The Kentucky Mesonet: Past, Present, and Future

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Legislative Research Commission
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Kentucky’s Weather and Climate Monitoring Infrastructure
Getting Off the Ground

1. Approval of federal funding via National Weather Service
2. State recognition via SJR 228
3. Kickoff meetings at ADDs across the state
Kentucky Mesonet Infrastructure across the Commonwealth

Graves County, KY

Morgan County, KY

Carroll County, KY

Pike County, KY
Vertical Integration of the Kentucky Mesonet

- Test and calibrate instruments
- Install and maintain instruments
- Quality assure and disseminate data
- Archive data and system metadata
Station Instrumentation

Standard Instrumentation
- Air temperature
- Precipitation
- Leaf Wetness
- Solar radiation
- Relative humidity
- Wind speed & direction

Base Infrastructure
- Datalogger controls station operations
- Cellular modem enables 2-way communication via AT&T
- Batteries are trickle-charged via solar or AC power

Supplemental Instrumentation *
- Soil moisture & temperature
- Barometer
- Camera
- Multi-level temperature

* Tier II stations are in the process of being developed. Some sites already have all listed instrumentation.
Station Maintenance

- Spring, summer, and fall site maintenance passes to maintain station network infrastructure
  - Check and clean instrumentation
  - Periodically swap out instruments and replace batteries
  - Cut vegetation
  - Take site photographs
- Respond to “trouble tickets” when QA reports require unscheduled site maintenance visits
Metadata Database

- Inventory of all scientific instrumentation, including serial numbers, deployment sites and dates, and calibration history
- Record of visits to all sites for both regular maintenance and trouble tickets.
Quality Assurance

Over 200,000,000 data values are collected, processed, and archived each year across the network.

- Automated QA processes run on data every five minutes as they are collected from remote sites

- Manual QA is performed on a daily basis to provide expert assessment of system performance and issue “trouble tickets”
Tiered Funding Model

Leveraging State Investment

Local Sponsorships
Station Maintenance

State Appropriation
Network Operations Center & Local Matching for New Stations

Federal Grants
Instrumentation & Applied Research/Services

Public-Private Partnerships
Local Partnerships

• **Standard Station Installation Agreement**
  – Estimated station cost: $25,000
    • Local sponsor’s portion: First $15,000
    • Mesonet match: Remaining $10,000

• **Sponsorship Agreement**
  – Annual contribution up to $5,000, but currently $3,000
  – Supports cost of maintaining station
  – Priority site for instrumentation enhancements

• **Site License Agreement**
Kentucky Mesonet Outreach Applications

- Kentucky DEWS
- Public Health
- Custom Forecast Model
- Phone App
- Temperature Inversion
- Kentucky Mesonet Outreach Applications
Temperature Inversion Monitoring System
Experimental Project Supported by USDA Midwest Climate Hub

- Multi-level temperature measurements (1.5’, 6’, and 10’) help to determine when the potential for a temperature inversion is high.
- Farmers can determine when conditions are right for applying chemical treatments to crops.
- The monitoring system is being installed at 6 sites.
- Results will be evaluated to determine whether to invest in monitoring at additional sites.
The Kentucky Drought Early Warning System

Proposed scope of work integrates four key themes:

- Data Collection
- Information Extraction
- Messaging
- Communication

Projected timeline:
Two-year project beginning in Summer of 2018.
Vegetation Health Indicator
Experimental Project for Drought Impact Monitoring

Visual imagery to document landscape condition

Infrared imagery to document vegetation health through NDVI
Takeaways

• A world-class infrastructure benefitting rural and urban communities across Kentucky
• Enhancing public safety in partnership with the National Weather Service
• Strengthening economic competitiveness and development of weather-sensitive industries
• Leveraging state funding through local partnerships and federal grants
• An opportunity to grow Kentucky’s knowledge economy through R&D partnerships