Monitoring for Extreme Climatological Impacts on Vegetation – The MRCC’s Vegetation Impact Program

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Motivation

- **2007 spring freeze in early April**
  - $2 Billion in damages
  - Late in season for the southern US
  - Not late in Midwest, but followed a warm March

- **2009 delayed maturity of crops**
  - Wet spring delayed planting
  - Cool summer (especially July) slowed crop maturity
  - Late harvest so more susceptible to freeze damage

- **NWS needs**
  - Environmental monitoring tools
  - Communication between offices
  - Communication with vegetation experts
NWS Recommendations

Analysis of 2007 Freeze event...

• NWS services and communication were good overall

• Recommendations for future:
  • Base freeze warning / headlines on potential impacts to agriculture, horticulture, nurseries, and home gardens rather than calendar dates
  • Develop and utilize ties with University Extension, state climatologists, USDA personnel, and other relevant partners to:
    • Determine when freezing temperatures are a threat
    • Gather quality, detailed post-event impact information for regional reports and even documentation (i.e., storm reports, drought monitor)
• **Relationship** with NWS, SCs, University Extension, vegetation stakeholders

• **Monitors and Assess** regional climate conditions and their impacts

• **Provides high-quality, operational climate data, tools, resources** for the region and sector

• **“Neutral” party** between partners
The end goal

A one-stop shop for Frost/Freeze products and forecasts

- Daily Products ✅
  - Many in production and operational or in beta phase

- Incorporate hourly data ✅
  - Duration of freeze at an hourly time step

- Incorporate hourly forecasts
  - View and prepare for upcoming forecasted freezes

- Reporting
  - Along the lines of storm reports and drought monitor
    - Input from NWS, University Extension, etc... on status of crops and susceptibility for a freeze
    - Reports of freeze impacts
Current Products - Daily

Date of First 28°F Freeze since 8/1
As of 3/18/2016

Accumulated Growing Degree Days (base 50°F) Since Most Recent 28°F Freeze
As of 3/18/2016

MRCC Experimental Freeze Guidance:
These experimental maps may be utilized as a guide to local and regional freeze conditions but should NOT be used by themselves for decision processes.
## Growing Season Summary
**PADUCAH BARKLEY RGNL AP (KY)**
**USW00003816**
**1981 - 2010**

### Probability of Later Date in Spring Than Indicated

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<th>Temperature</th>
<th>Earliest</th>
<th>90%</th>
<th>80%</th>
<th>70%</th>
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<th>40%</th>
<th>30%</th>
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### Probability of Earlier Date in Fall Than Indicated

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### Probability of a Longer Than Indicated Freeze Free Period (days)

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</table>
Current Products – Expert Input

Freeze Advisory Status per NWS input
as of 8:00 AM CDT on 6/9/2014

Note: For more detailed information on input reports, please use the GIS interface:
http://mrcc.isws.illinois.edu/gismaps/freeze/freeze_guidance.html

Freeze Advisory Status per non-NWS input
as of 8:00 AM CDT on 6/9/2014

Note: For more detailed information on input reports, please use the GIS interface:
http://mrcc.isws.illinois.edu/gismaps/freeze/freeze_guidance.html

MRCC Experimental Freeze Guidance:
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Currently have a listserv populated with 200+ experts

- State Climatologists
- NWS Forecasters
- University Extension
- NCDC and the RCCs

Ever expanding

- Private sector (e.g., Master Gardeners, growers, farmers)
- USDA
Registered Subscribers to ViP by state as of 3/21/2016

249 members in 29 states
Recent Enhancements

- Bigger domain
  - *Products are now national*

- Combine spring and fall
  - *Separate seasons in Midwest but not in South*

- Incorporate hourly data
  - *Information about hours below freezing*

- [Future plan] Integrate digital forecast data
  - *Map susceptibility vs. Risk*
Birth of “VIP”

- **Demand for more than just frost/freeze monitoring**

- **Partnership with mesonets for more diversified tools**
  - Disease
  - Pests
  - High Resolution

- **Stress Degree-Day Tools; Chilling Hour monitoring**

- **Keetch-Byram Drought Index**

- **VIP – Vegetation Impact Program**
  - Climate monitoring of vegetation impacts
  - Partnership between:
    - MRCC / RCC
    - NWS
    - SCs
    - University Extension
    - Private Sector
    - USDA
Accumulation of hours throughout dormant season within an ideal temperature range

Accumulated Chilling Hours (Between 35°F and 45°F)
September 1, 2015 through March 17, 2016

Accumulated Chilling Hours Departures (1998/99-2012/13 Average)
September 1, 2015 through March 17, 2016
When temperatures get too warm, corn growing process shut down.
Keetch-Byram Drought Index

Daily updated drought index based upon temperature and precipitation
Demand for ...

- Improved communication between experts
- Operational monitoring tools to minimize impacts
- High resolution climate and forecast tools