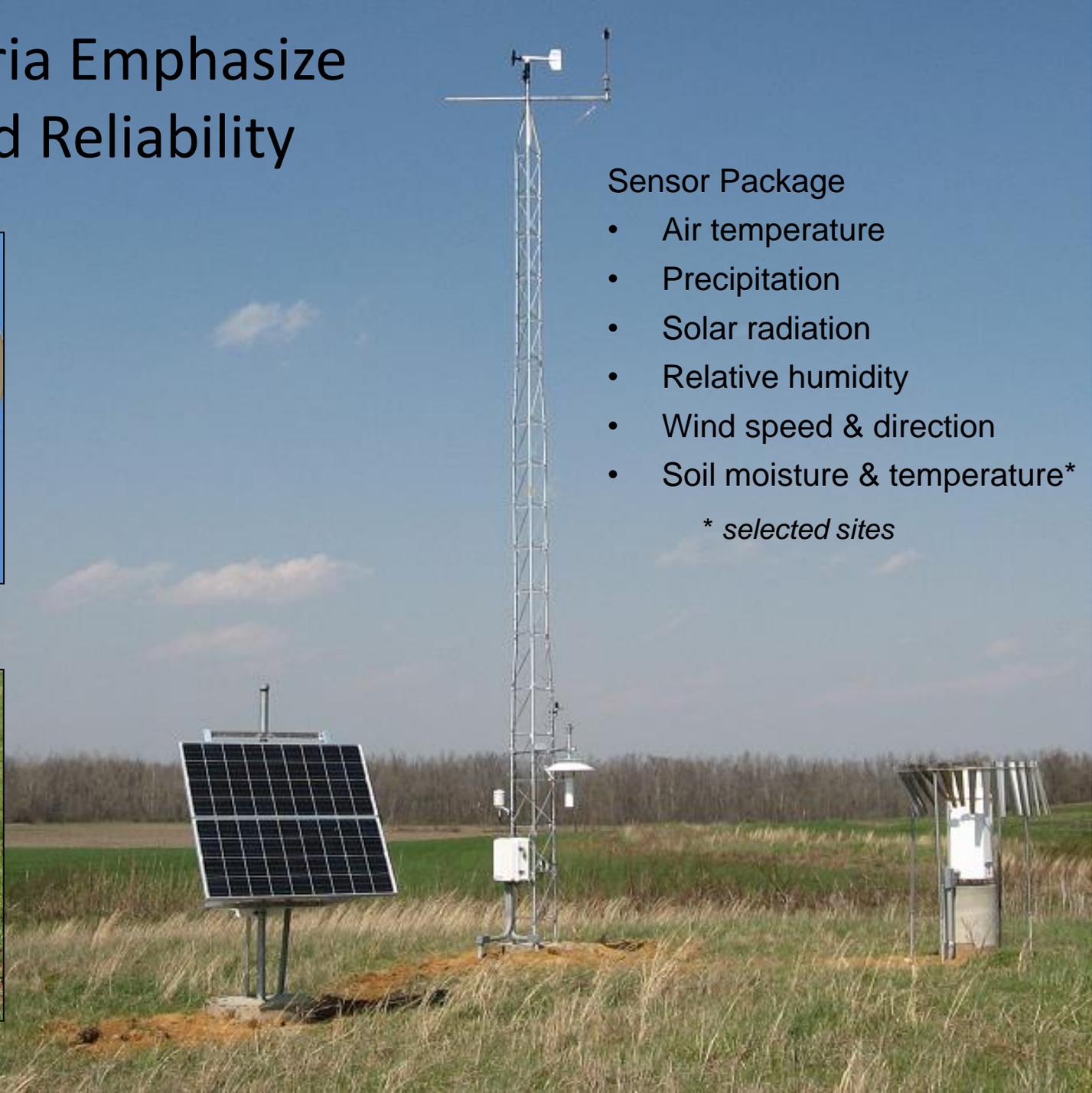


Precipitation

Sensor Package

- Air temperature
- Precipitation
- Solar radiation
- Relative humidity
- Wind speed & direction
- Soil moisture & temperature*

* *selected sites*



Metadata Database

Equipment History

Calibration History

Effective Time	Performed By	Calibration Location	Equipment Used	Variable	Equation
2008-04-04 16:55:00	Dana Grabowski	KYMN LAB	Fluke 7380 High Pre	TA01	0.9968X+-0.0511
2008-04-04 16:55:00	Dana Grabowski	KYMN LAB	Fluke 7380 High Pre	TA02	0.9968X+-0.0511
					0.9968X+-0.0511

User: aquilligan

KYMN ▼

Manage Sites

Manage Equipment

Manage Sites

Add/Modify Collection Sites
Add Non-Collection Sites
Site Pass
Site Status

Move Equipment At Sites

All Sites Russellville 2 W ▼

Manufacturer	Model	Serial No	Vendor	Type
AirLink	Raven Edge E3214	0638149585	Campbell Scientific	Cellular Modem
Vaisala	VRG101	B45102	Vaisala	Weighing Bucket
Campbell Scientific	CR3000-XT-SW-NB-NC	1353	Campbell Scientific	Micrologger
Thermometrics	316-125-1000CR-385-4-TL3	7	Thermometrics	PRT
Kyocera	KC125TM	058101920	Solar Craft	Solar Panel
Kyocera	KC125TM	058101359	Solar Craft	Solar Panel
R M Young Company	05103-5	WM00075165	R.M. Young	Wind Monitor
Vaisala	HMP45C	B3220026	Campbell Scientific	Temp/RH probe

^^ Move Up ^^
vv Move Down vv
Effective Time
December ▼
16 ▼
2010 ▼
19 ▼
59 ▼
UTC

User: aquilligan

KYMN ▼

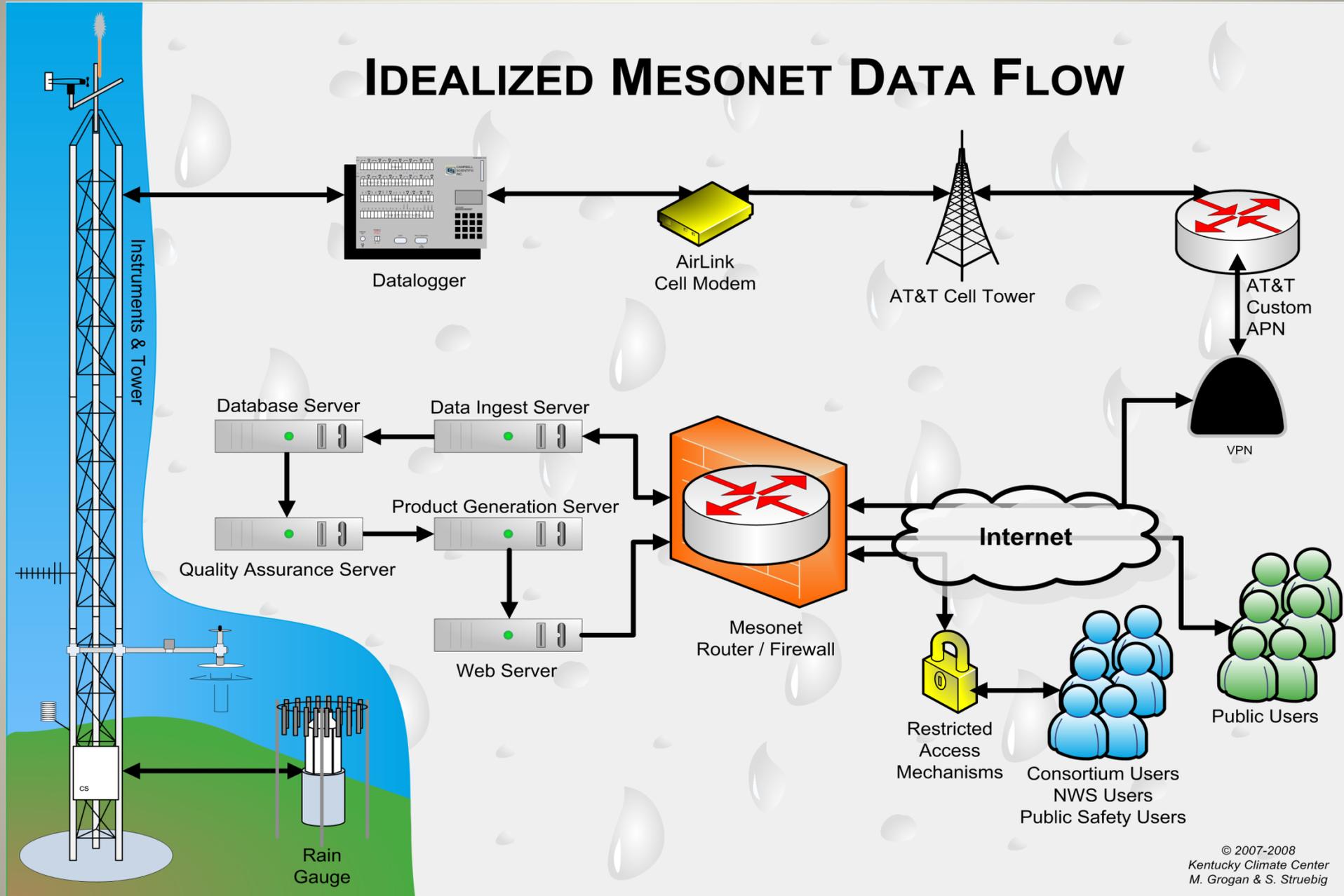
Manage Sites

Manage Equipment

Non-Collection Site Laboratory ▼

Manufacturer	Model	Serial No	Vendor	Type
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R M Young Company	05103-5	WM00075175	R.M. Young	Wind Monitor
Thermometrics	316-125-1000CR-385-4-TL3	138	Thermometrics	PRT
Vaisala	HMP45C	B3230034	Campbell Scientific	Temp/RH probe
Met-One Instruments	076-B	F7077	Met-One Instruments	Aspirated Shield
Thermometrics	316-125-1000CR-385-4-TL3	9	Thermometrics	PRT
Thermometrics	316-125-1000CR-385-4-TL3	8	Thermometrics	PRT
R M Young Company	05103-5	WM00075174	R.M. Young	Wind Monitor
Apogee Instruments Inc.	PYR-P	4048	Apogee	Silicon Pyranometer
Vaisala	HMP45C	B3240065	Campbell Scientific	Temp/RH probe

IDEALIZED MESONET DATA FLOW

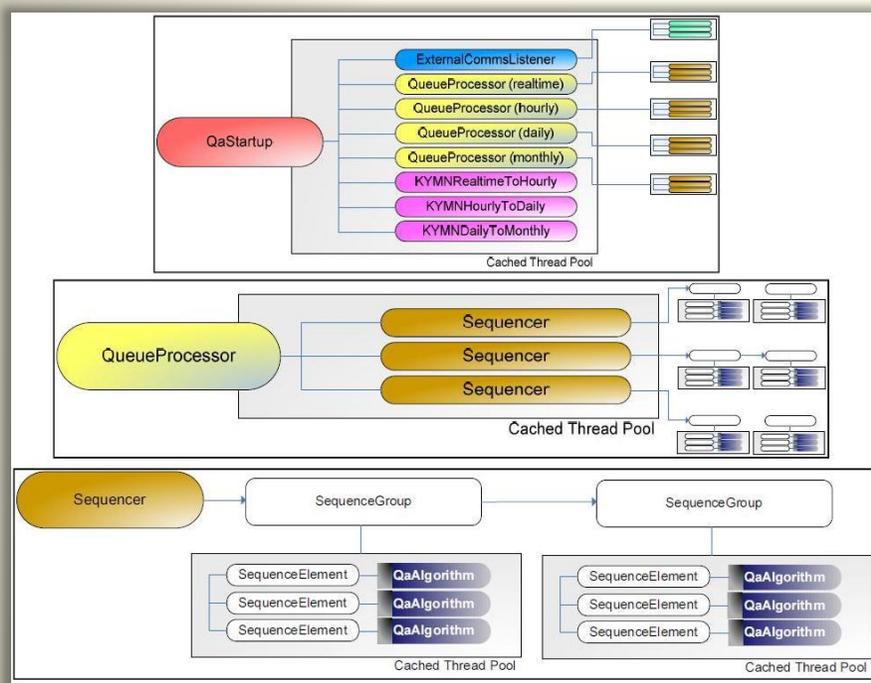


Meteorological Database

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- Observations are taken every 5 minutes
- Each station collects over 105,000 observations each year
- Each station returns over 2,730,000 data values each year

Quality Assurance Procedures



- Automated QA runs on five-minute data as they are collected from remote sites
- Manual QA is implemented on a daily basis to provide expert assessment of system performance



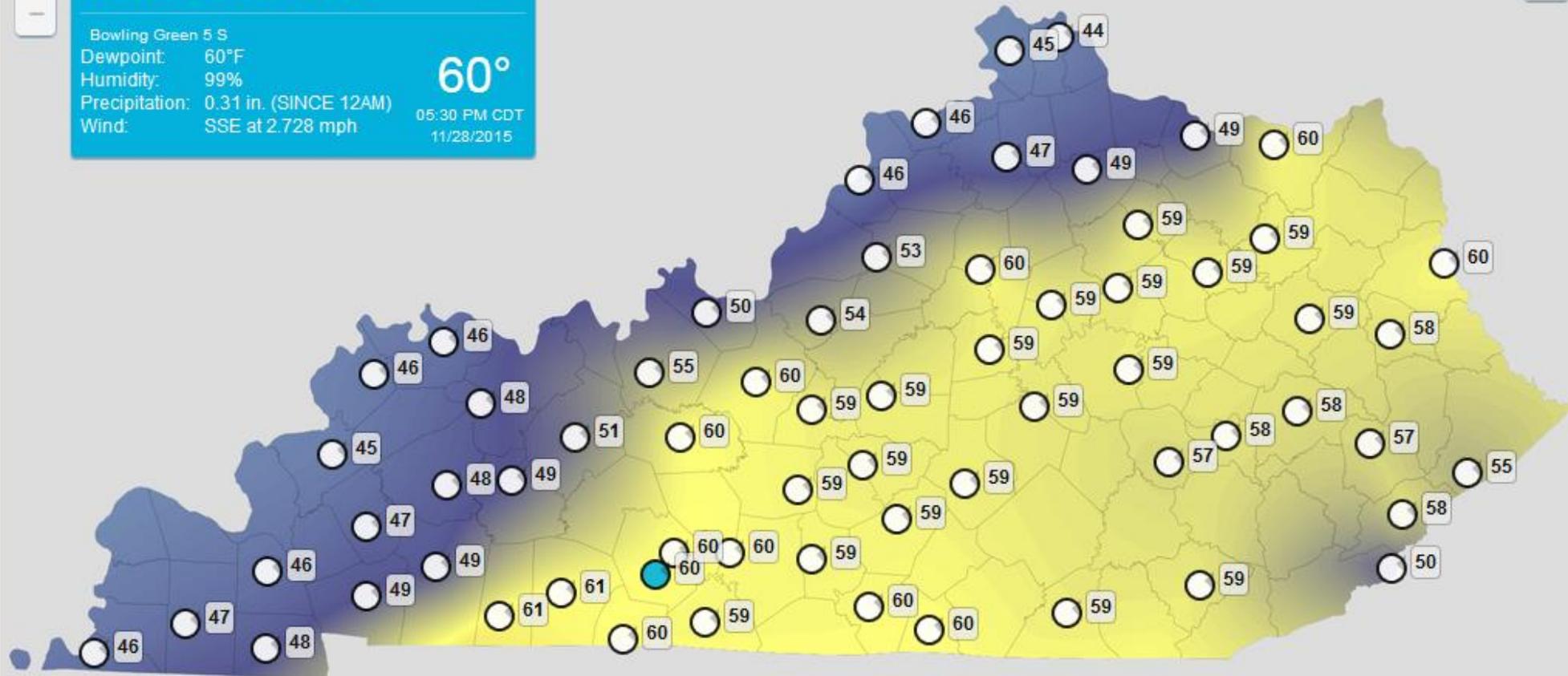
Warren County, KY

save

Bowling Green 5 S
Dewpoint: 60°F
Humidity: 99%
Precipitation: 0.31 in. (SINCE 12AM)
Wind: SSE at 2.728 mph

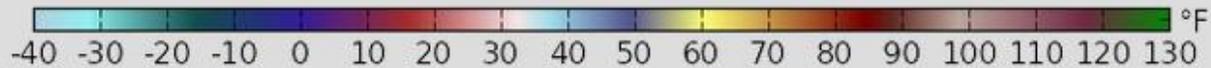
60°

05:30 PM CDT
11/28/2015



Leaflet

Air Temperature Data Points on Air Temperature Contour Map



Home

About

Live Data

Summary Data

Event Tracking

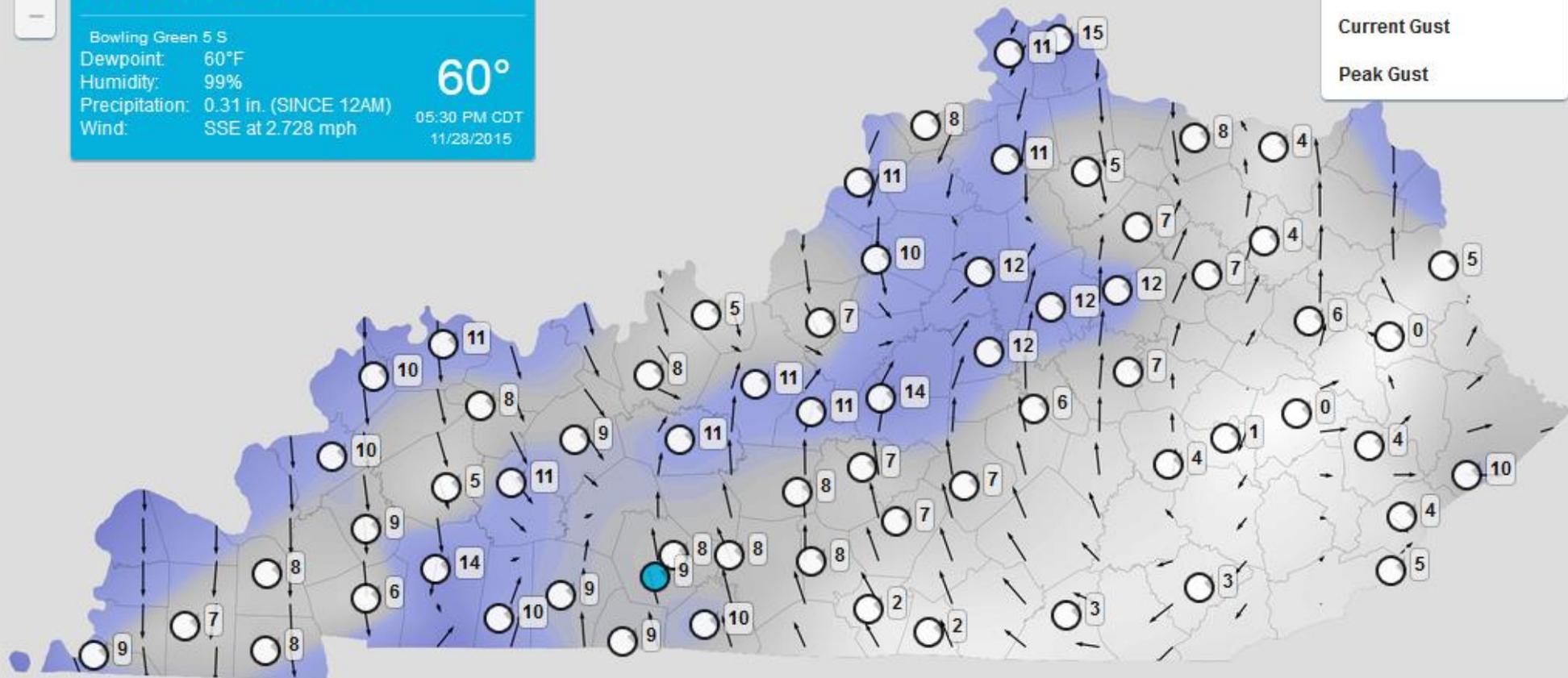
Outreach

Warren County, KY save

Bowling Green 5 S
 Dewpoint: 60°F
 Humidity: 99%
 Precipitation: 0.31 in. (SINCE 12AM)
 Wind: SSE at 2.728 mph

60°
 05:30 PM CDT
 11/28/2015

- Current >
- Current Gust
- Peak Gust

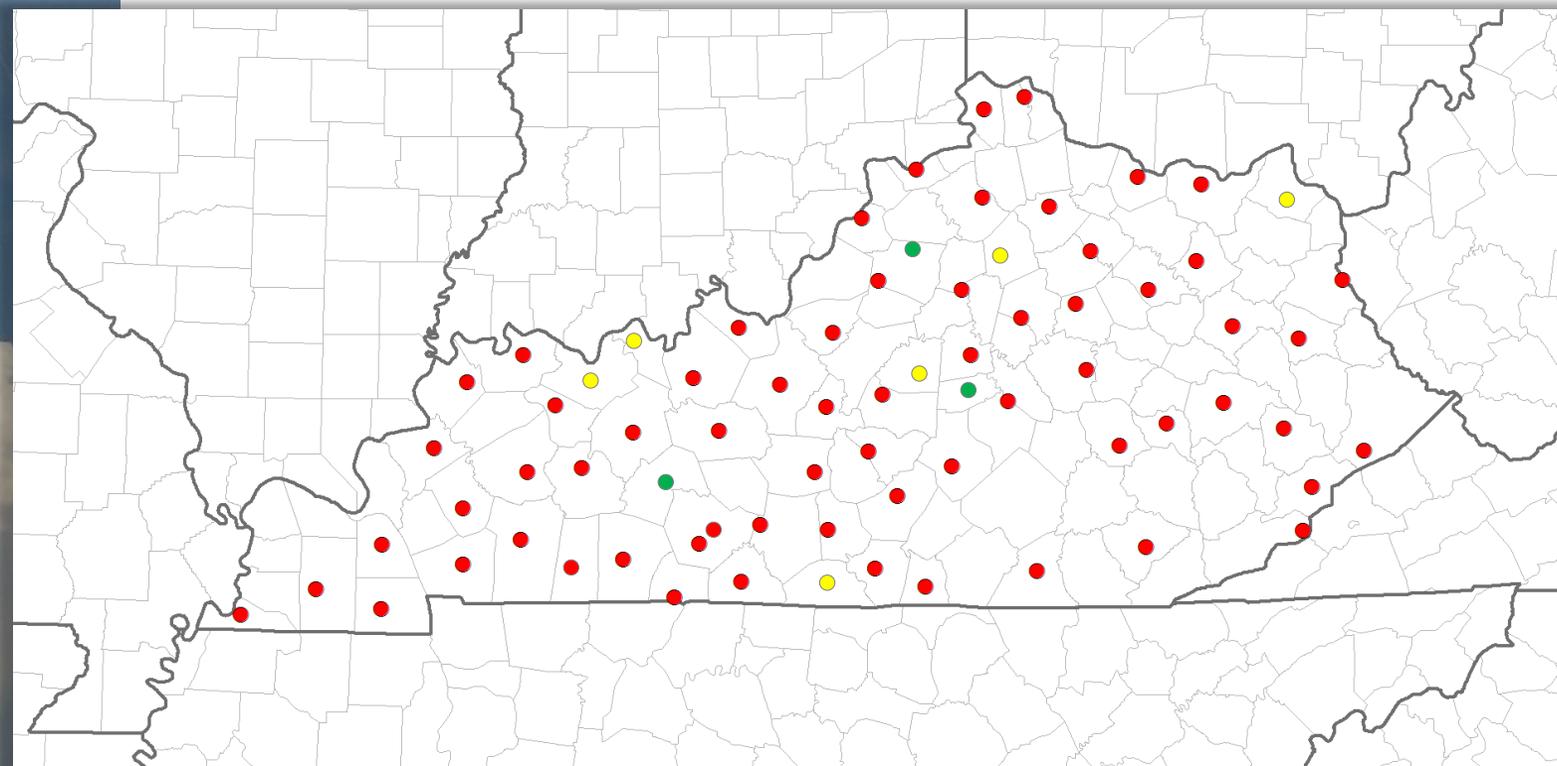


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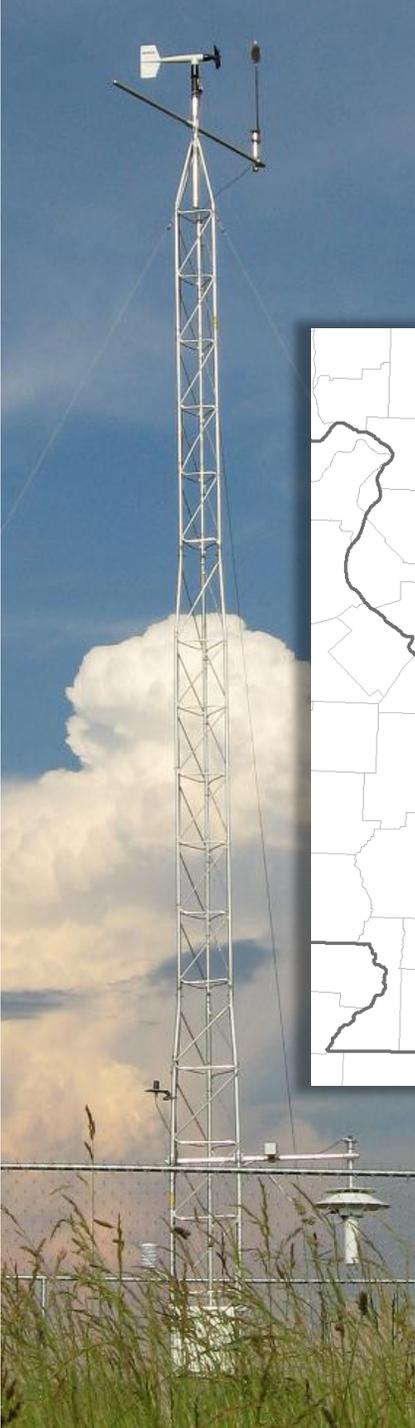
Wind Speed Max Gust Data Points on Wind Speed Max Gust Contour Map



Kentucky Mesonet Coverage Map



- 65 - Existing stations in the Kentucky Mesonet
- 3 – Local governments have secured funding to acquire a new station
- 6 – Local governments are evaluating options to acquire a new station



Tiered Partnerships

National Mesonet Program – 3rd year of funding, with increasing allocation each year

Federal Partners

State Partners

While Mesonet data are used by many state agencies, no funding has been provided to support operations since inception of program nearly 10 years ago

Western Kentucky University

Kentucky Climate Center
Kentucky Mesonet

Private-Sector Partners (End users)

Private-Sector Partners (Value-added resellers)

Supported operations for the benefit of ALL Kentuckians since project began in 2006

Building relationships with local and national companies to promote economic development and create jobs.

Local Partner

Local Partner

Local Partner

Local Partner

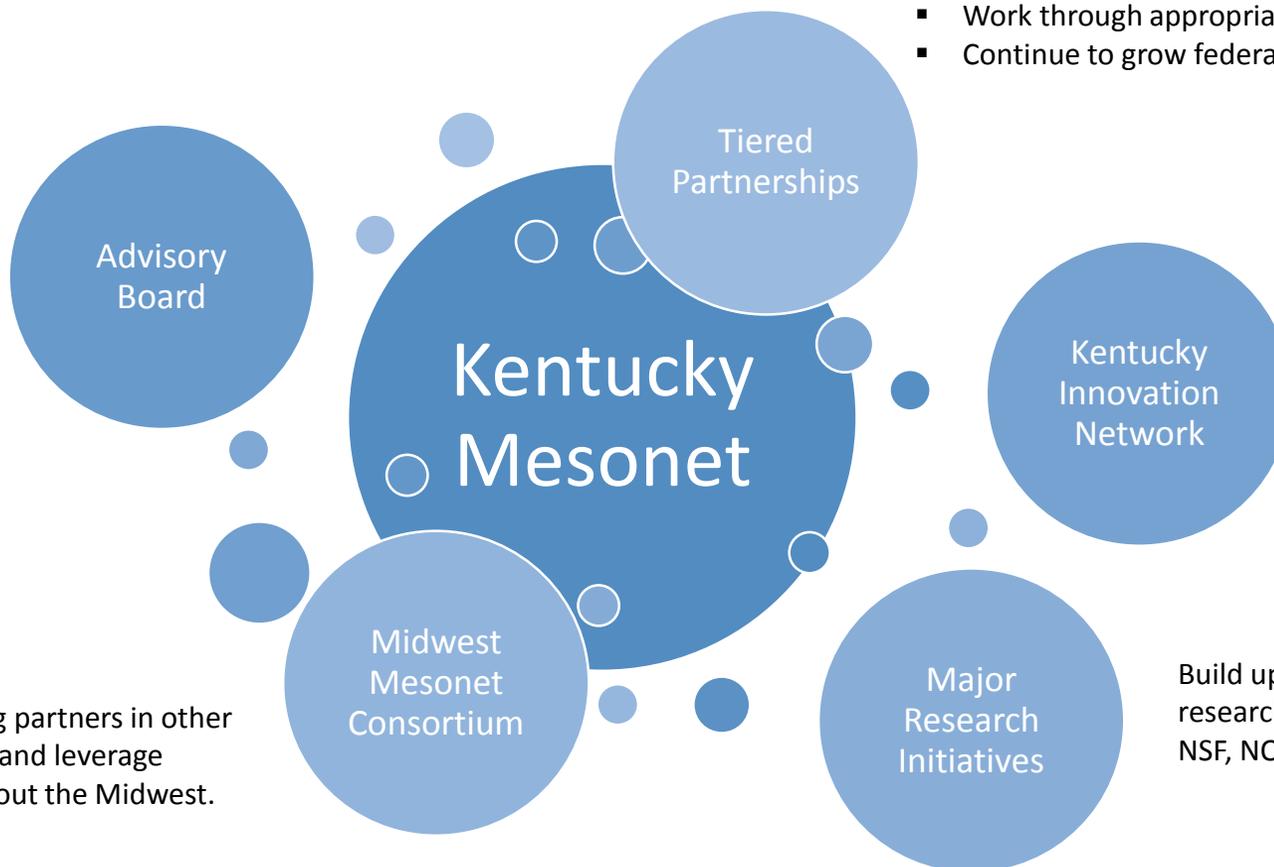
Local Partner

Local sponsorship program in 2nd year – local governments, private companies, and other stakeholders have provided matching operating support for stations

Expanding the network – local governments and stakeholders are providing funds to add 3 new stations in 2015, with efforts underway for more stations in 2016

Active Strategic Initiatives

Recruit individuals with expertise from diverse backgrounds who can advise regarding strategic initiatives and be champions for the Kentucky Mesonet.



- Expand efforts at the local level to secure station sponsorships.
- Work through appropriate channels to secure state funding.
- Continue to grow federal funding stream.

Explore options for incorporation to expand capacity to leverage assets of the Kentucky Mesonet and pursue commercialization opportunities.

Lead efforts among partners in other states to integrate and leverage mesonets throughout the Midwest.

Build upon successes in securing competitive research funding by pursuing opportunities with NSF, NOAA, AGU, USDA, and other agencies.

