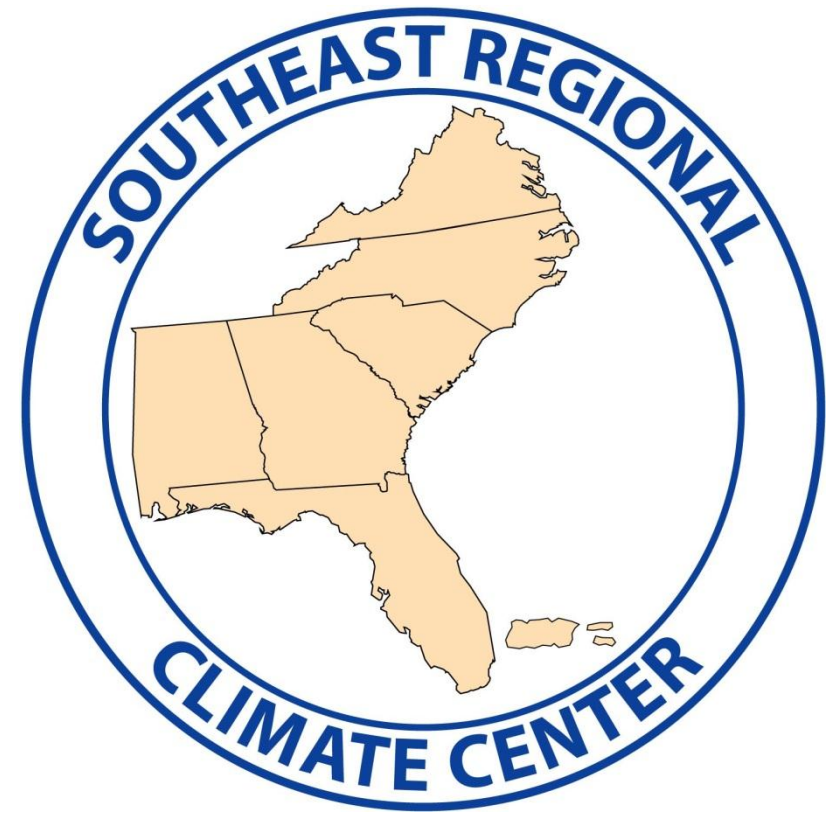


Regional Differences in Vulnerability to Climate Change in the United States: State Climatologists Discuss Challenges and Opportunities in the Southeastern United States

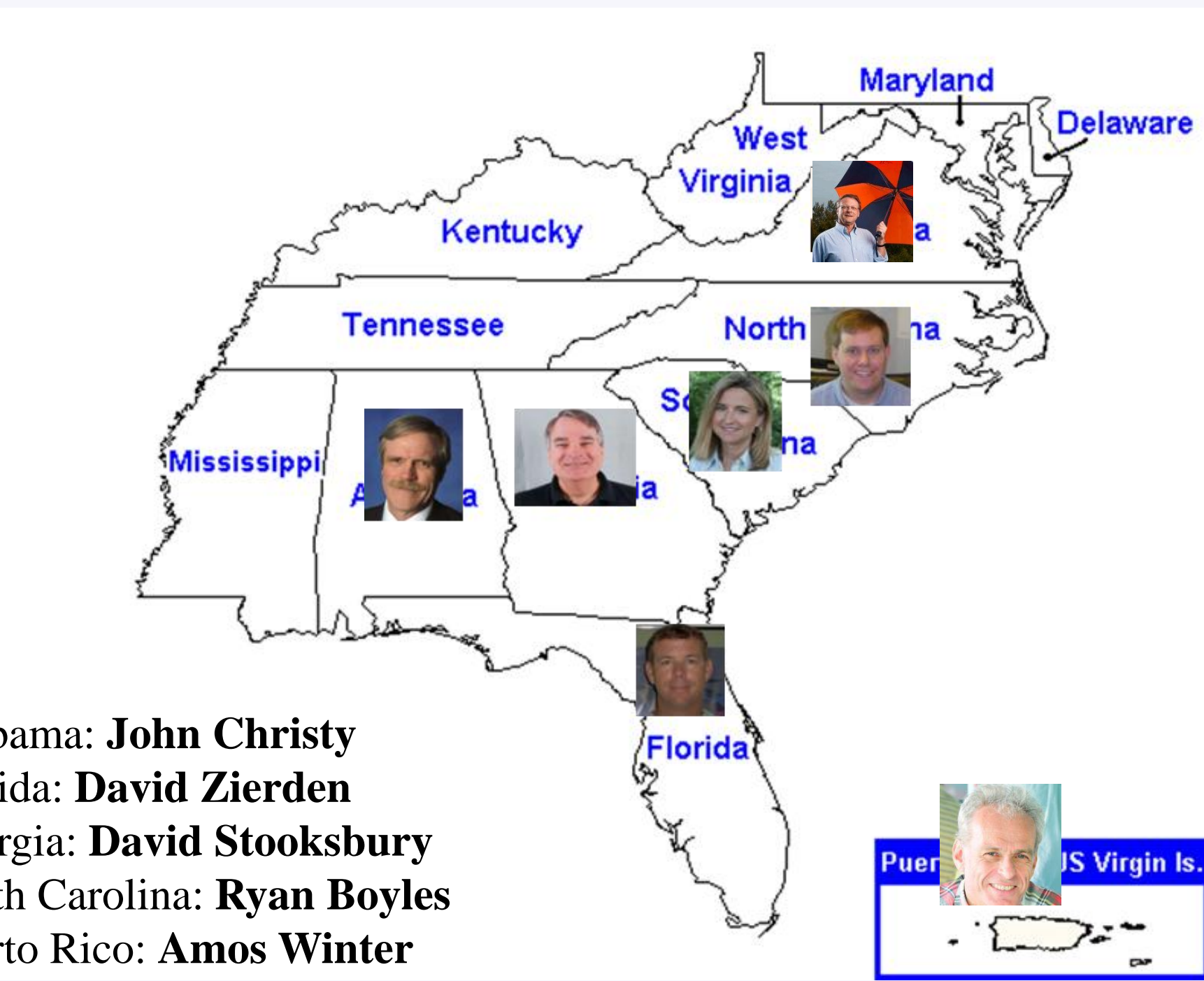


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Motivation and Basis of Work

**The South remains a land apart—
a land that still owes much of its
distinctiveness to climatic forces”**

(Raymond Arsenault, The End of the Long Hot Summer:
The Air Conditioner and Southern Culture,
Journal of Southern History (quoted in Low Country Hurricanes page 6)

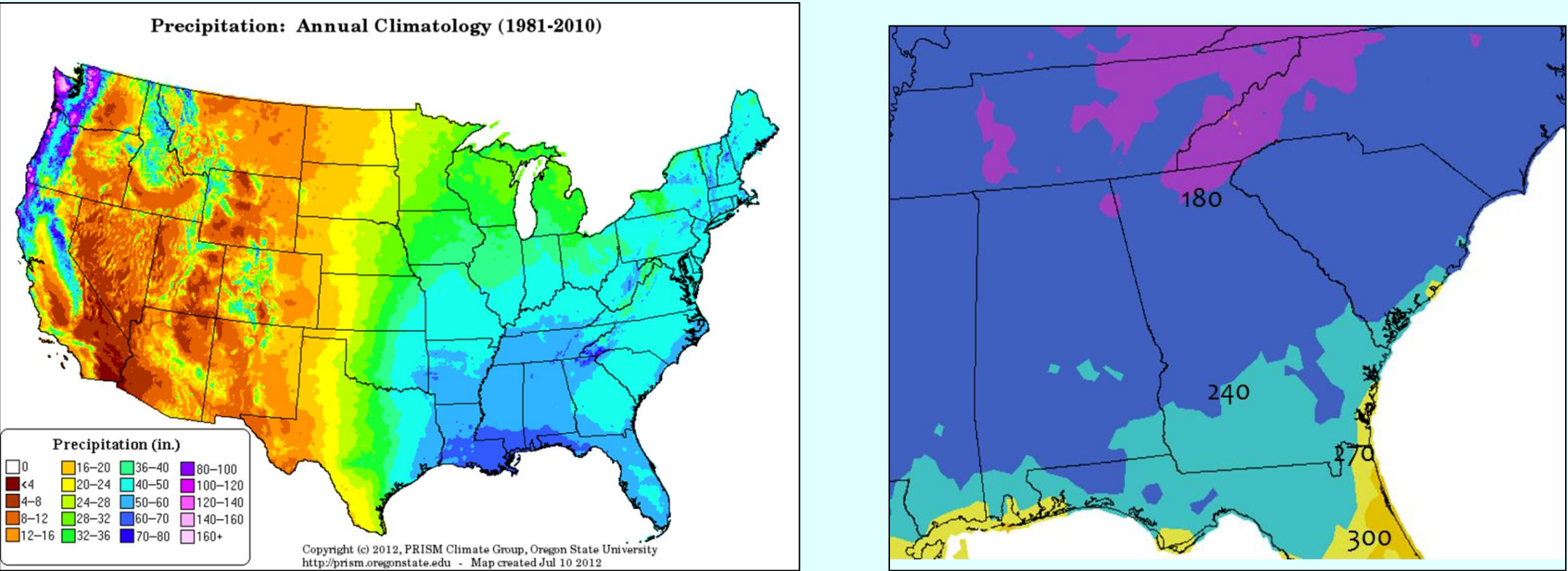


Alabama: John Christy
Florida: David Zierden
Georgia: David Stooksbury
North Carolina: Ryan Boyles
Puerto Rico: Amos Winter
South Carolina: Hope Mizzell
Virginia: Jerry Stenger

State Climatologists across the Southeast were interviewed to determine their perspectives on their local climates and the challenges and opportunities in agriculture and water resources provided by the current climate as well as variability and trends in climate over time. Interviews were done in person and by telephone with email follow-ups in 2011 by the Southeast Regional Climate Center. The interviews were done in semi-structured formats and were wide-ranging, since climate concerns varied quite a bit from one state to the next.

Climatology of the Southeast

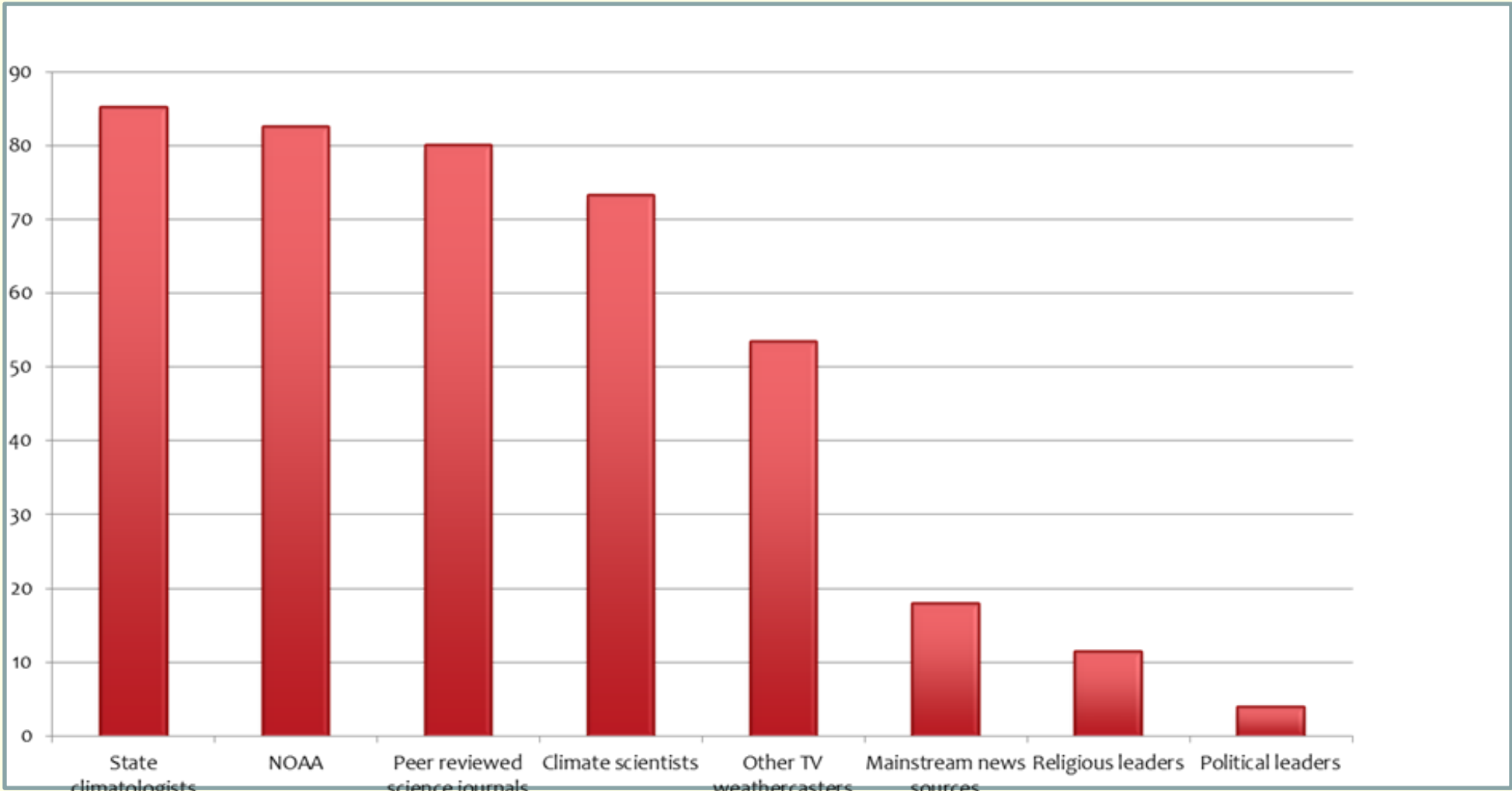
- Abundant precipitation
- Relatively long growing season
- Diversity of climatic systems, soils, and ecosystems
- Seasonality of precipitation varies across region
- Length of growing season varies significantly north to south



Why State Climatologists?

State Climatologists were chosen because of their close interaction with the Southeast Regional Climate Center over time and their extensive knowledge of climate conditions and trends in their state. Due to their interactions with hundreds of stakeholders each year, they also have intimate knowledge of the impacts that weather and climate have on the agriculture, energy, industry, recreation, water supplies, and other sectors of their state economies. The climatologists interviewed have well over 130 years of collective experience in climatology.

Because of the broad experience state climatologists have in presenting climate information, they are among the most trusted sources of unbiased climate information across all sectors.



TV weathercasters' trust in climate change information by group (Maibach, Wilson and Wite, 2010, George Mason University)

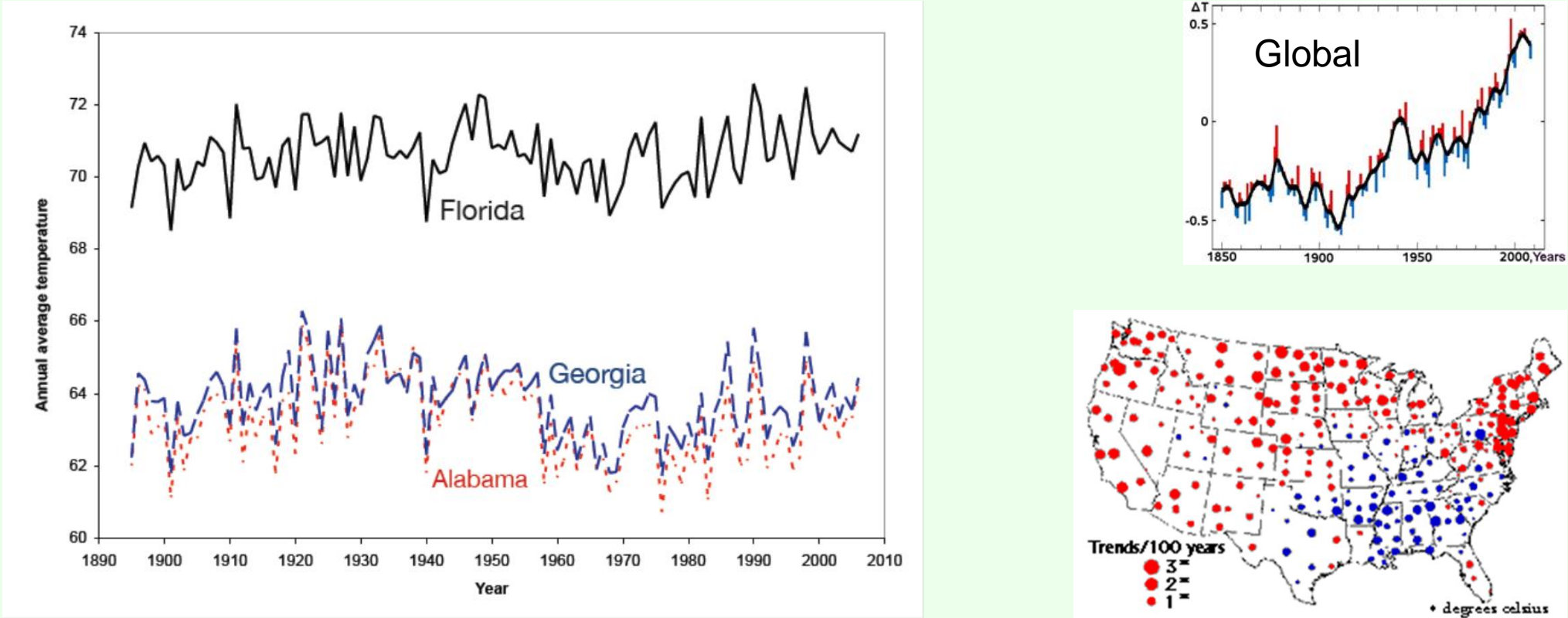
Focus of Interviews

The Southeast State Climatologists were asked the following questions:

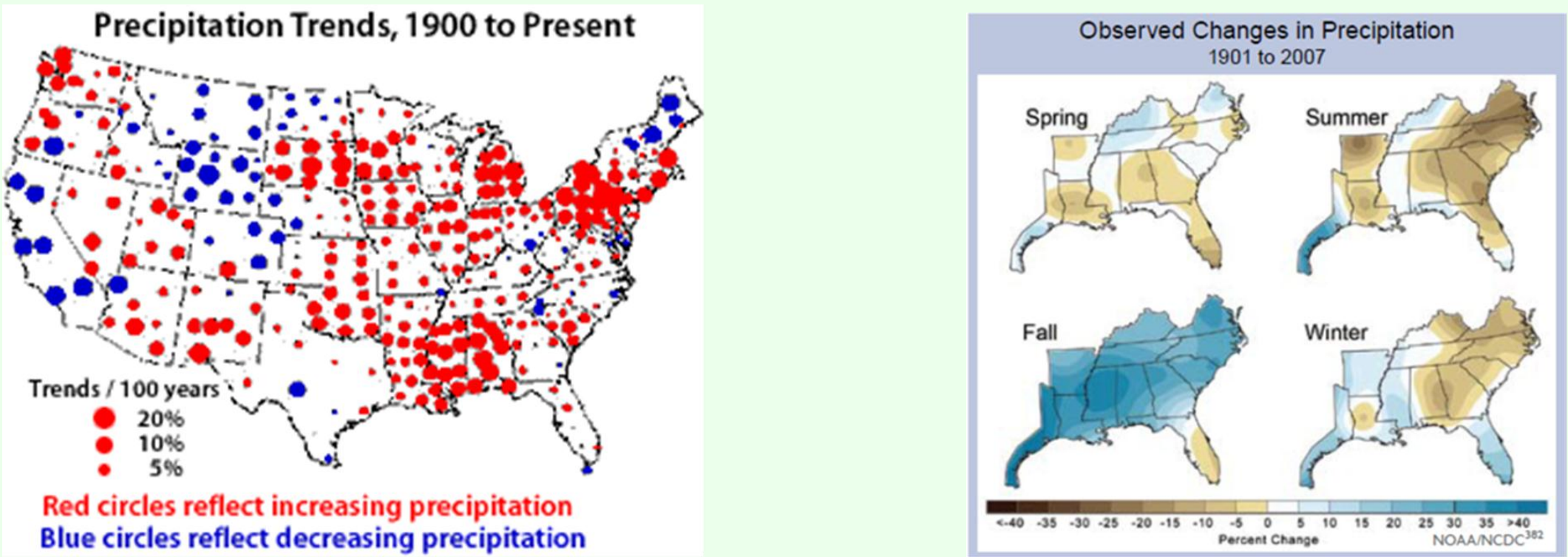
- 1.What makes the climate of your state unique compared to other parts of the US?
- 2.How do those unique conditions affect agriculture and water resource management in your state?
- 3.What challenges do you see ahead for your state under changing climate?
- 4.What opportunities does your state have for future needs in agriculture and water resource use compared to other parts of the country in a changing climate?

Climate Trends in the Southeast

Unlike many other parts of the US, the Southeast has been in a “warming hole.” Most of the Southeast has seen a trend towards cooler temperatures over the last 100 years with the exception of Virginia and the peninsula of Florida.



However, at the same time precipitation across the region has been increasing in most areas, particularly in Alabama and Mississippi. These trends have not been uniform over all seasons; in fact, the only season with positive trends in precipitation is fall across most of the Southeast. Summer rainfall in particular has become more variable although generally drier.



Because of this, the Southeast has unique challenges in communicating climate change to area residents.

Challenges for the Southeast

- Higher daytime temperatures will limit growth of corn
- Higher temperatures at night will increase heat stress on livestock and humans
- Increased temperatures will increase evaporation
- Increased need for water for energy production, irrigation (regardless of precip trend)
- Increased likelihood and frequency of droughts

Impacts of Climate Change on the SE

Across the Southeast, temperatures are expected to change over the next 100 years. However, the pace and extent of the predicted warming depends on the particular model used.

Impacts of increasing temperature:

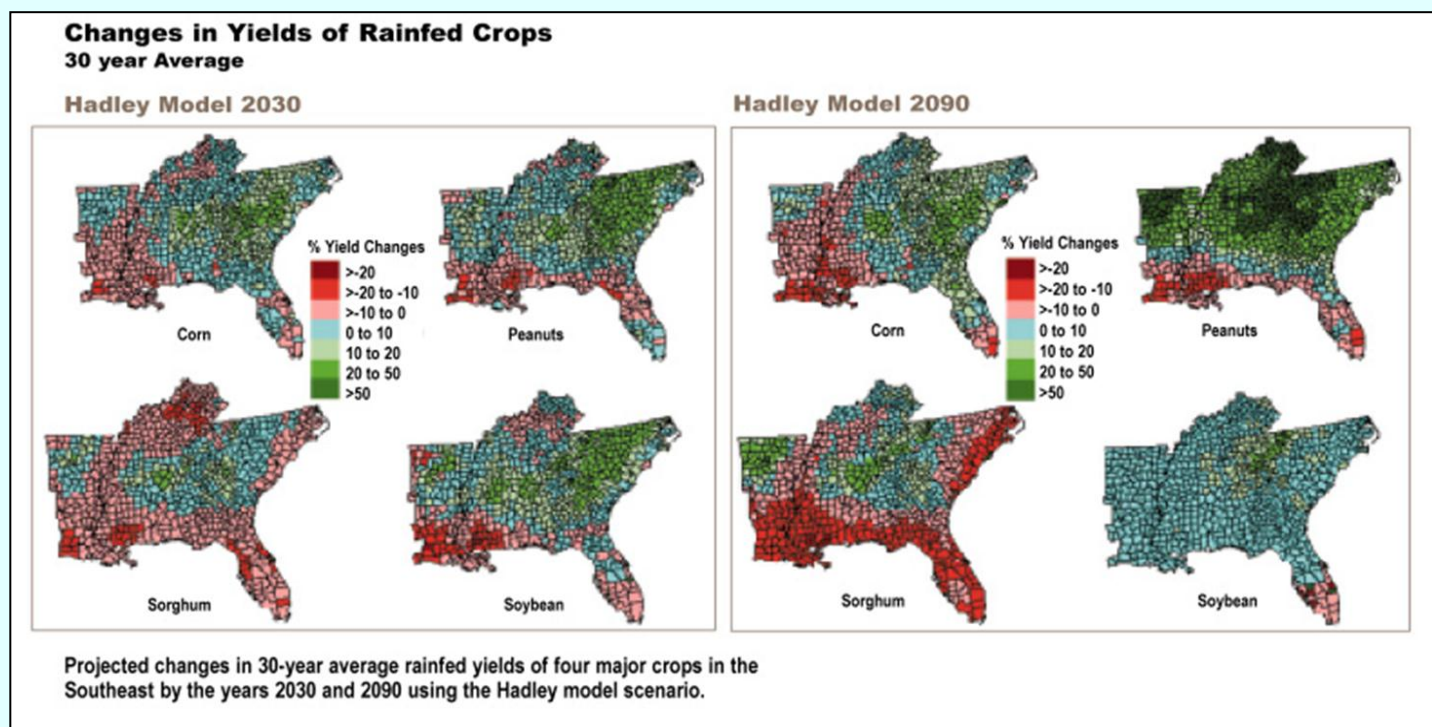
- Increased length of growing season for crops
- Increased heat stress on livestock and humans
- Increased length of growing season for insects
- Warmer surface water may affect ecosystems
- Reduction in heating costs
- Increase in cooling costs
- Increased evaporation



Predictions of precipitation trends in the next century are less certain than the trends in temperature. Most models indicate that rainfall may become more intense with longer dry spells in between rain events. When coupled with the higher temperatures, this could lead to increases in both local floods and droughts.

Impacts of changing precipitation:

- Increased erosion
- Soil moisture is likely to decrease
- Streamflows will become more “flashy”
- Increased demand for water for irrigation will compete with water for energy production and water for human consumption



Opportunities for the Southeast

- Longer growing season will allow use of new varieties and new crops
- Other parts of the country will be more stressed by increased temperature and water demand than SE
- Relatively small additions of irrigation water (inches instead of feet) will allow successful crops--farm ponds and local storage could sequester the necessary water