

# **AgroClimate** : Climate Tools and Information for the Southeast USA

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Clyde Fraisse

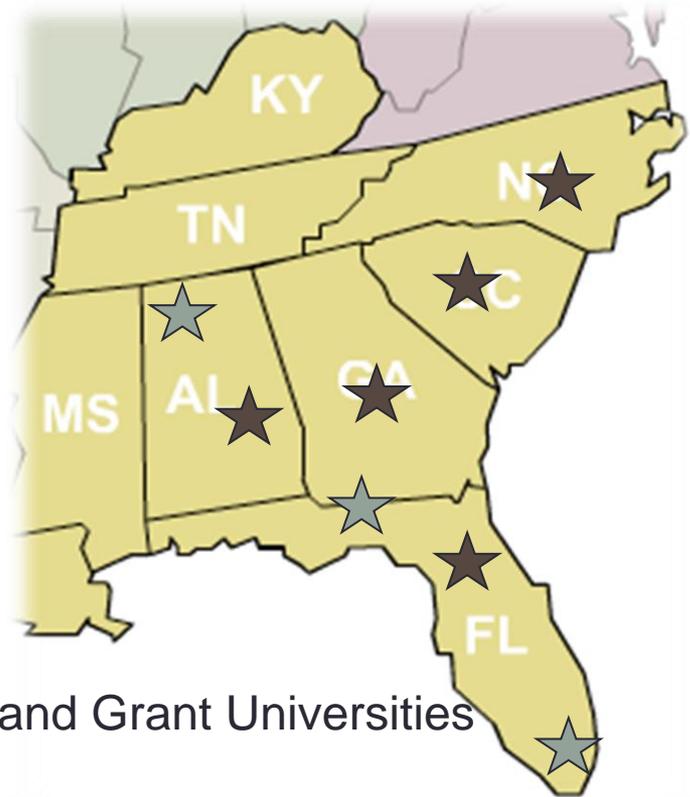
Agricultural and Biological Engineering

University of Florida



# The Southeast Climate Consortium

- Auburn University
- Clemson University
- Florida State University
- North Carolina State
- University of Alabama Huntsville
- University of Florida
- University of Georgia
- University of Miami



★ Land Grant Universities

# AgroClimate & Big Data



- Too much climate data is never enough; depending on the application, it normally lacks spatial and/or temporal resolution.

# AgroClimate & Big Data

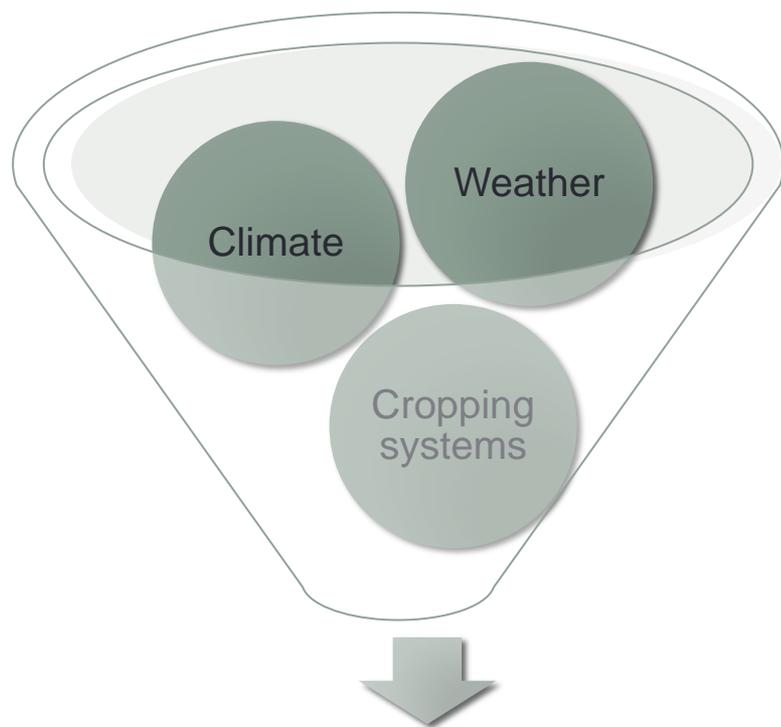


- Too much climate is never enough; depending on the application, it normally lacks spatial and/or temporal resolution.
- The challenge is to process data, produce and deliver **useful** information in a **timely** and friendly manner; this is where we feel overwhelmed!

# AgroClimate & Big Data



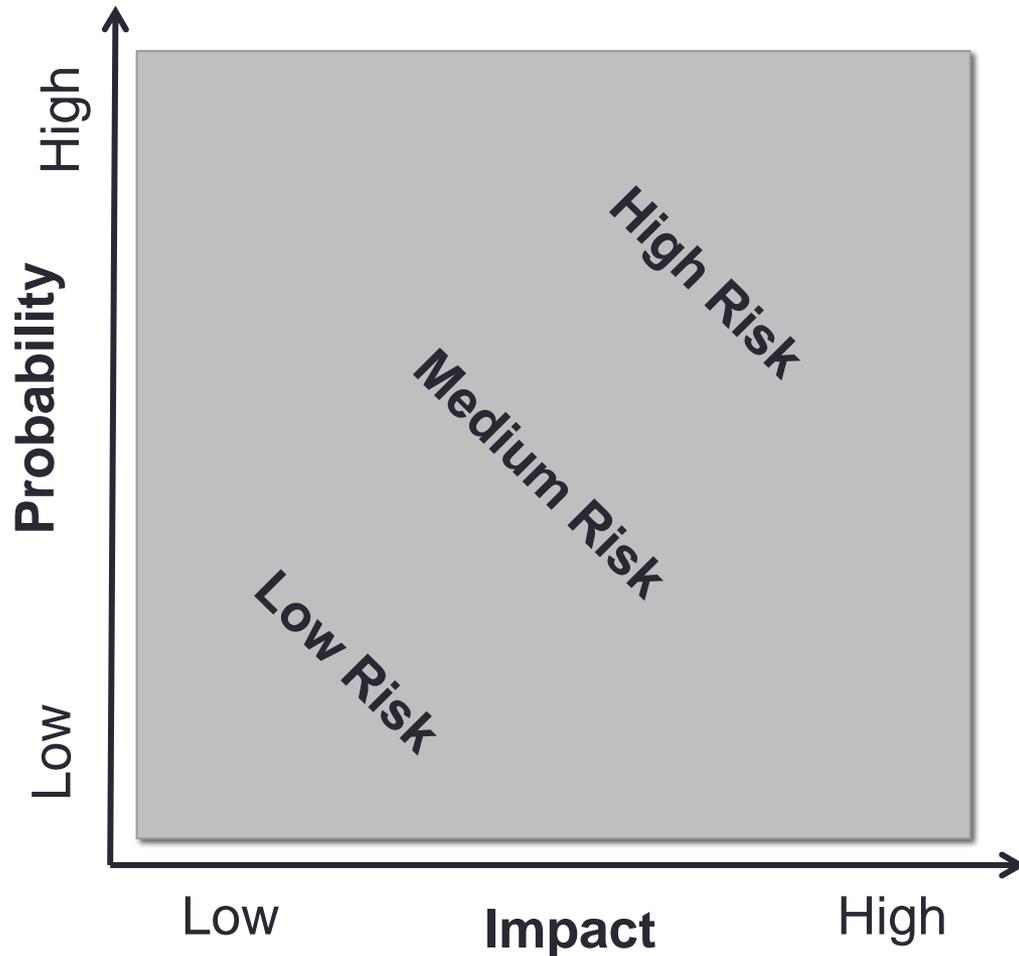
- To much climate data is never enough, it normally lacks spatial and/or temporal resolution depending on the application
- The challenge is to process data, produce and deliver useful information in a timely and friendly manner; this is where we feel overwhelmed!
- Sensors need regular maintenance and calibration, and they must be properly located and installed; **wrong data** is worse than no data!



Better decisions, reduced production risk, increased profitability, and more sustainable systems

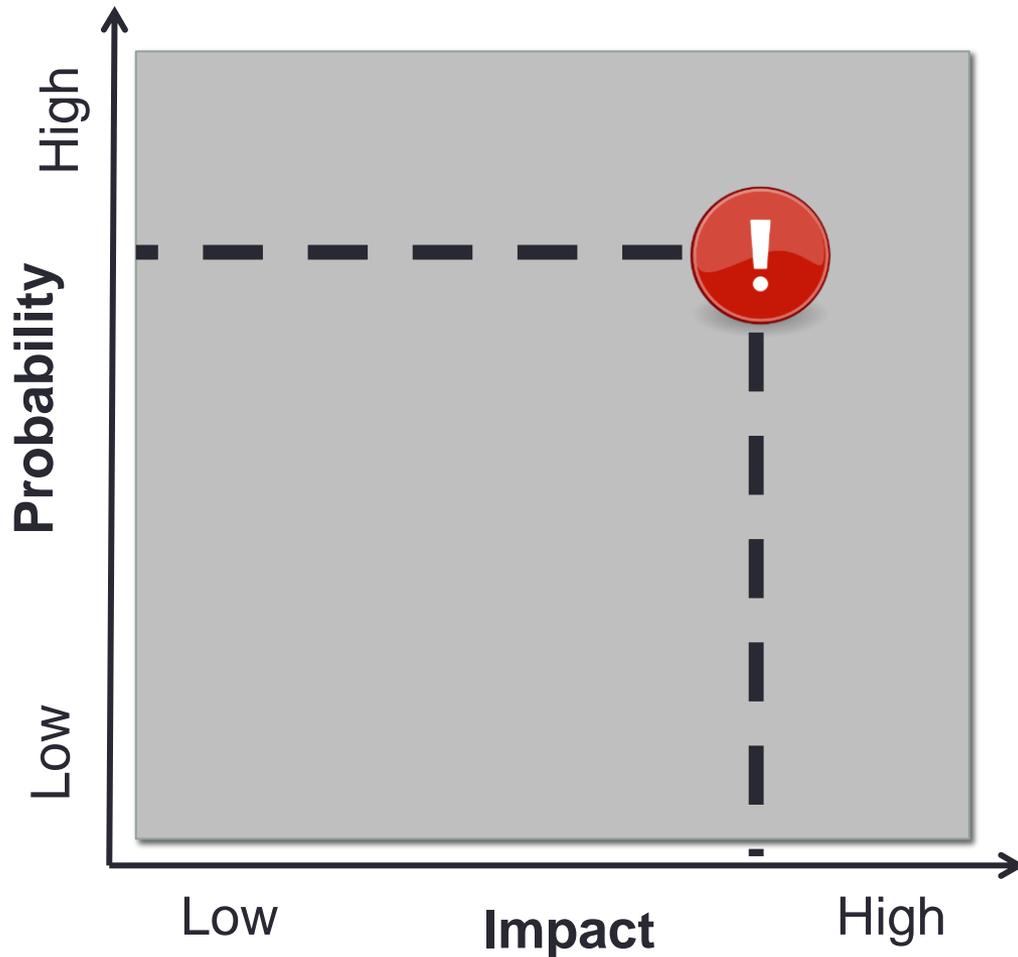
- Developed and operated under our climate extension and applied research program in cooperation with the SECC
- Dedicated to **translate** climate and weather data/information into decision aids to help farmers reduce **risk**

# Risk = Probability x Impact

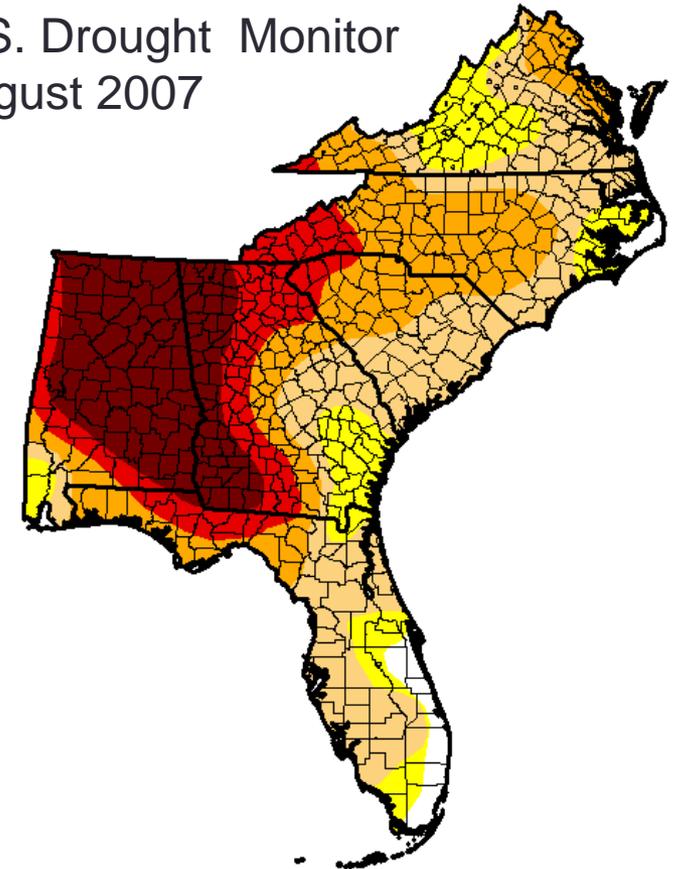


Summer 2013, Jackson County, FL

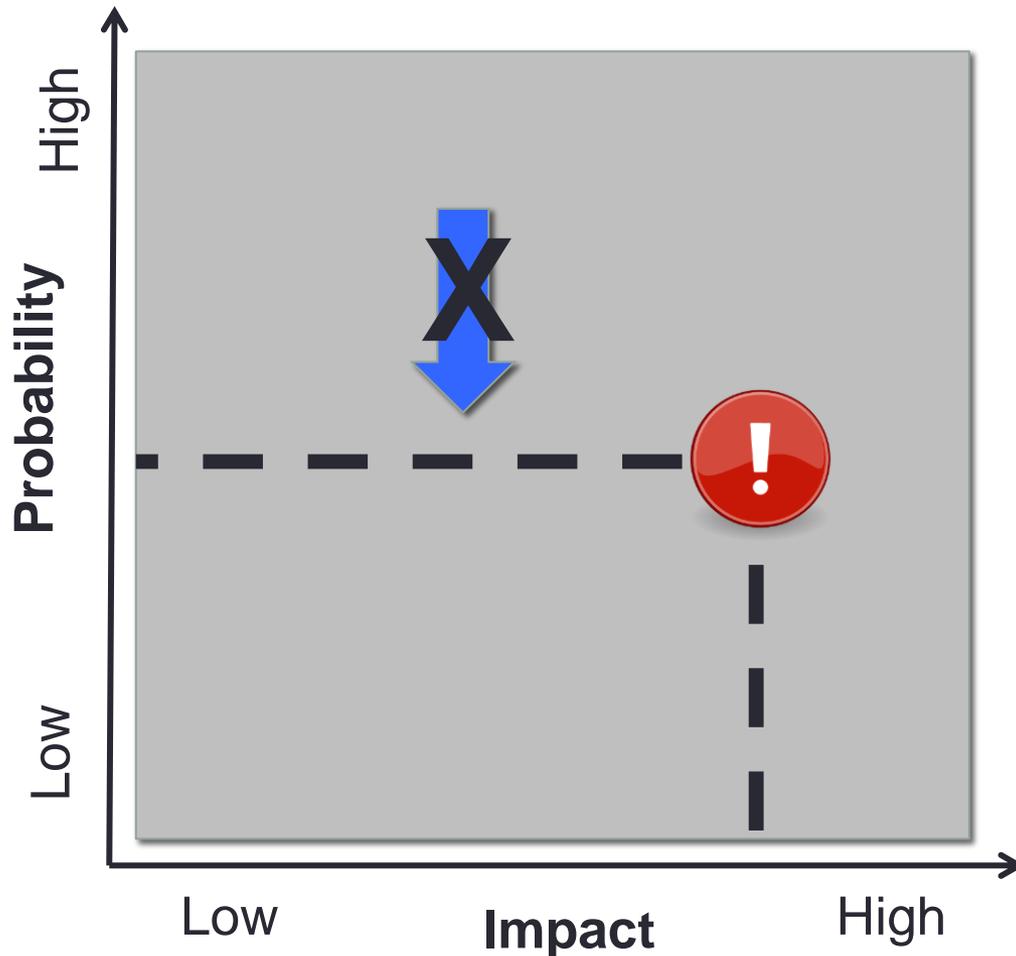
# Risk = Probability x Impact



U.S. Drought Monitor  
August 2007

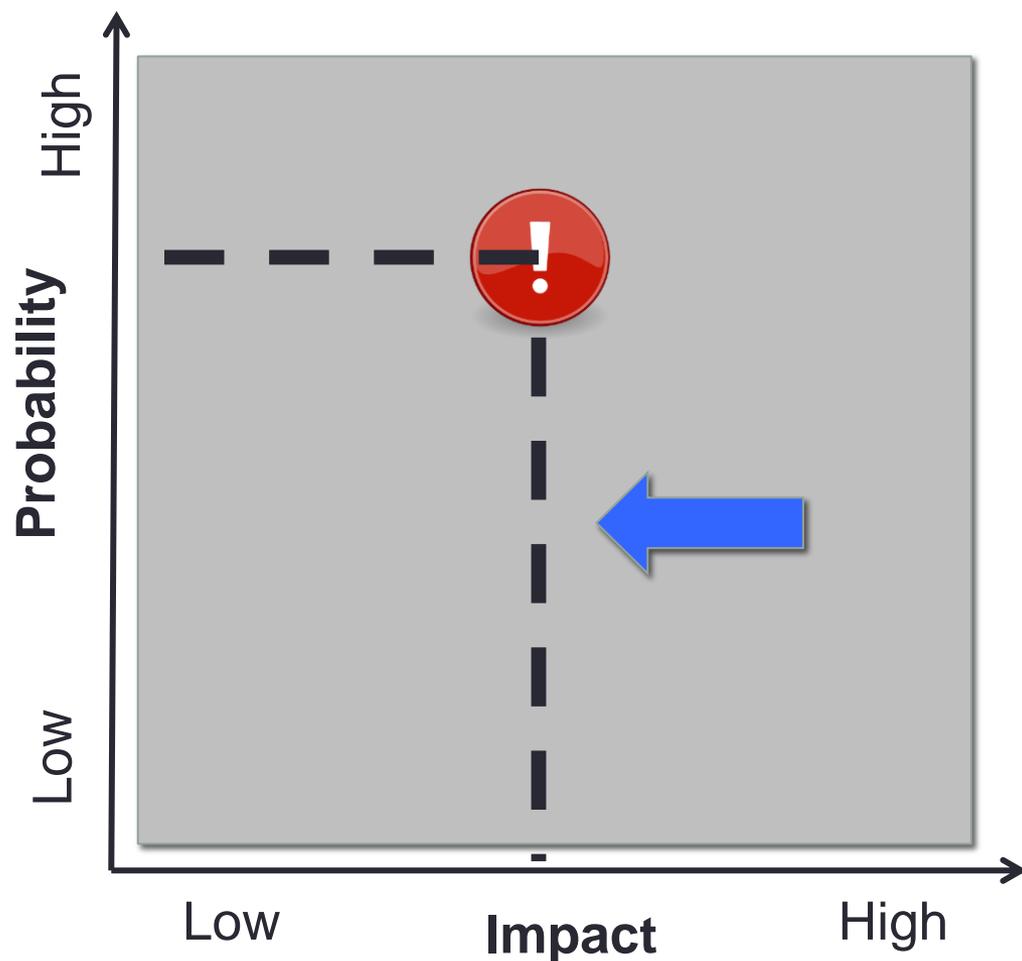


# Risk = Probability x Impact



- We can transfer the risk by buying crop insurance but we can't decrease the probability of extreme events!
- Or can we in the case of long-term climate projections?

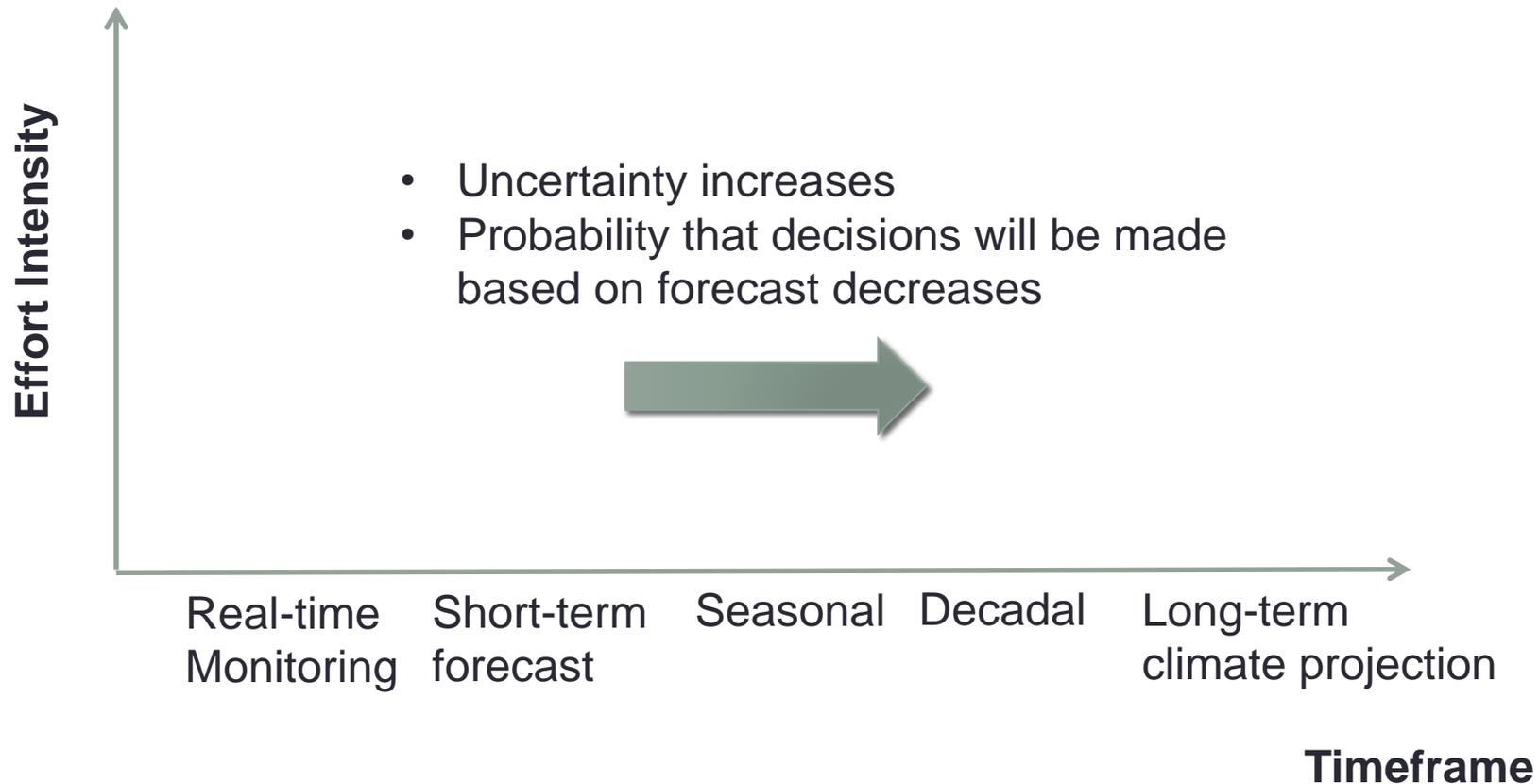
# Risk = Probability x Impact



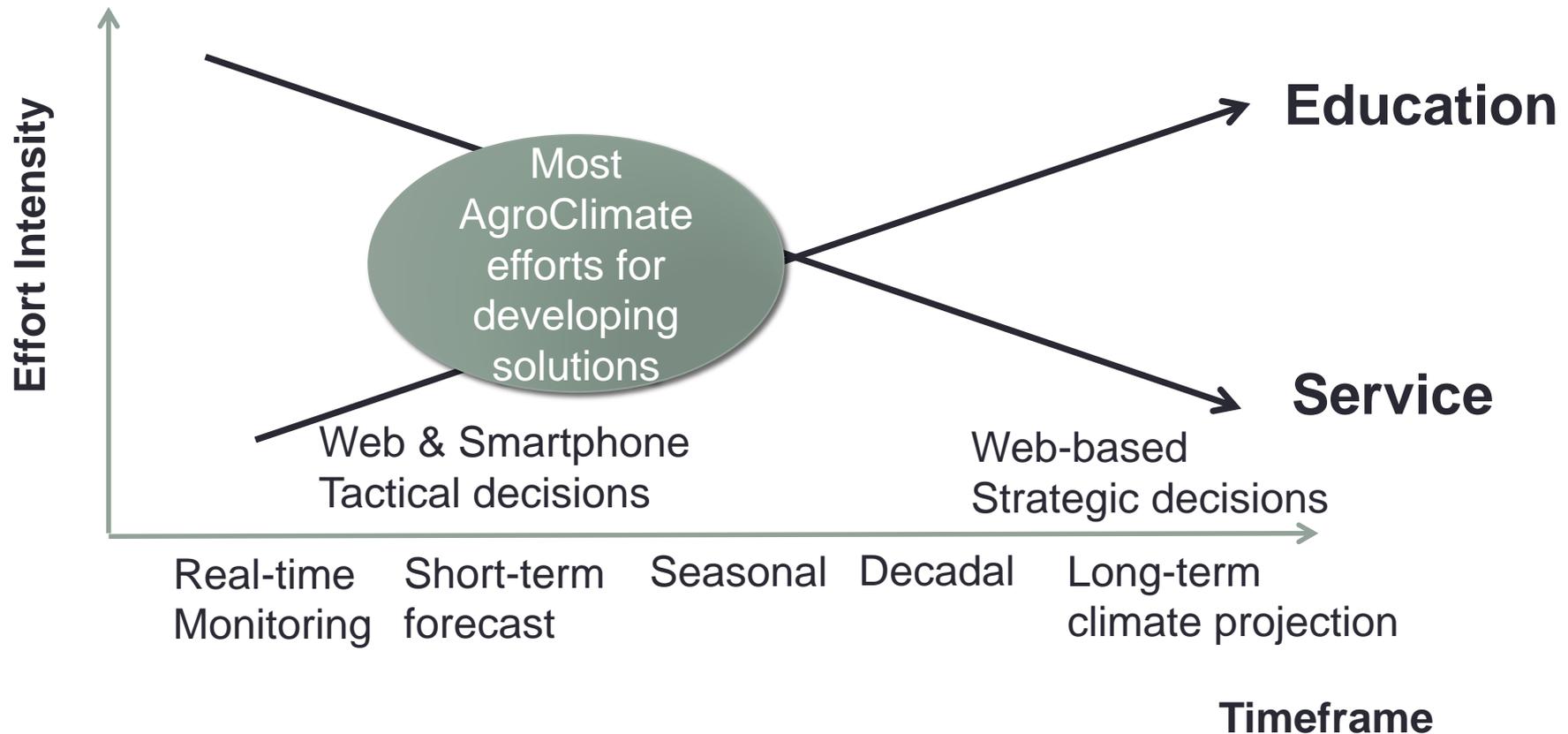
## We can reduce impacts!

- Increase climate literacy of producers, extension faculty, crop consultants
- Better evaluate impacts on crops and livestock (models, what if scenarios)
- Improve soil quality (medium term planning, increasing soil carbon, thus ability to hold water)
- Install irrigation systems
- Adapt:
  - Plant a different crop/variety and/or shifting planting dates
  - Adjust fertilizer rates (soil fertility will not be the limiting factor)

# AgroClimate has a Dual-Purpose: **Education and Service**



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# AgroClimate.org

- Started in 2005: USDA-Risk Management Agency funding
- Intended audience: Extension professionals, crop consultants, and producers
- Tools and information based on real-time monitoring, short-term and seasonal forecasts (El Niño Southern Oscillation – ENSO)
- Information on management practices to reduce risk and increase resource use efficiency



<http://agroclimate.org>



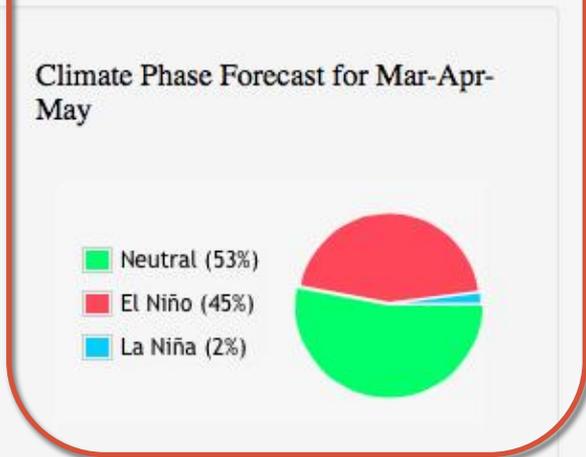
- Home
- Tools
- Forecasts
- State Summaries
- Management
- Climate
- Extension
- Video
- About

# Chill Hours Calculator

Monitor Chill Hour accumulation based on your nearest weather station

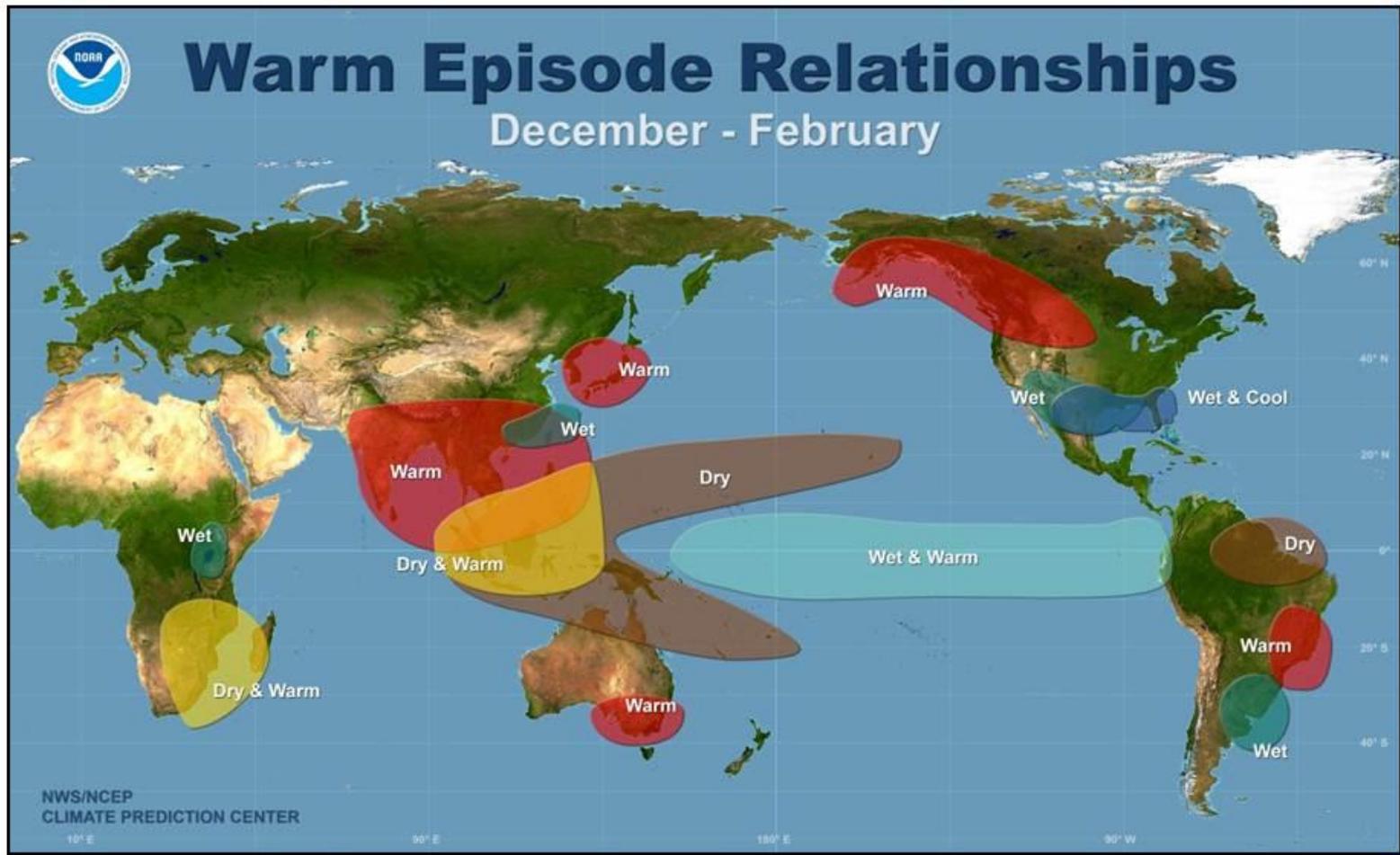
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**Current Climate Phase: Neutral**  
El Niño watch issued



Provided by the International Research Institute for Climate and Society

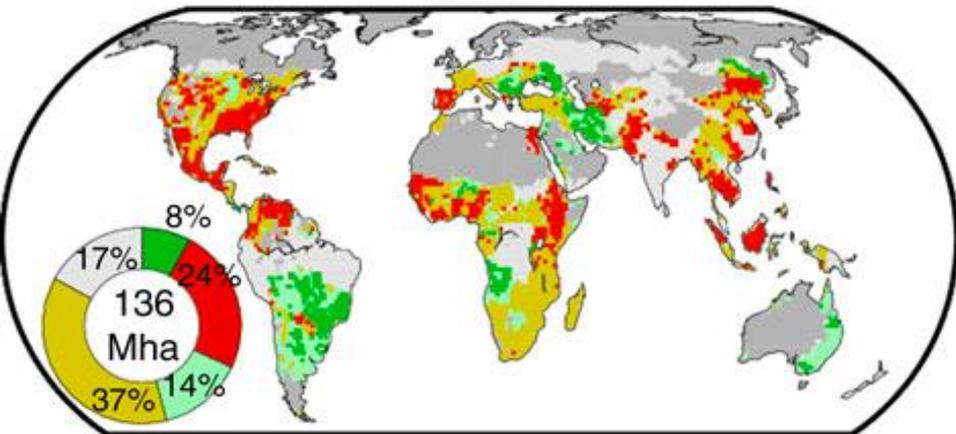
# El Niño – Global Effects



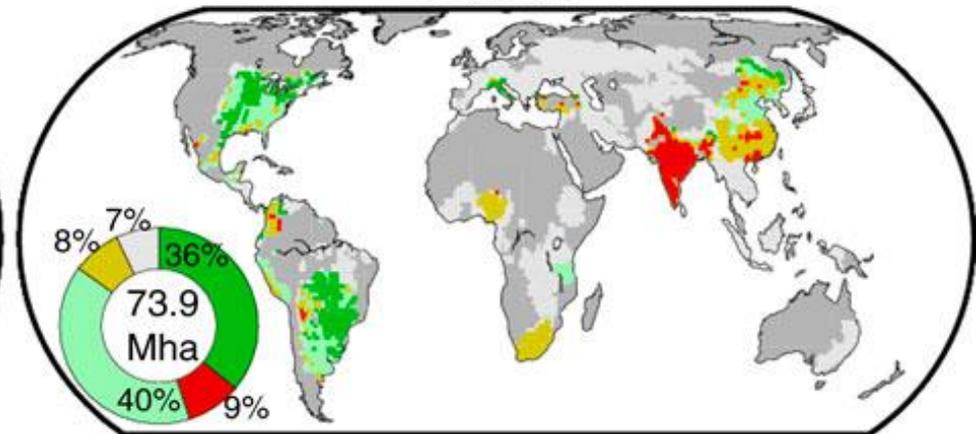
Source: NOAA – El Niño theme page: <http://www.pmel.noaa.gov/tao/elniño/impacts.html>

El Niño minus neutral

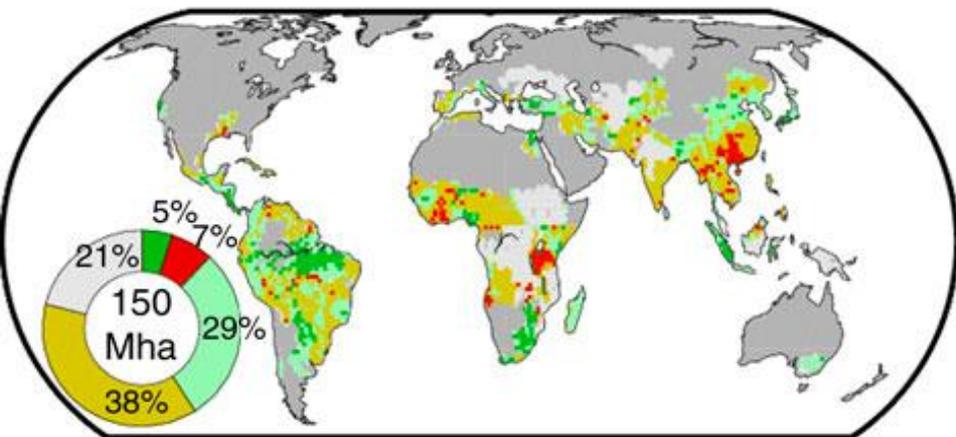
Maize



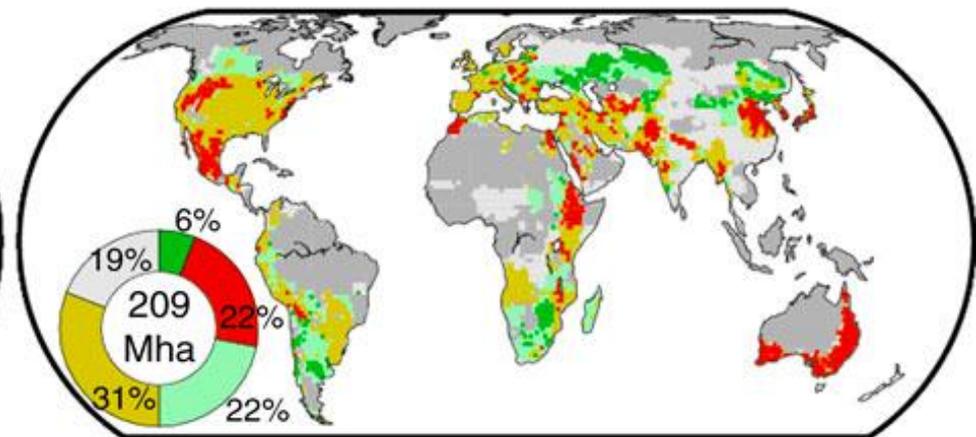
Soybean



Rice



Wheat



■ Significant-positive impacts  
■ Insignificant-positive impacts

■ Significant-negative impacts  
■ Insignificant-negative impacts

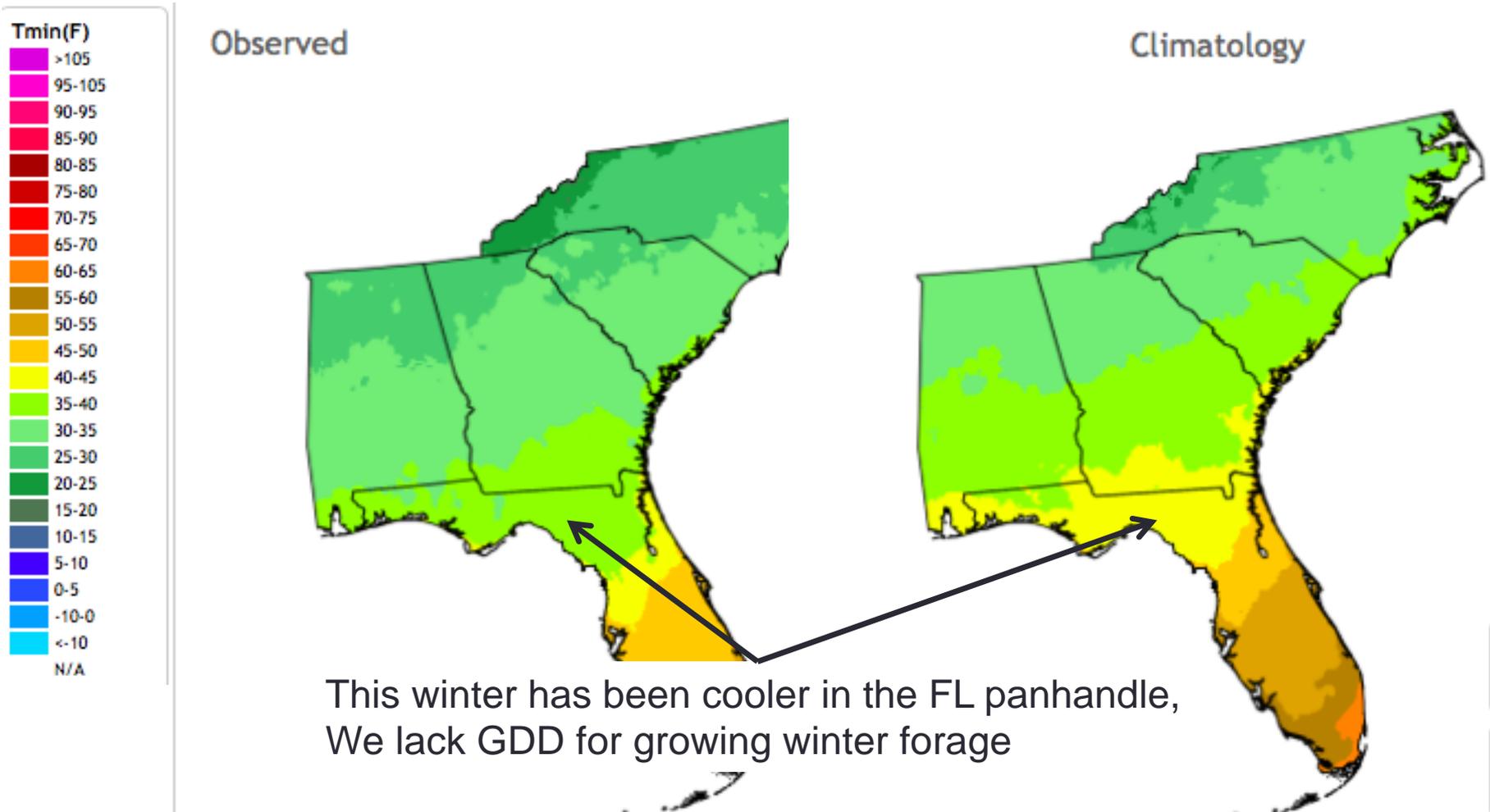
■ No yield data are available  
■ Non-cropland

# AgroClimate tools



Tools can be map-based, weather station-based, variable temporal resolution (15-minute, hourly, daily), require real time monitoring and/or historical datasets, based on process-based mechanistic models, regression models, or simple statistics.

# Climate Monitoring



Min temperature – Last 30 days

Average

Deviation from Average

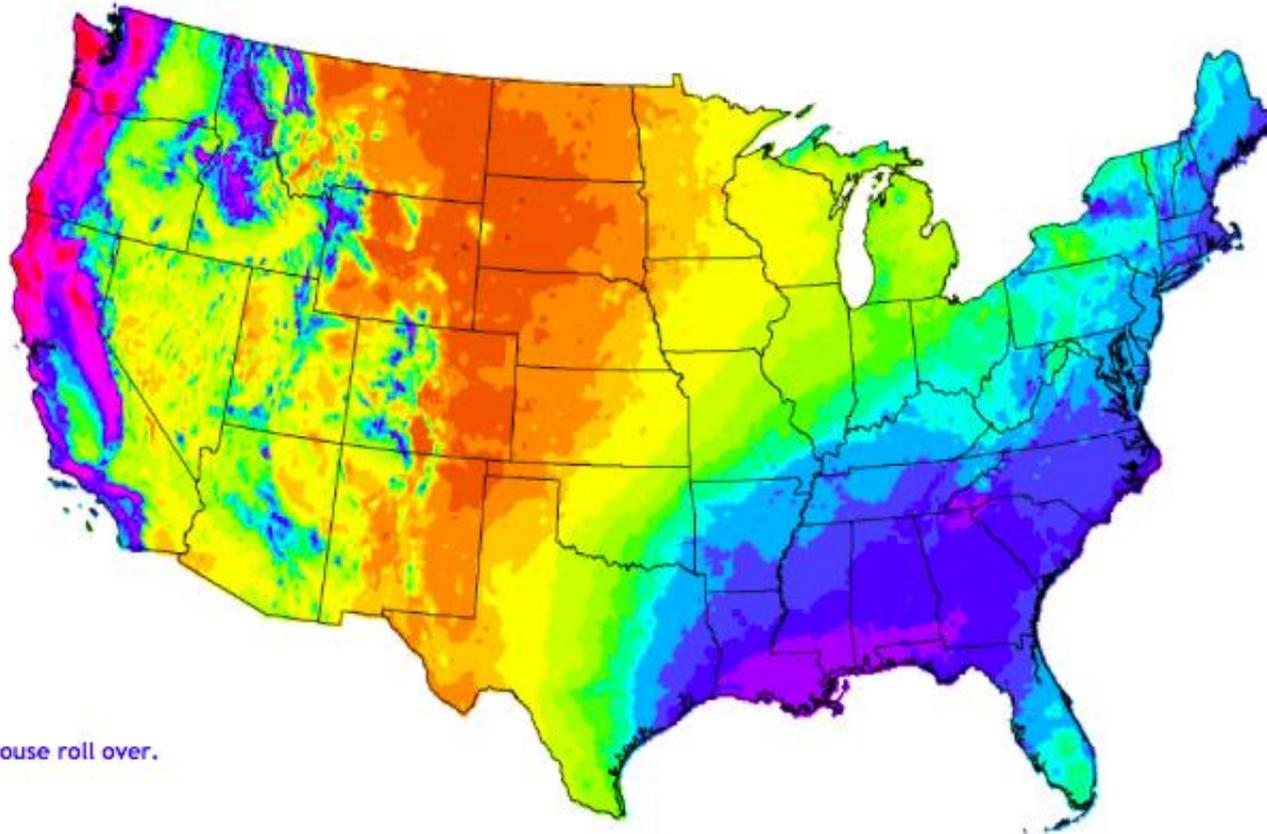
Interactive Map, Average

### Average - Total Rainfall (Inch) - El Niño Years | January



Rainfall(in)

- >16
- 12-16
- 8-12
- 6-8
- 5-6
- 4-5
- 3.2-4
- 2.8-3.2
- 2.4-2.8
- 2-2.4
- 1.6-2
- 1.2-1.6
- 0.8-1.2
- 0.6-0.8
- 0.4-0.6
- 0.2-0.4
- <0.2



\*Enlarge the map on mouse roll over.



Download Map

Average

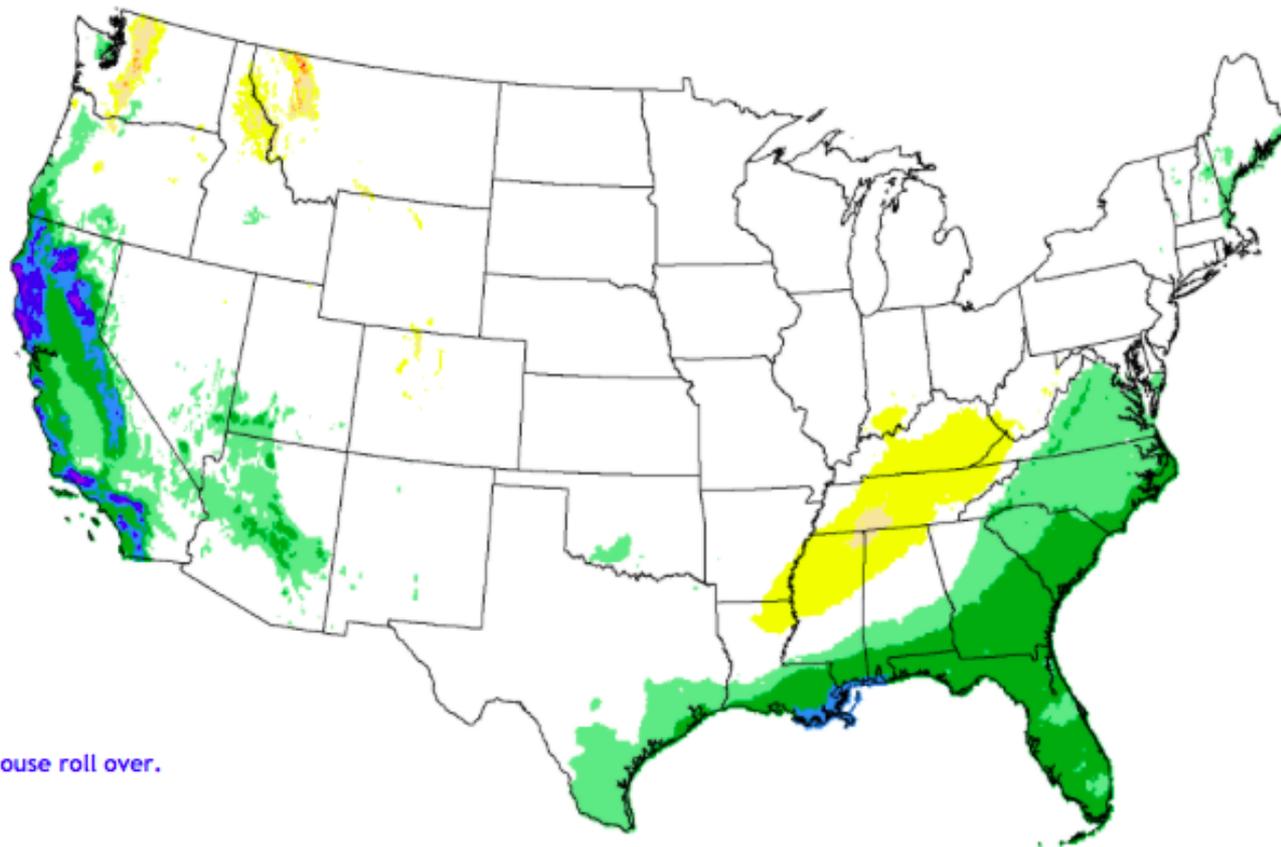
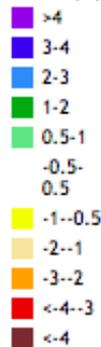
Deviation from Average

Interactive Map, Average

## Deviation from Average - Total Rainfall (Inch) - El Niño Years - January



Rainfall(in)

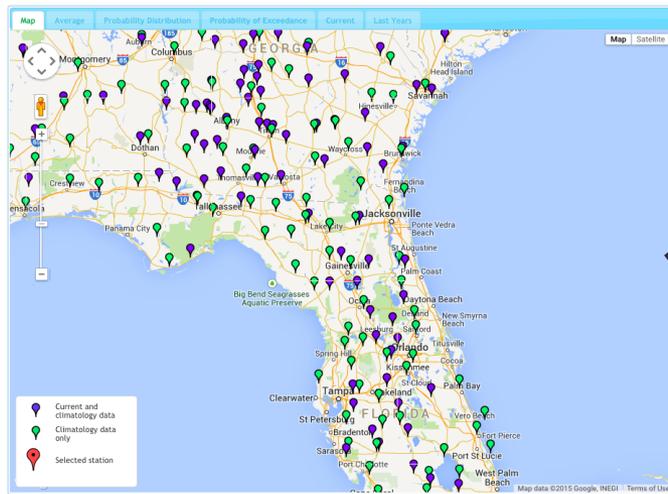


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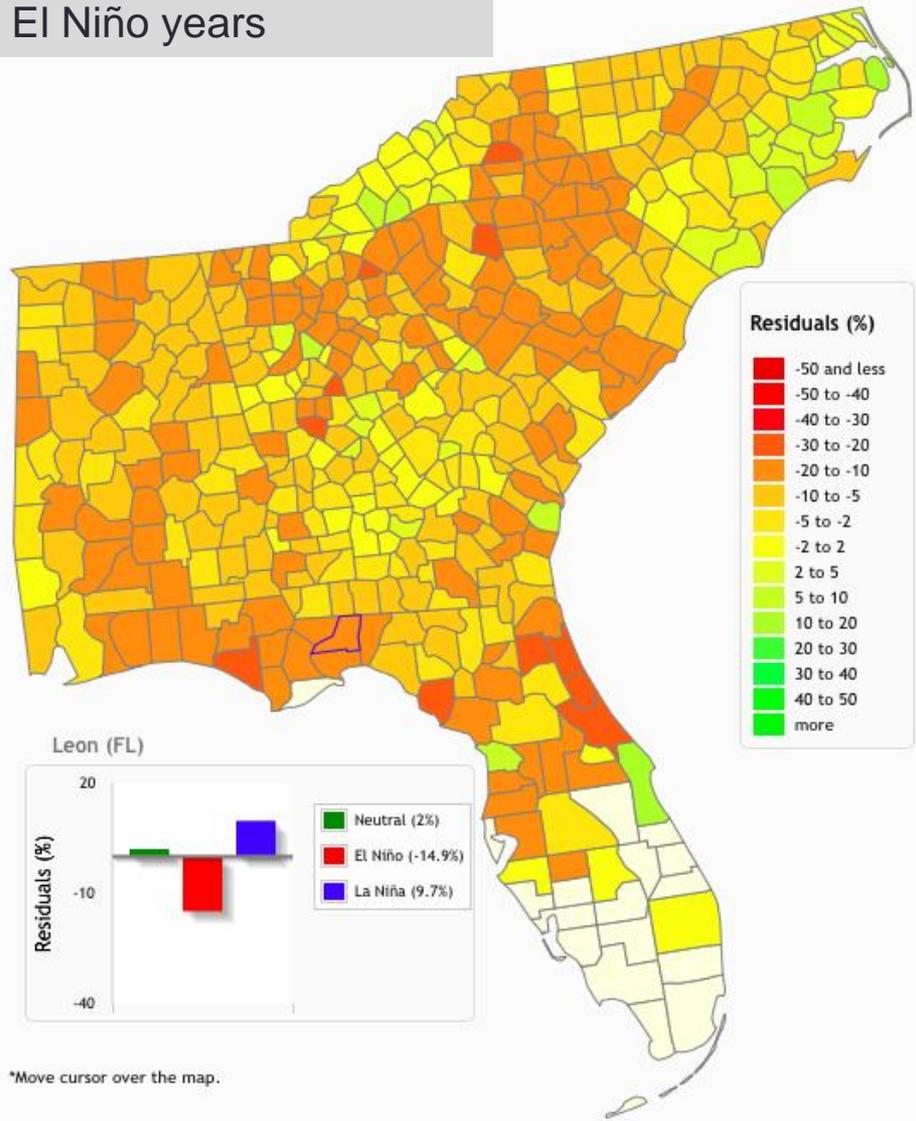
[Download Map](#)

# El Niño Southern Oscillation (ENSO) and climate variability in the Southeast USA

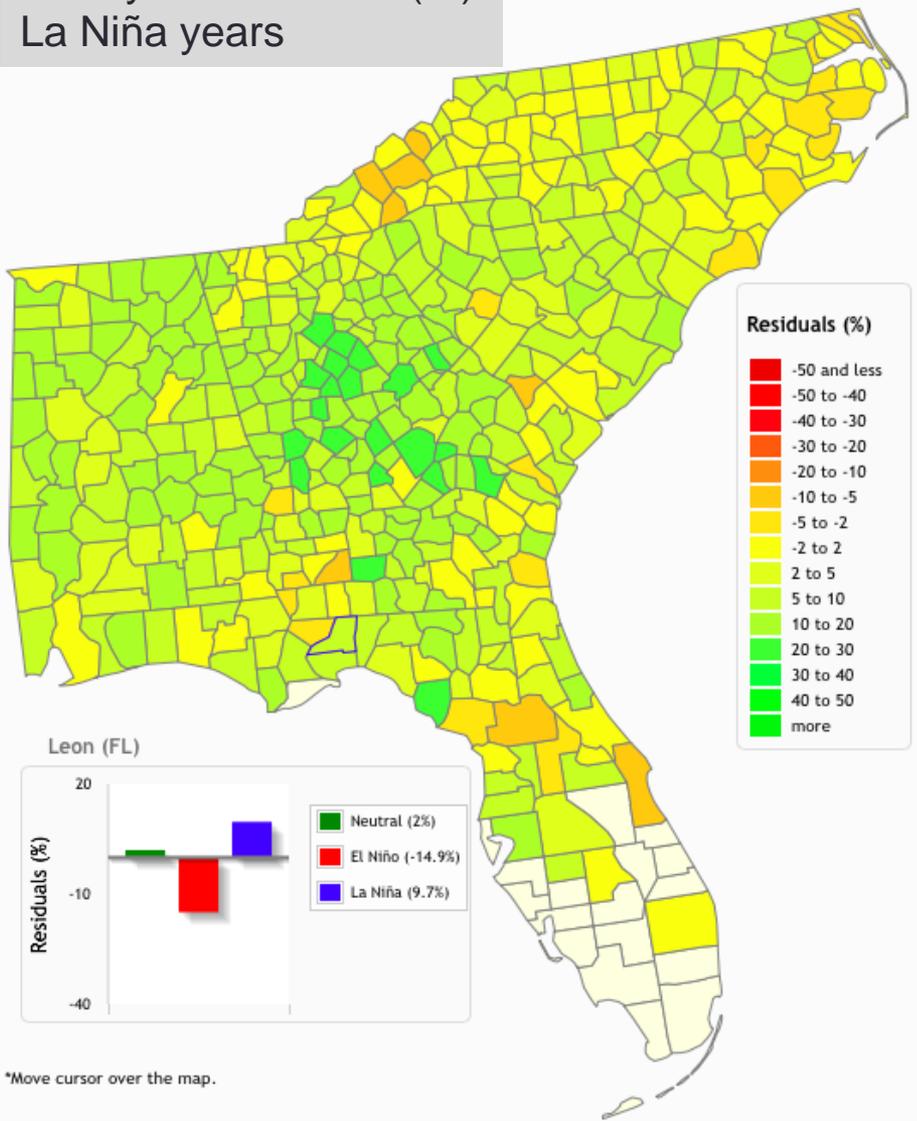


Monthly precipitation - El Niño years  
NOAA cooperative observer network

Corn yield residuals (%)  
El Niño years

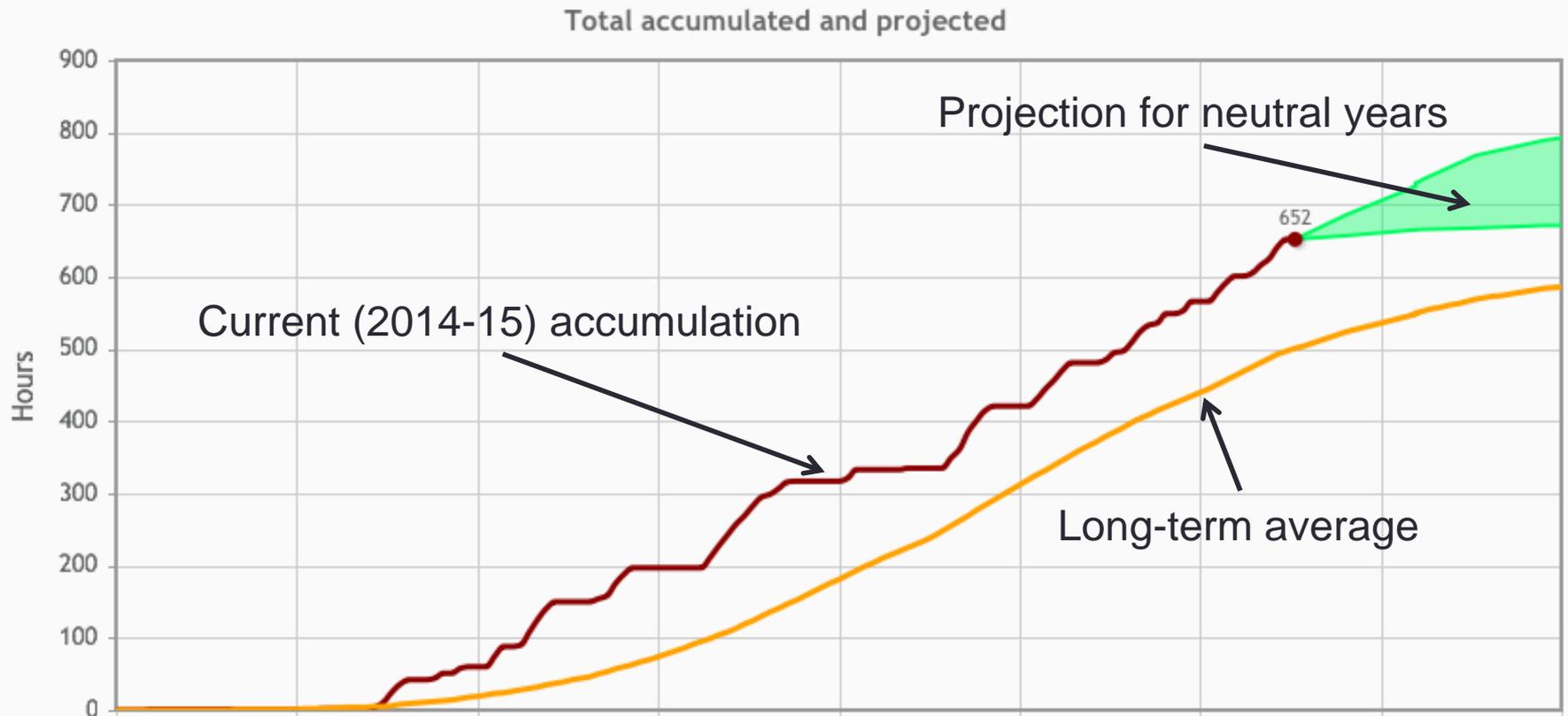
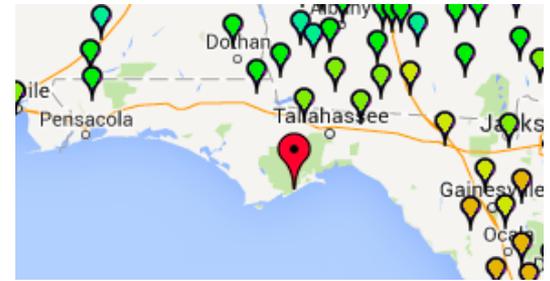


Corn yield residuals (%)  
La Niña years



# Chill hours < 45°F

Carrabelle station - Franklin County, FL



We lack historical hourly temperature datasets for climatology and evaluation of ENSO effects on chill accumulation.

# Planting Date Planner



**Yield Probability**    Phenology Table / Freeze probability

Corn - Irrigated - Baldwin County (AL) - Soil: Tifton Sandy Loam - El Niño Years

Select planting date(s):

- Feb 15     Feb 21     Mar 1     Mar 8     Mar 15     Mar 22     Apr 1     Apr 8     Apr 15

Select crop

Select variety

Select location

Select soil

Orangeburg Sandy Loam

Ruston Sandy Loam

Tifton Sandy Loam

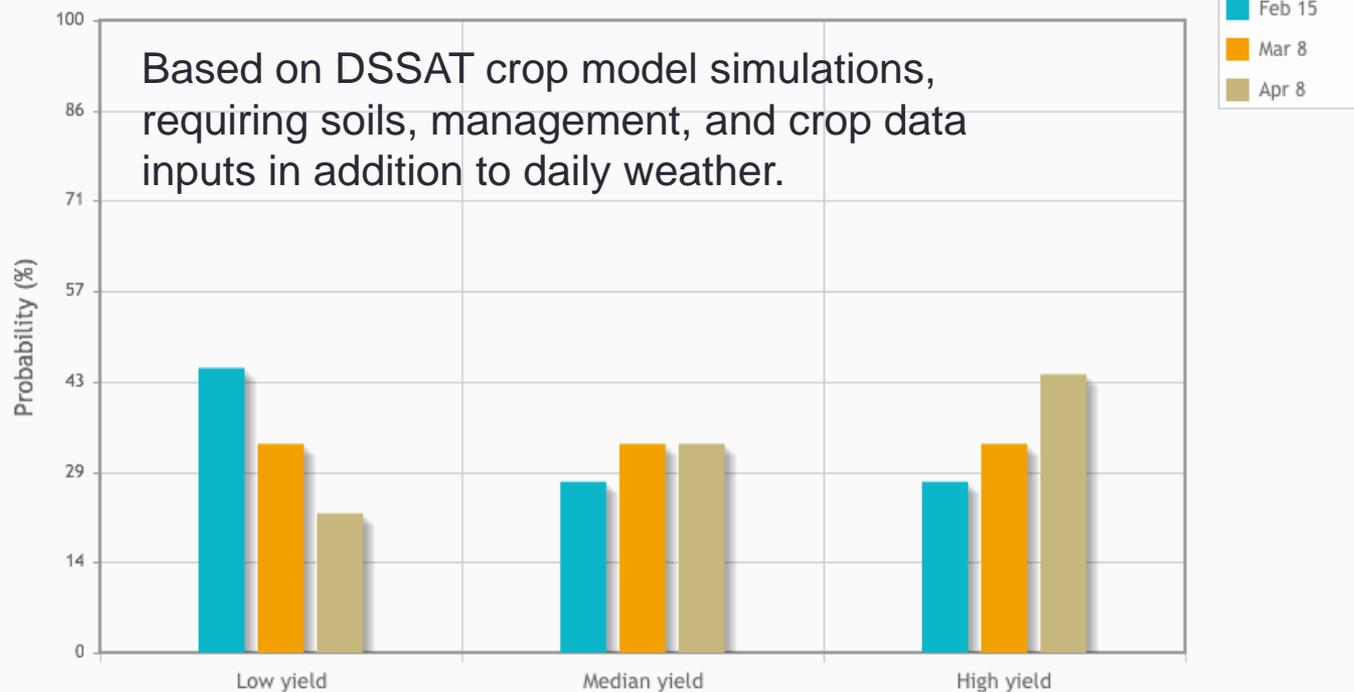
Irrigation management

Select nitrogen

Select ENSO phase

About crop yield risk

Yield



# Disease Alert Systems

## Strawberry Advisory System (SAS)



- Optimize spray applications (50% reduction in dry years)
- Apply fungicide only when conditions are favorable for disease development
- 15-minute temperature and leaf wetness data required



Temperature



Leaf wetness

Limited geographically by availability of weather stations

RISK



Big Bend Seagrasses Aquatic Preserve

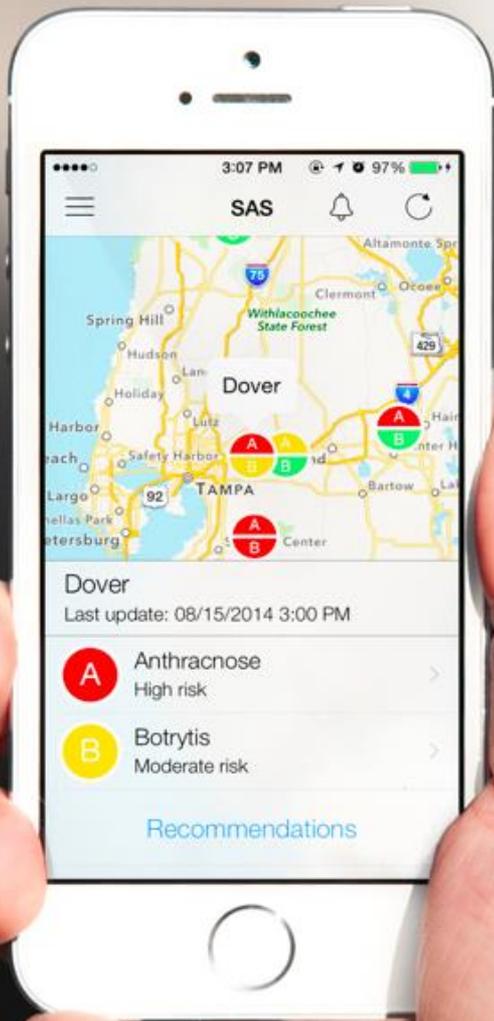


**Balm Station Hillsborough (FL)**  
FAWN # 350

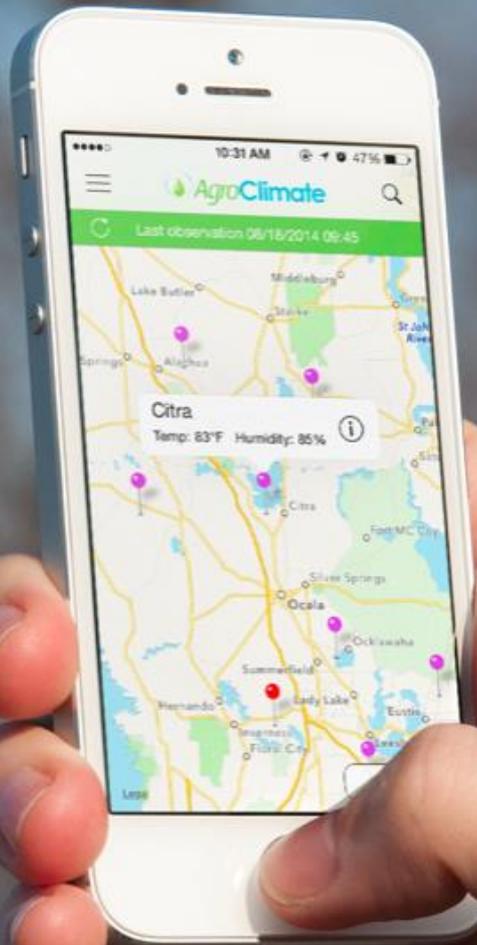
**Low Risk of Anthracnose or Botrytis**

[Click for Simulation Graph](#)

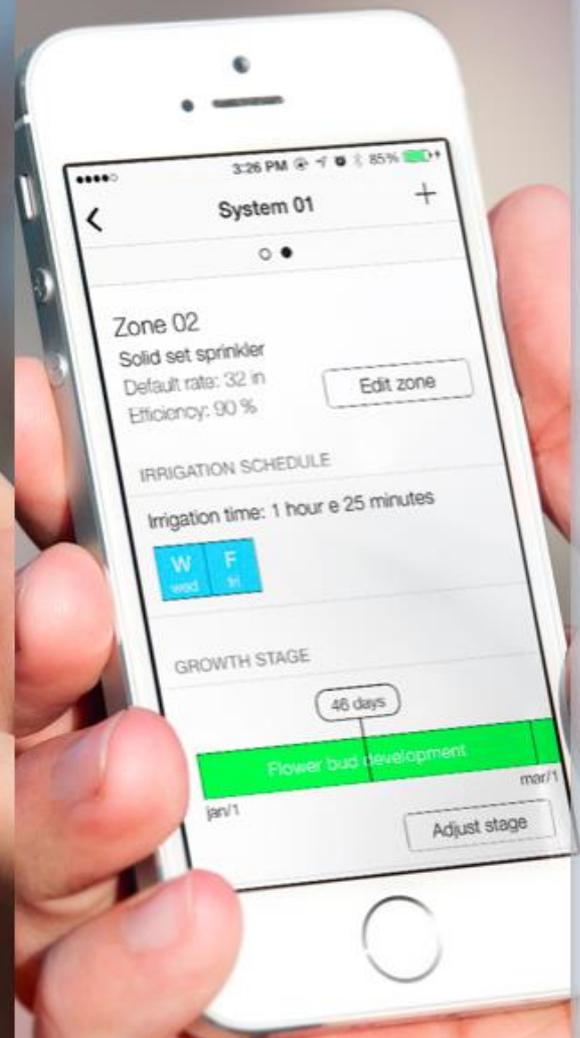
	High risk
	Moderate risk
	Low risk



**DISEASES**



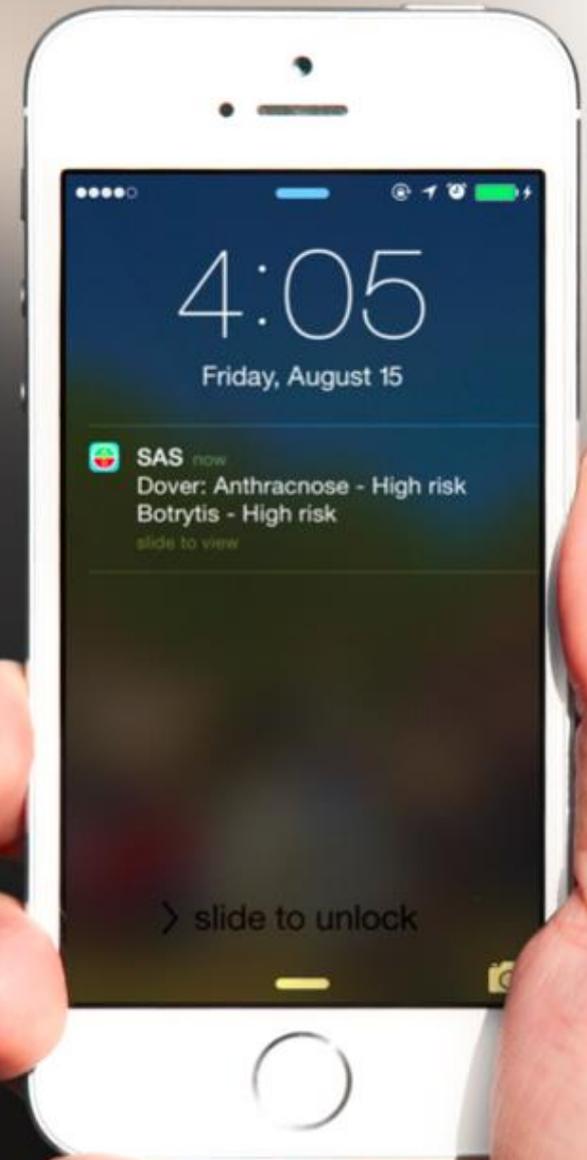
**WEATHER**



**IRRIGATION**

# NOTIFICATIONS

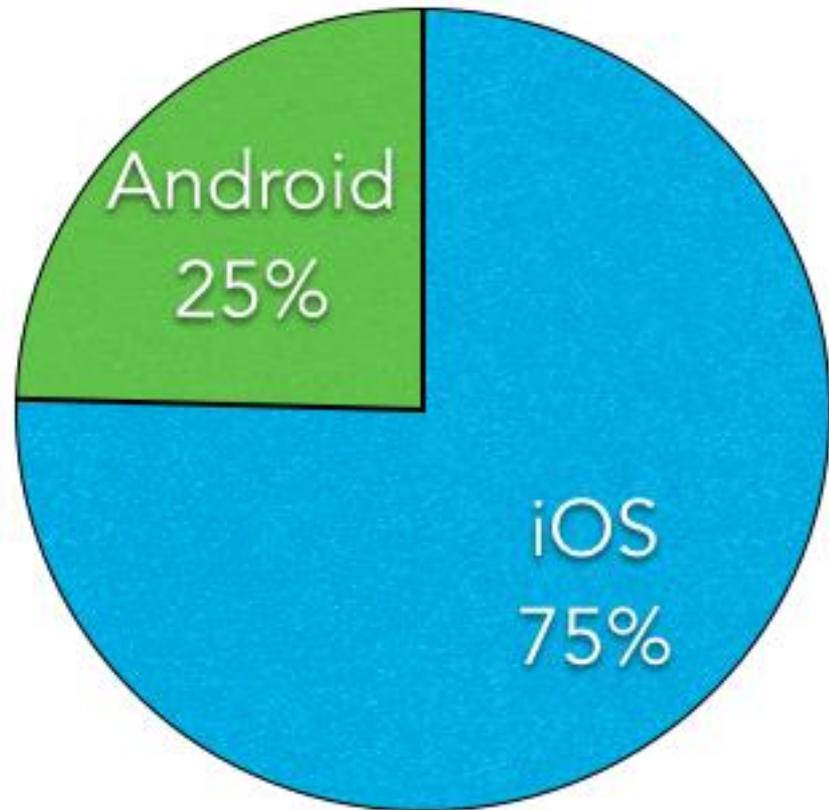
- SmartIrrigation Apps
  - Irrigation scheduling changes
  - Probability of rain in the next hours
  - Water savings
- AgroClimate app
  - Accumulated rain, GDD/chill hours, water stress
- Strawberry Advisory System
  - Disease infection risk alerts



# Downloads

- + 4 k downloads
- + 1.7 k registered users

of apps available in both platforms



# Management Fact Sheets: Reducing Climate Risks and Improving Resource-use Efficiency

- All
- Information Management
- Soil Health
- Optimized Inputs
- Irrigation
- Crop-specific Information



### AgroClimate

Learning resources and interactive tools for improving climate resilience in agriculture



### High-residue Cover Crops

Reduce variability in yields, improve soil health



### Sod-based Rotation

Perennial grass in a conventional rotation to improve soil organic matter and increase root zone depth



### Conservation Tillage

Reducing tillage to decrease runoff and save time on field operations



### Sensor-based Nitrogen Application

Optical sensing for adjusting Nitrogen applications for different field areas



### Irrigation and Climate Risks

Irrigation impacts, investment, and climate risks



### Microirrigation

Drip and micro-sprinkler irrigation for more efficient water application



### Subsurface Drip Irrigation

More efficient irrigation delivery that can be cost-competitive for agronomic crops

# AgroClimate Initiatives



# Thank you!

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