KENTUCKY MESONET

The Kentucky Mesonet: Monitoring Weather and Climate across the Commonwealth

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Louisville, Kentucky
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Outline

- Background
- Design
- Instrumentation
- Information technology
- Analysis and modeling

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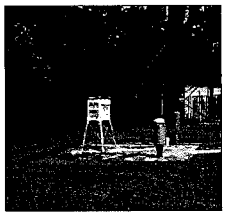
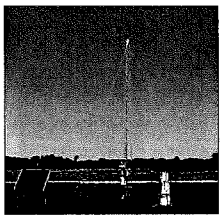


Observations collected every 5 minutes, 24 hours a day, 365 days a year and available in near real time

Observations collected once a day and often not available for four months



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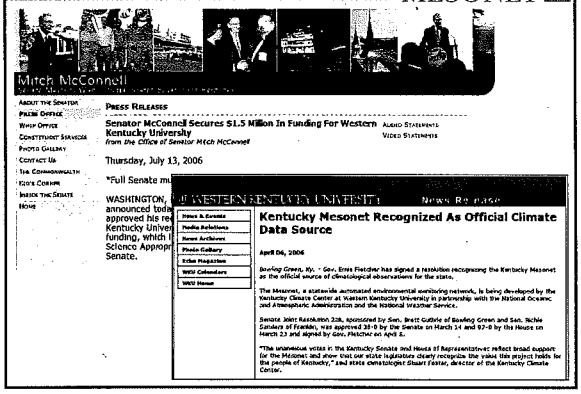

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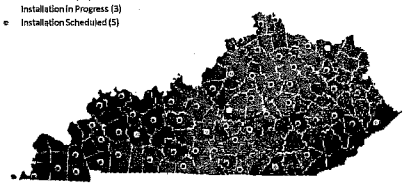
Kentucky Mesonet Status Map

- Active Station (48)
- Installation in Progress (3)
- Installation Scheduled (5)



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Design Principles

- Quality
- Reliability
- Scalability

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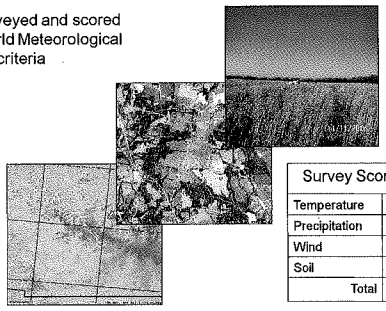
Site Selection Activities

Sites and surveyed and scored based on World Meteorological Organization criteria



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

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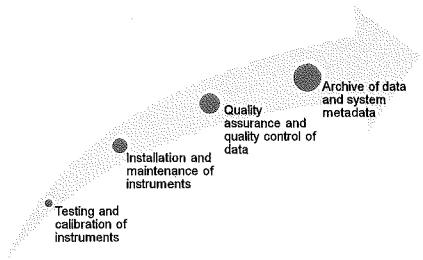
Vertical Integration



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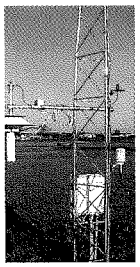
Station Configuration



Sensor Package
- Air temperature
- Precipitation
- Wetness
- Solar radiation
- Relative humidity
- Wind speed and direction
- Soil moisture and temperature (selected sites)

Integrated IT Infrastructure
- Datalogger
- Cellular digital modem

"A scalable infrastructure for environmental monitoring that reaches across the Commonwealth"

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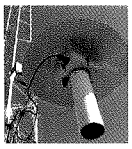
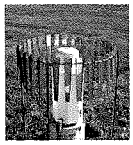
Temperature and Precipitation Sensors

Air Temperature
- Sensors
  - Thermometrics PRTs
  - Met One aspirated shield
- Quality Control
  - Redundant sensors
  - Laboratory calibration using Fluke 7380 temperature bath





Precipitation
- Sensors
  - Vaisala VRG101
  - Vaisala DRD11A wetness sensor
- Quality Control
  - Intelligent rim-heating
  - Alter shield
  - Field calibration using Vaisala calibration kit

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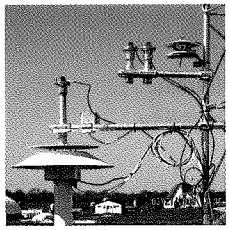
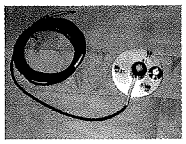
Solar Radiation Monitoring



- Field calibration
  - Pre-installation
  - Post-installation



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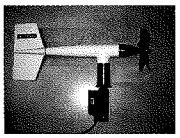
Wind Monitoring

- Site selection criteria
- Measured at 10 meters
- Variables
  - Maximum, 3-second
  - Minimum, 3-second
  - Mean, 5-minute



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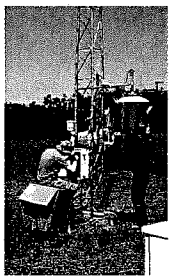
Station Installation and Maintenance

- Technicians install stations and instrumentation
- Technicians make spring, summer, and winter maintenance passes
- Technicians respond to "trouble tickets" when QA processes indicate problems



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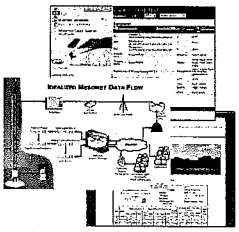
Information Technology

- Efficient and reliable communications for collecting environmental data
- Integrated databases for meteorological data and system metadata
- Thorough quality assurance and quality control procedures
- Flexible systems for delivering data and information products



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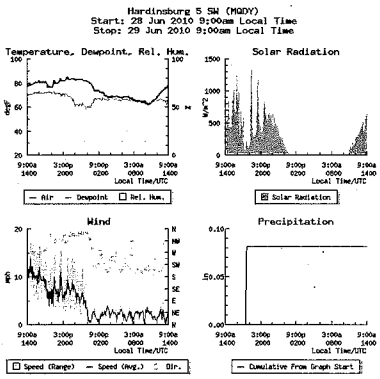

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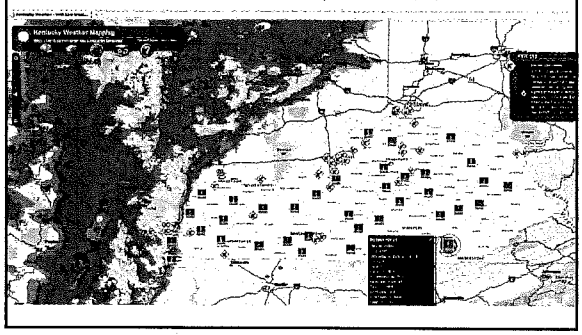
Kentucky Weather Mapping

Commonwealth Office of Technology, Division of Geographic Information



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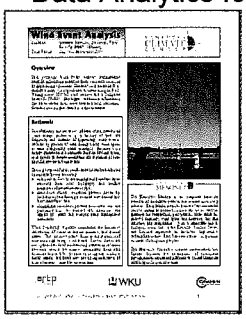
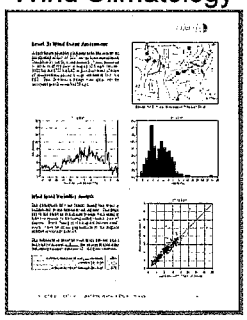
Data Analytics for Wind Climatology





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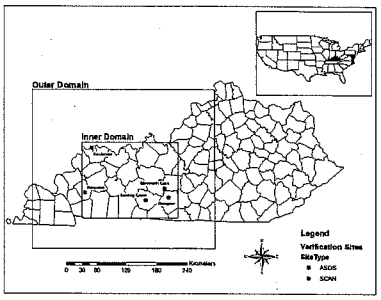
Model Initialization and Verification



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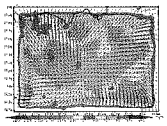
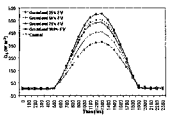
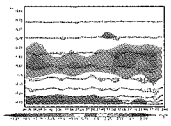
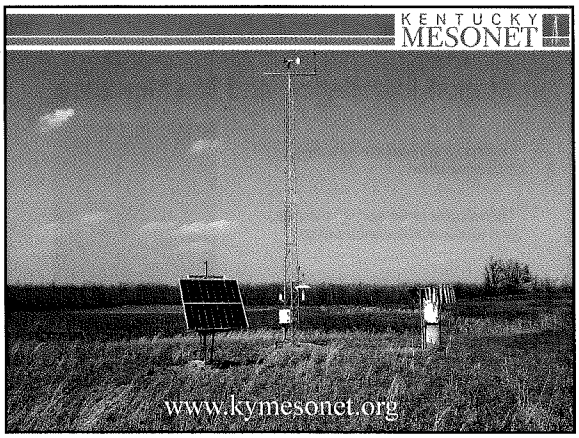
Model Applications

- Meso-scale Models
  - WRF
  - MM5
  - RAMS
- Application scenarios
  - Forecasting
  - Event analysis
  - Climate change



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