



Mesonets in the Midwest Region

Stuart Foster

State Climatologist for Kentucky

Kentucky Climate Center

Western Kentucky University

NIDIS Regional Workshop Series

Nov 7-10 & Dec 5-8, 2016



Talking Points

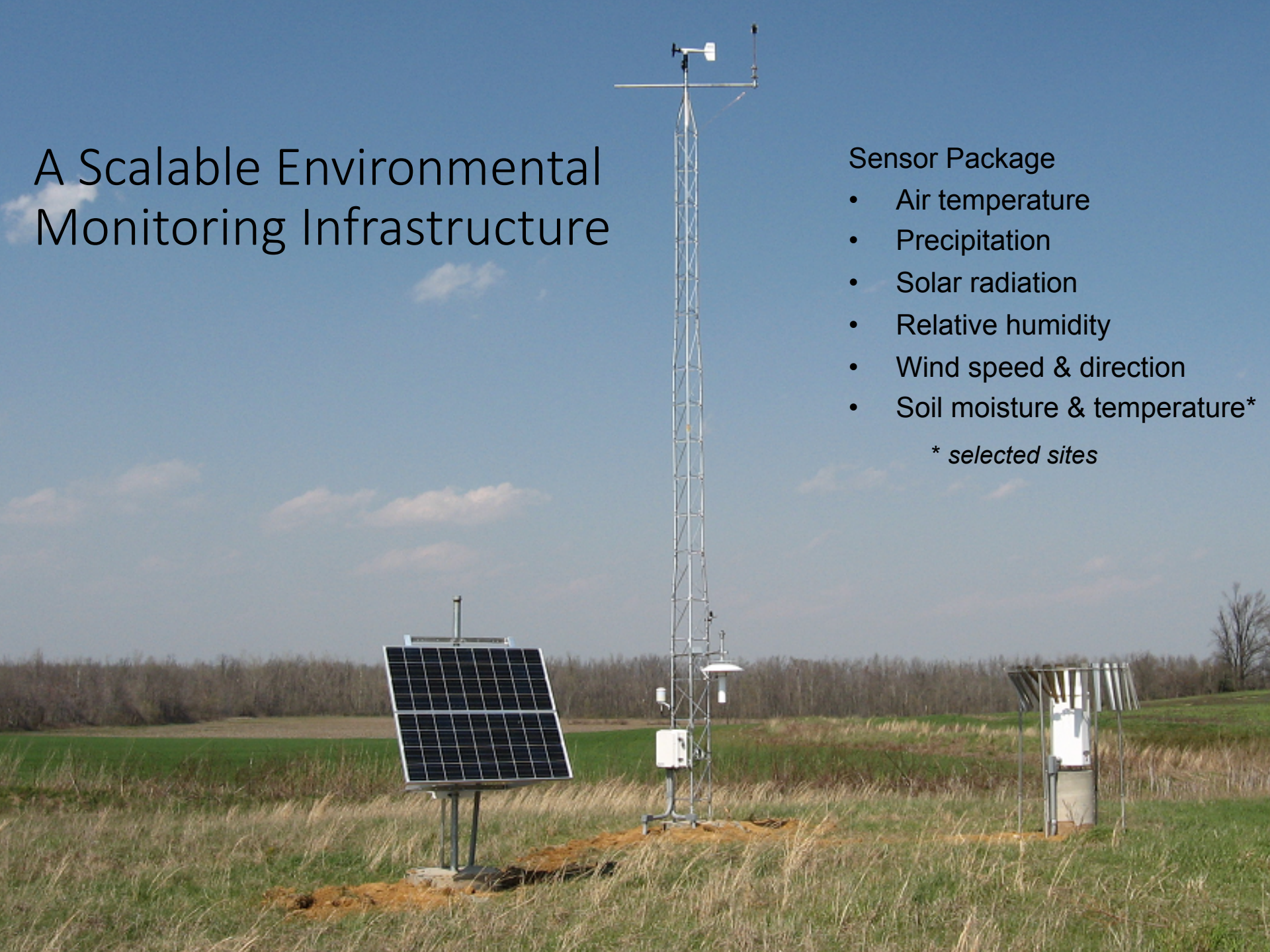
- What is a mesonet?
- How mesonets fit into the Midwest DEWS
- Lessons learned from building the Kentucky Mesonet
- Toward an integrated Midwest mesonet

A Scalable Environmental Monitoring Infrastructure

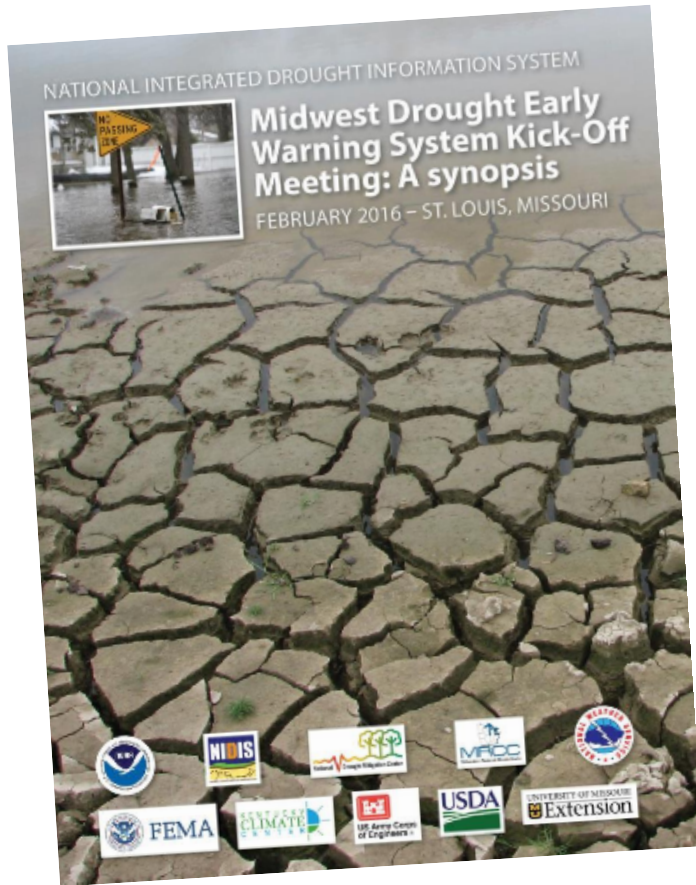
Sensor Package

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

** selected sites*

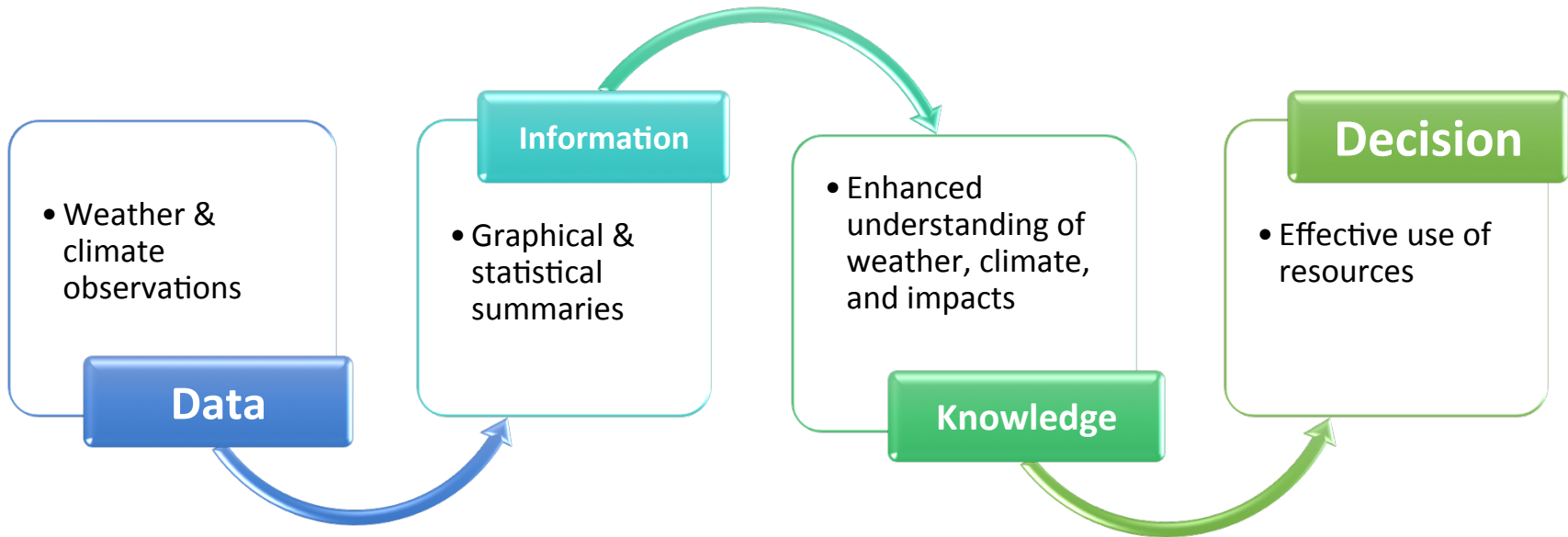


Midwest DEWS Priorities and Needs Related to Mesonets



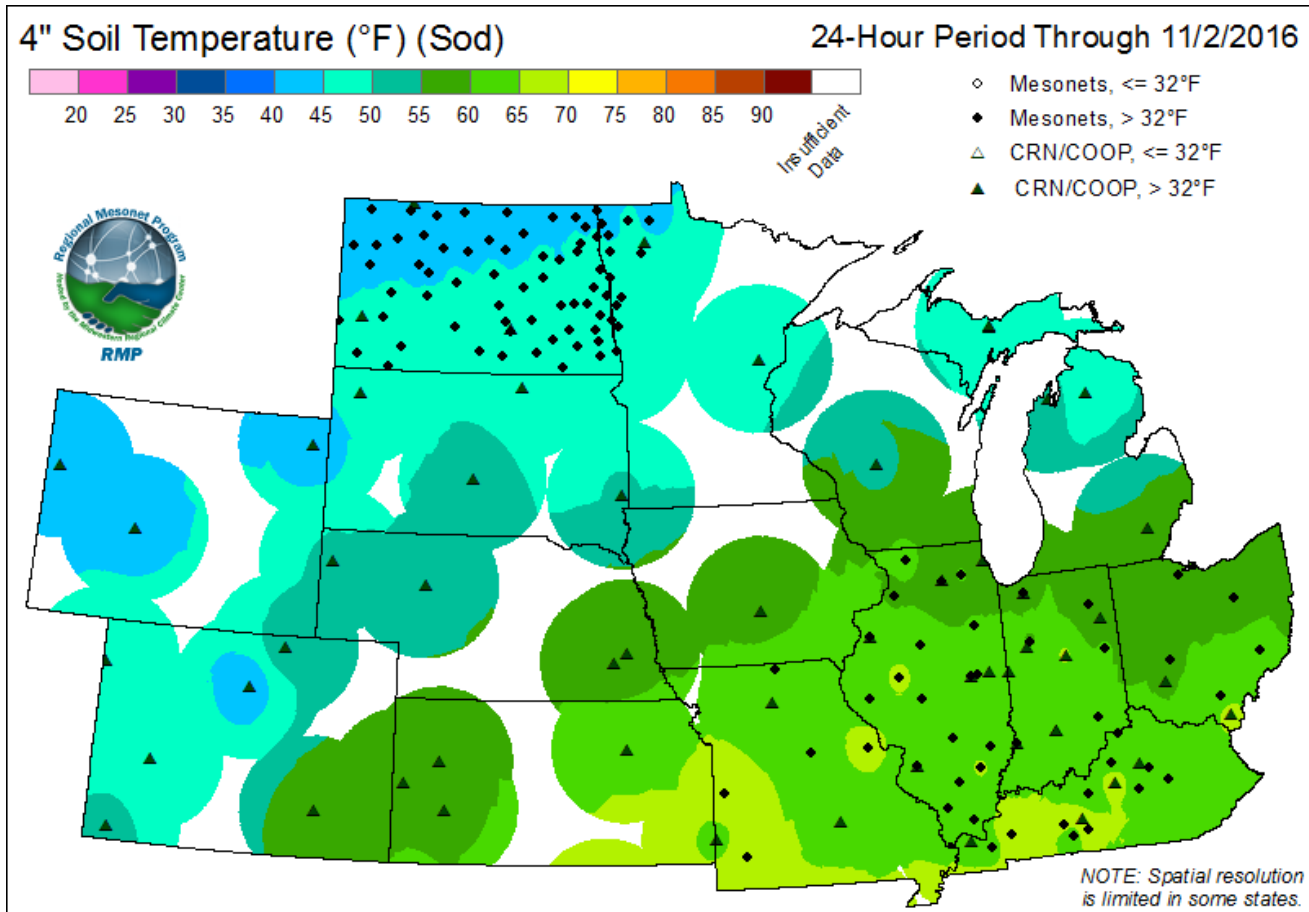
- Integration of networks to facilitate delivery of data, tools, and information
- Understanding of hydrologic and climatic processes
 - Improvements to soil moisture networks
 - Surface-groundwater relationships

From Data to Decision



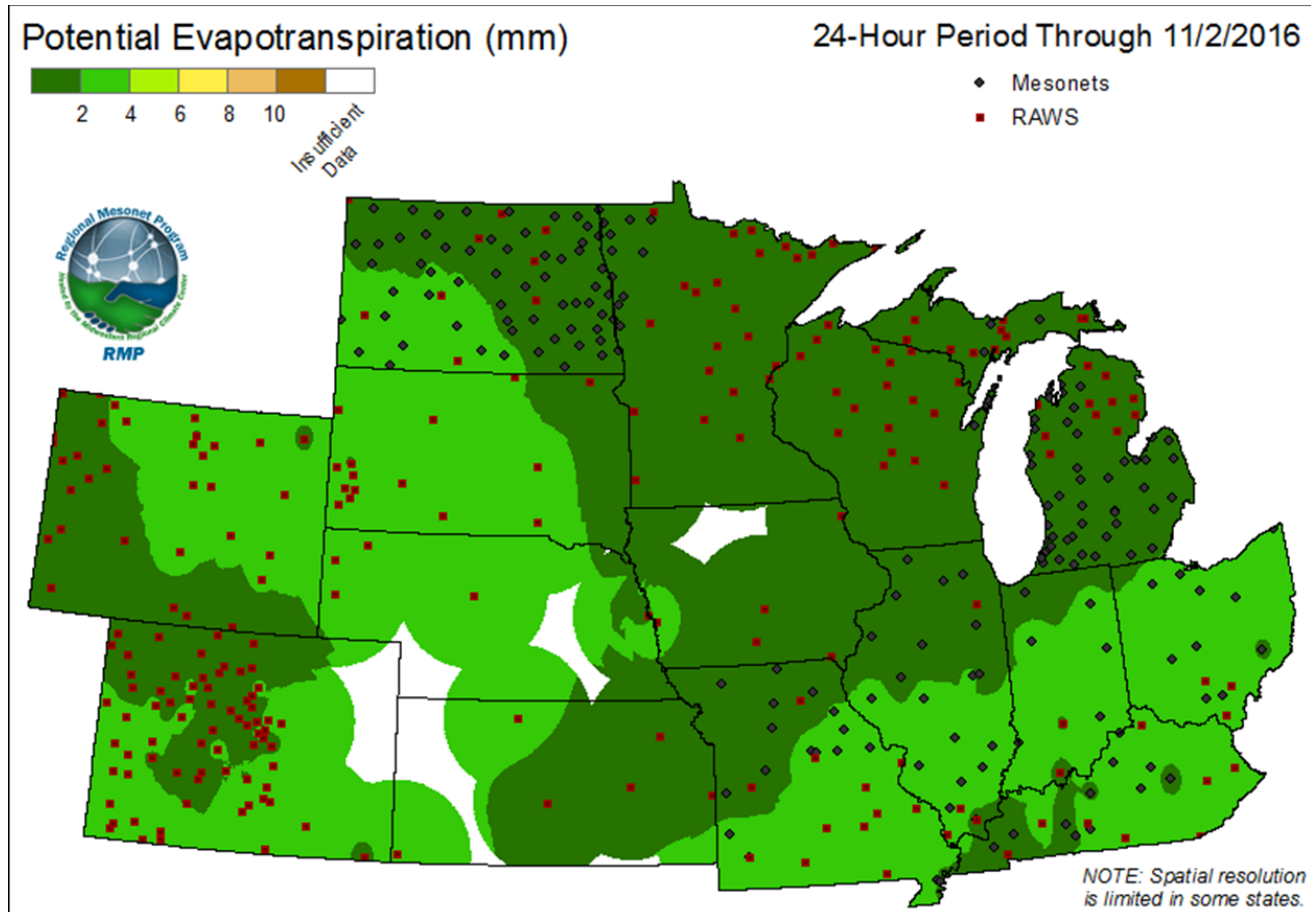


Regional Mesonet Program (RMP)





Regional Mesonet Program (RMP)





Midwest

Climate Watch

MRCC

Midwestern Regional
Climate Center

Maps & Images

Highlights & Reports

Special Topics



Partners in the Regional Mesonet Program (RMP)



The mesonet groups that are a part of Regional Mesonet Program (RMP) are from multiple states and mesonet groups. For more information on any of the state or national networks, please visit their websites.

Illinois
Climate
Network



KENTUCKY
MESONET
AT WKU

MICHIGAN
STATE
UNIVERSITY
Enviro-weather

MU
Extension
AgEBB
MISSOURI
AG WEATHER

THE
OHIO
STATE
UNIVERSITY
OARDC

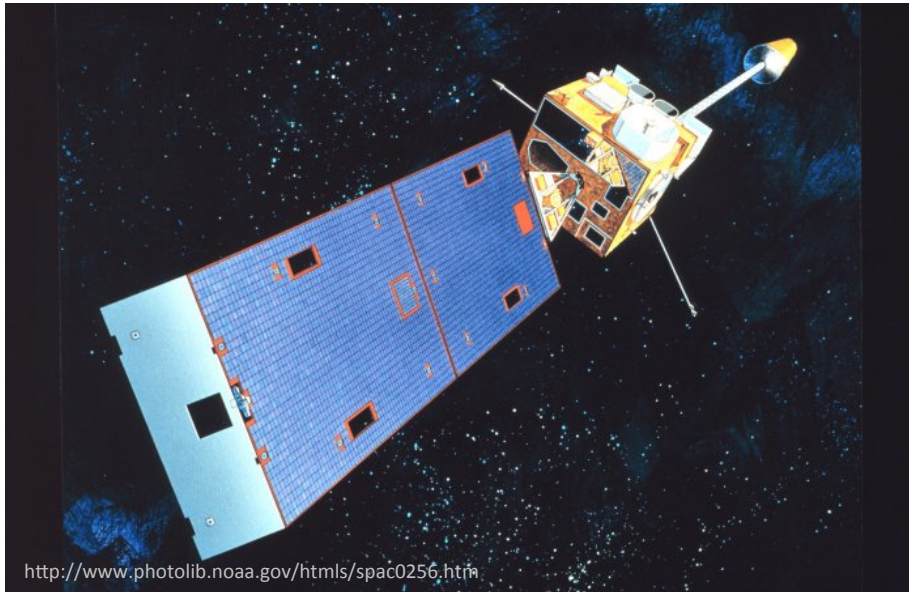
NDAWN
Center
North Dakota
Agricultural
Weather Network

NATIONAL NETWORKS: [CRN](#), [RAWS](#)

Regional Mesonet Program Partners Forum

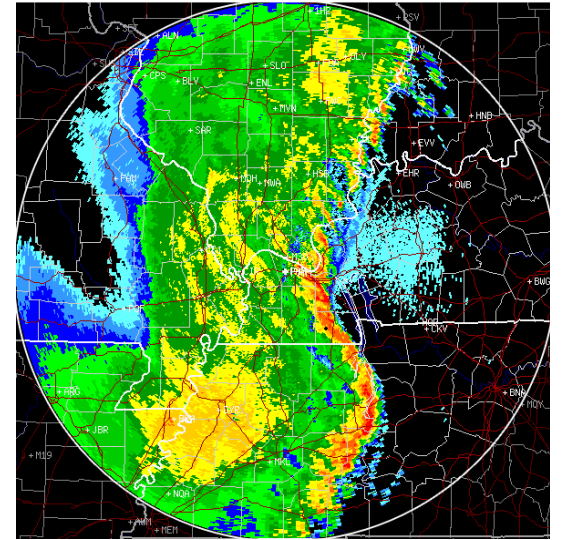
A Matter of Perspective

Geostationary Earth Observing Platforms



Remote sensing provides a bird's-eye view, while people see the world from their front porch.

Complementary Monitoring Systems



Why a mesonet?



Across the Commonwealth



Kick-off Meetings

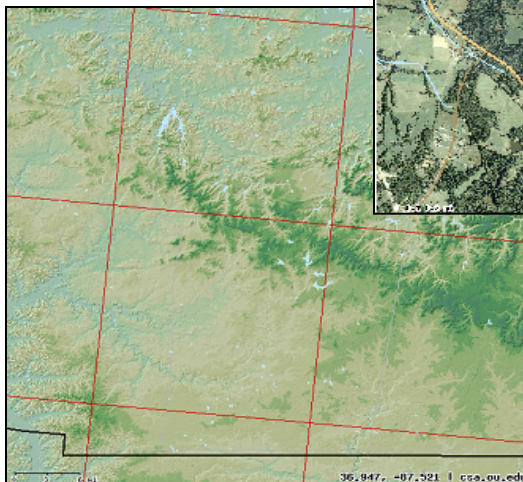


It's all about partnerships



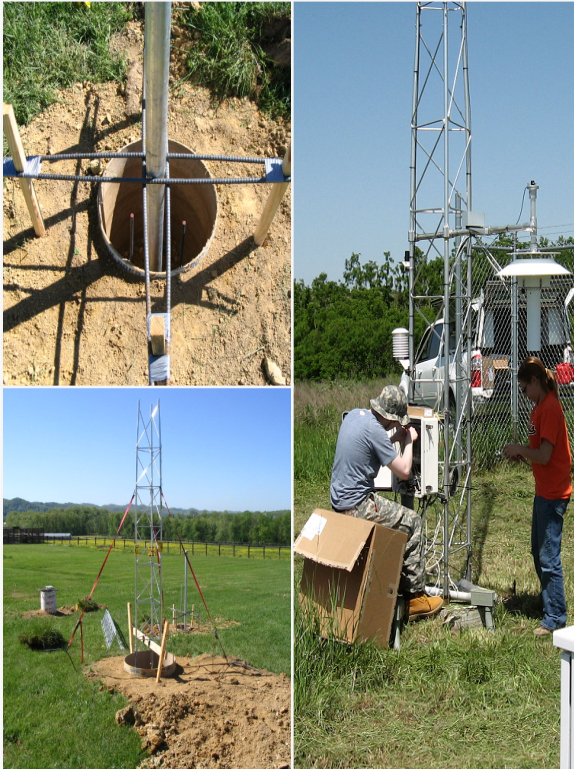
High-Quality Sites for High-Quality Data

- 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

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

Metadata Database

Equipment History

User: aquilligan

KYMN ▼

Manage Sites

Manage Equipment

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

Manage Sites

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

User: aquilligan

KYMN ▼

Manage Sites

Manage Equipment

Move Equipment At Sites

All Sites Russellville 2 W ▼

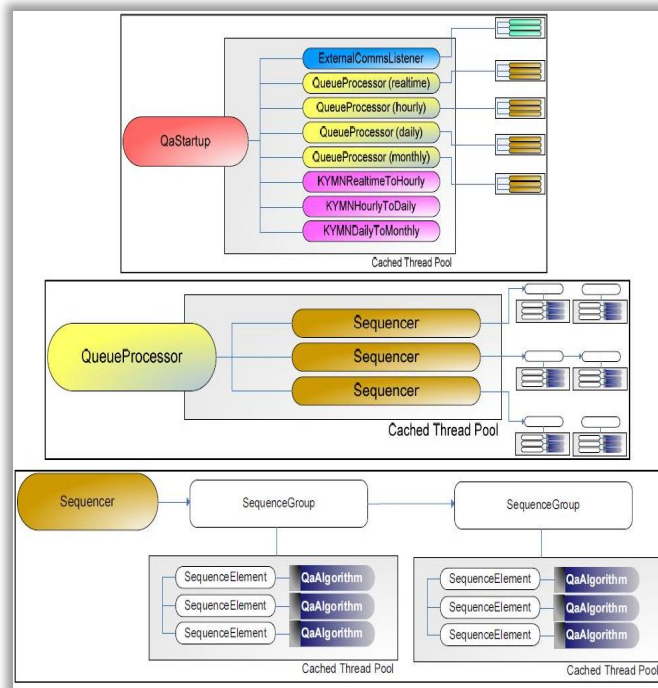
Manufacturer	Model	Serial No	Vendor	Type
AirLink	Raven Edge E3214	0638149585	Campbell Scientific	Cellular Modem
Vaisala	VRG101	B45102	Vaisala	Weighing Bucket
Campbell Scientific	CR3000-XT-SW-NB-NC	1353	Campbell Scientific	Micrologger
Thermometrics	316-125-1000CR-385-4-TL3	7	Thermometrics	PRT
Kyocera	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

Non-Collection Site Laboratory ▼

Manufacturer	Model	Serial No	Vendor	Type
Thermometrics	316-125-1000CR-385-4-TL3	134	Thermometrics	PRT
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

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

Home

About

Live Data

Summary Data

Event Tracking

Outreach



Franklin County, KY

Frankfort 7 S

Dewpoint: 70.9°F

Humidity: 65%

Precipitation: 0.00 in. (SINCE 12AM)

Wind: SE at 3 mph

83.9°

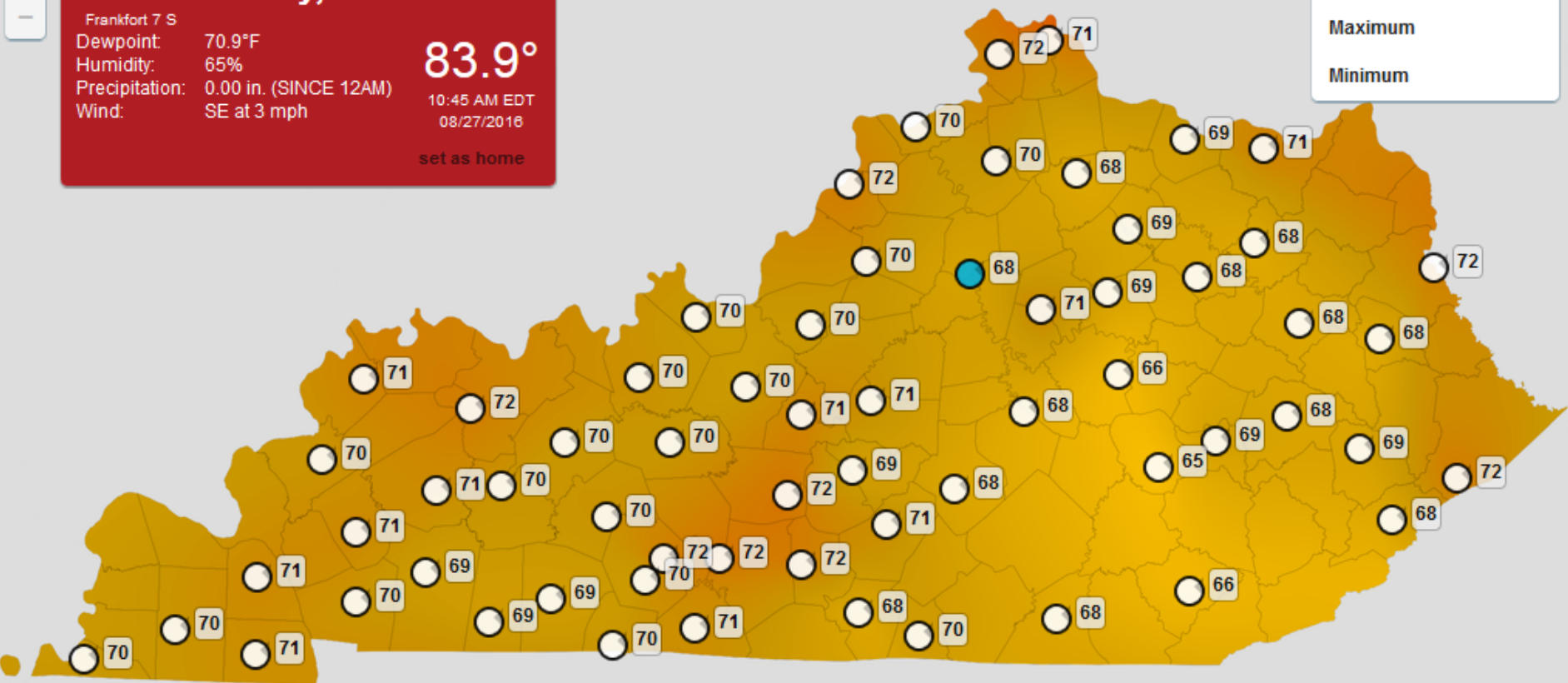
10:45 AM EDT
08/27/2018

set as home

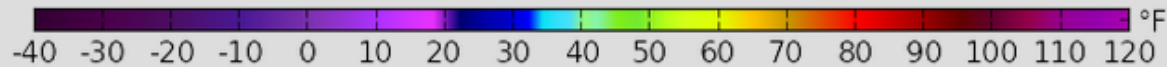
Current >

Maximum

Minimum



Air Temperature Minimum Data Points on Air Temperature Minimum Contour Map



Leaflet

Home

About

Live Data

Summary Data

Event Tracking

Outreach

+

-

Warren County, KY

Bowling Green 4 E

Dewpoint: 60.4°F

Humidity: 99%

Precipitation: 0.07 in. (SINCE 12AM)

Wind: SSW at 3 mph

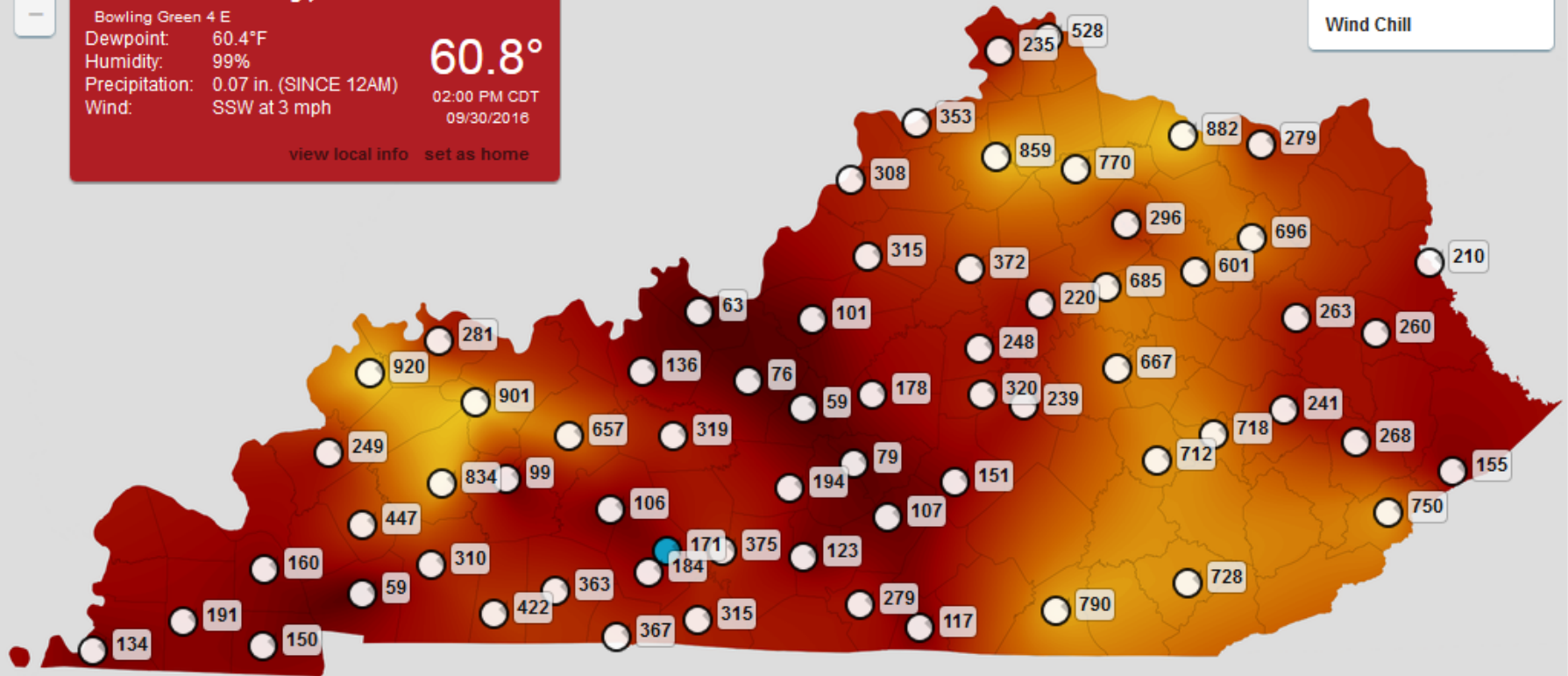
60.8°

02:00 PM CDT
09/30/2018

[view local info](#) [set as home](#)

Solar Radiation >

Wind Chill



Solar Radiation Data Points on Solar Radiation Contour Map



Leaflet

Home

About

Live Data

Summary Data

Event Tracking

Outreach

SITE

Franklin County (LSML)

TEMPERATURE GRAPHS

WIND GRAPHS

MOISTURE GRAPHS

PRECIPITATION GRAPHS

✓ PRECIPITATION AND ACCUMULATED PRECIPITATION

ACCUMULATED PRECIPITATION AND TEMPERATURE

PRECIPITATION AND TEMPERATURE

PRECIPITATION, ACCUMULATED PRECIPITATION, AND TEMPERATURE

SOLAR RADIATION GRAPHS

TIME INTERVAL

6 HOURS

12 HOURS

24 HOURS

48 HOURS

72 HOURS

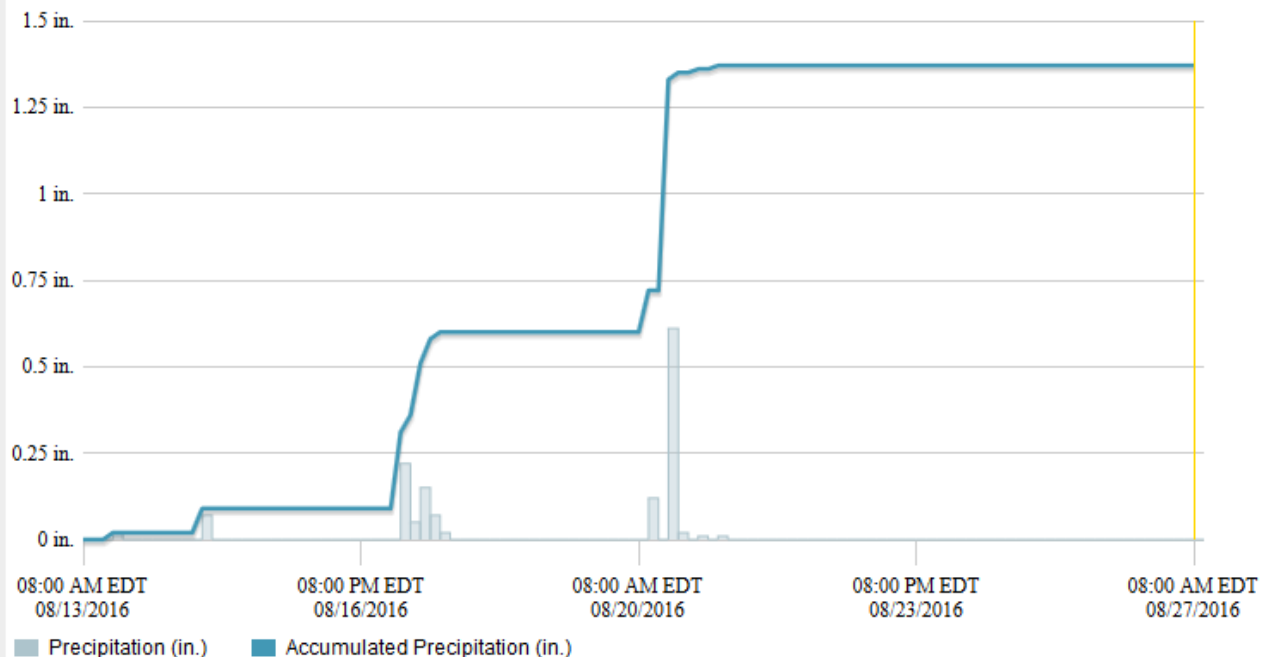
5 DAYS

7 DAYS

✓ 2 WEEKS

1 MONTH

LSML Precipitation and Accumulated Precipitation (14 Day)



Station	Franklin County, KY
Time	08/27/2016, 08:00 AM EDT
Air Temperature	69.6 ° F
Relative Humidity	100 %
Precipitation	0.00 in.
Wind Speed	0 mph
Wind Direction	57 ° (NE)
Wind Speed Max Gust	1 mph
Solar Radiation	97 W/m ²
Dewpoint	69.6 ° F

Strategic Initiatives

- Tiered public partnerships

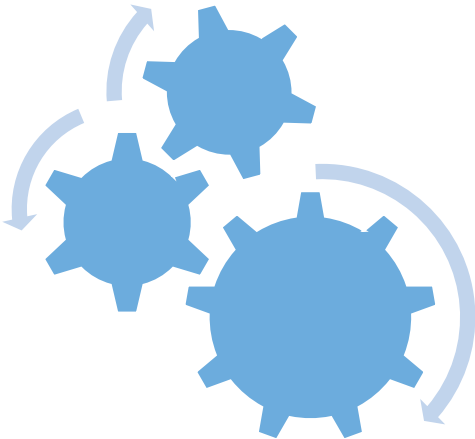
Federal, State, Local

- Advisory board

Individuals to guide and champion efforts supporting public safety and economic development

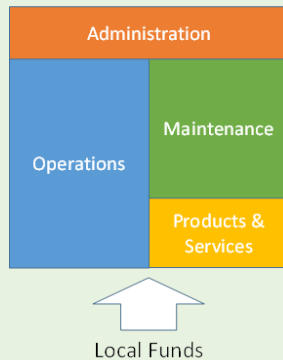
- Industry partnerships

Engage and link expertise from industry and academia for research and development of weather and climate services



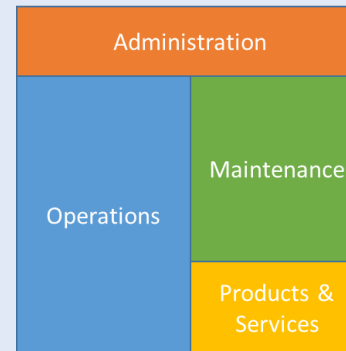
Alternative Funding Strategies

1 Bottom-Up



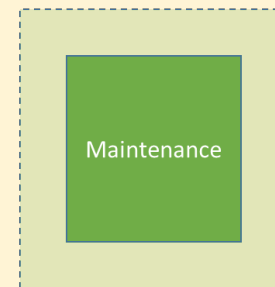
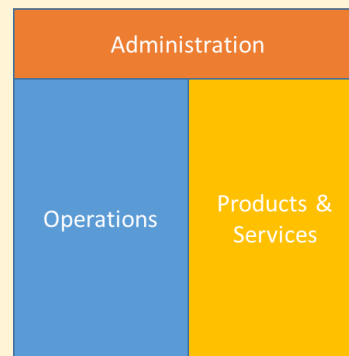
State and Federal Funds

2 Top-Down



State and Federal Funds

3 Convergent



Local Sponsorship Funds

In search of ...

Agility

&

Resilience



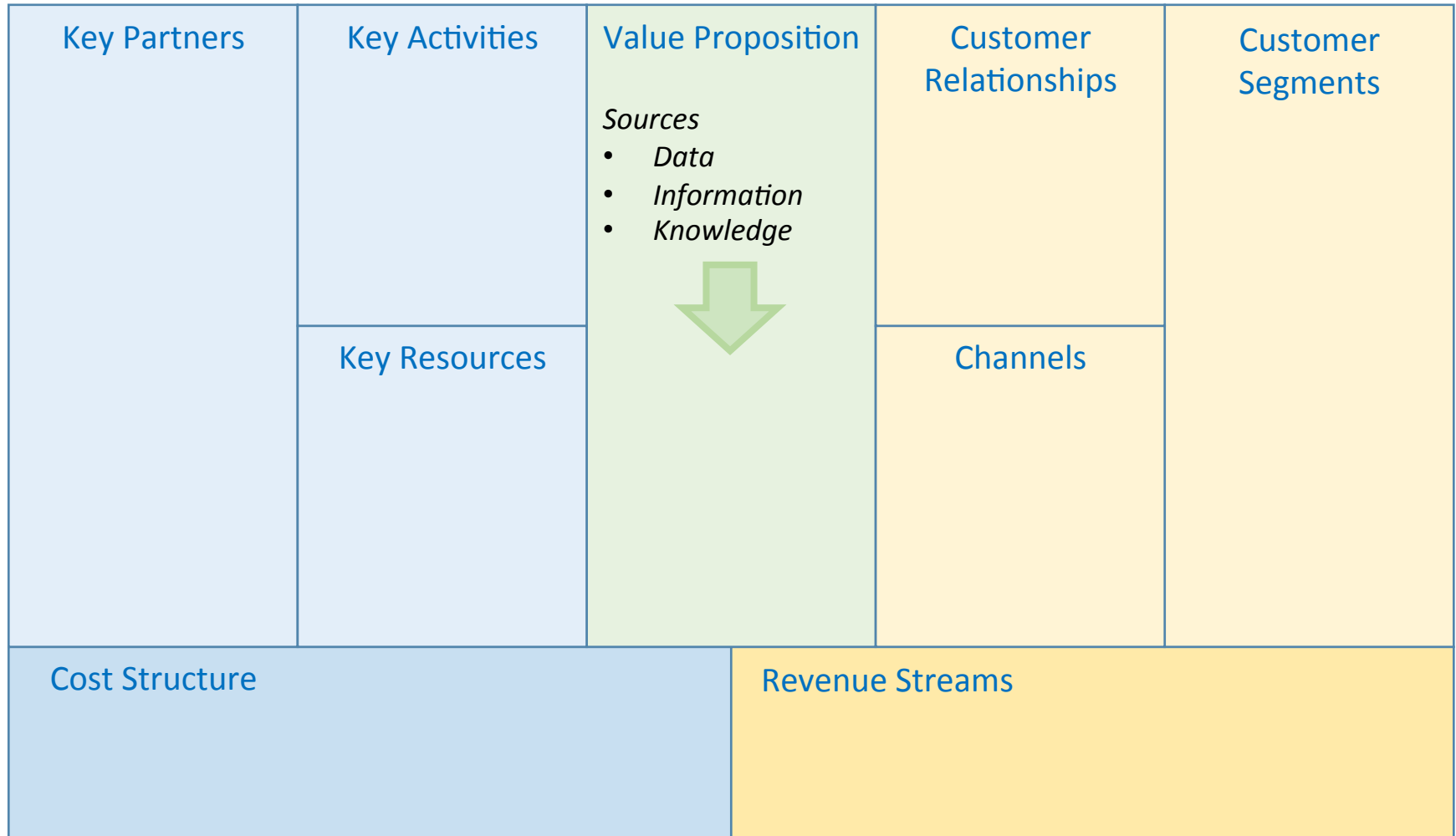
Creating Value

Places in Spaces

- Awareness
- Accessibility
- Attraction



A Business Model Canvas for Mesonet Operators



The road ahead ...



Midwest Mesonets for Climate Monitoring and Assessment Workshops

- ✓ September 28-29, 2015
- ☐ March 2016, date TBD