

Southeast Region Technical Report to the 2013 National Climate Assessment

Keith Ingram & Kirstin Dow

Florida Water Climate Alliance Meeting,
Orlando FL, 27 February 2013



NC STATE UNIVERSITY



UAHuntsville
The University of Alabama in Huntsville

CLEMSON
UNIVERSITY



Geographic Scope

11 Southern States
East of the Mississippi
River

US
Virgin
Islands

Puerto
Rico

Alabama

Arkansas

Florida

Georgia

Mississippi

Louisiana

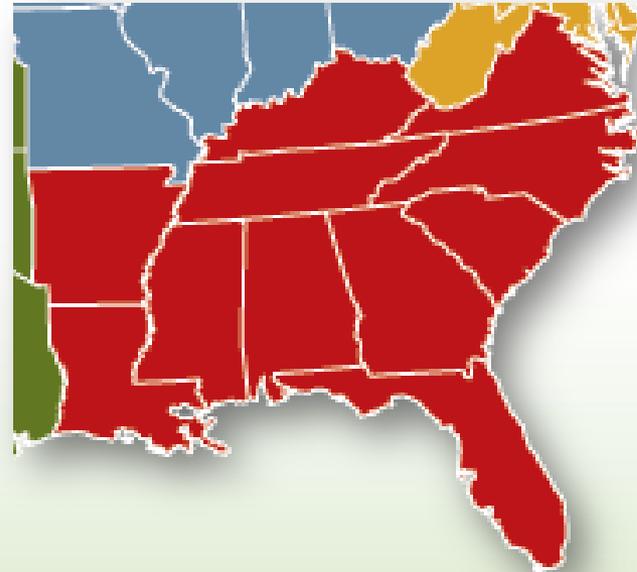
North Carolina

South Carolina

Tennessee

Virginia

West Virginia





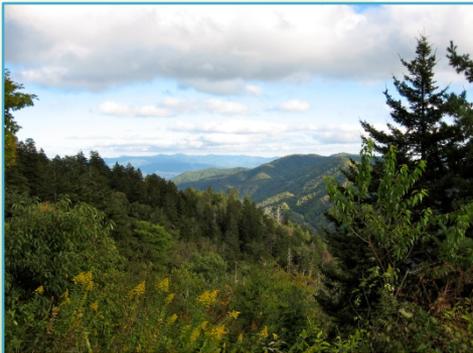
Regional Diversity

Climate

Natural and
managed
ecosystems

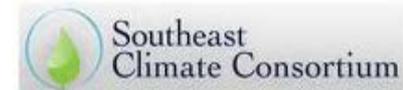
Social and
political
attitudes

Vulnerabilitie
s



Report Development Process

- Collaboration led by 3 Regional Integrated Sciences and Assessments (RISA) programs
- Contributions from numerous local, state, federal and non-governmental individuals and agencies
- 2-day workshop with 90 participants
 - Atlanta, GA, September 2011
- Contributions provided to lead authors, who developed report chapters
 - September 2011 – February 2012
- Chapters peer-reviewed and revised



Affiliations of Chapter Lead Authors

- Auburn Univ, Mississippi & Alabama Sea Grant
- Centers for Disease Control & Prevention
- Marshall Space Flight Center, NASA
- Louisiana State Univ, School of Renewable Natural Resources
- NC State Univ, Forestry & Environmental Resources
- Southeast Regional Climate Center
- Univ. of Florida, Agricultural & Biological Engineering Department
- Univ. of Georgia, Dept of Marine Sciences
- US Department of Transportation, Region 4
- US EPA, Region 4
- US Forest Service, Eastern Forest Environmental Threat Assessment Center
- *All chapters had additional contributors from across the region*

Report Organization

Climate of the Southeast

- Historic Climate
- Current Climate
- Projected Future Climate

Climate Interactions with Important Sectors

- Human Health
- Energy
- The Built Environment
- Transportation
- Agriculture
- Forests
- Fisheries and Aquaculture
- Water Resources
- Natural Ecosystems

Cross-sectoral Issues

- Climate Change Mitigation
- Adaptation
- Education & Outreach

Historic SE Climate Trends

- Historical records of precipitation and temperature reveal much interannual and interdecadal variability, with no long-term trends *since* the end of the 19th century
- Temperatures have steadily increased *since* the 1970s, with the most recent decade (2001 to 2010) noted as the warmest on record
- Interannual precipitation variability has increased, with more exceptionally wet and dry summers compared to the middle of the 20th century
- The SE experiences a wide range of extreme weather and climate events, including floods, droughts, heat waves, cold outbreaks, winter storms, severe thunderstorms, tornadoes, and tropical cyclones

Total Annual vs. Extreme Rainfall

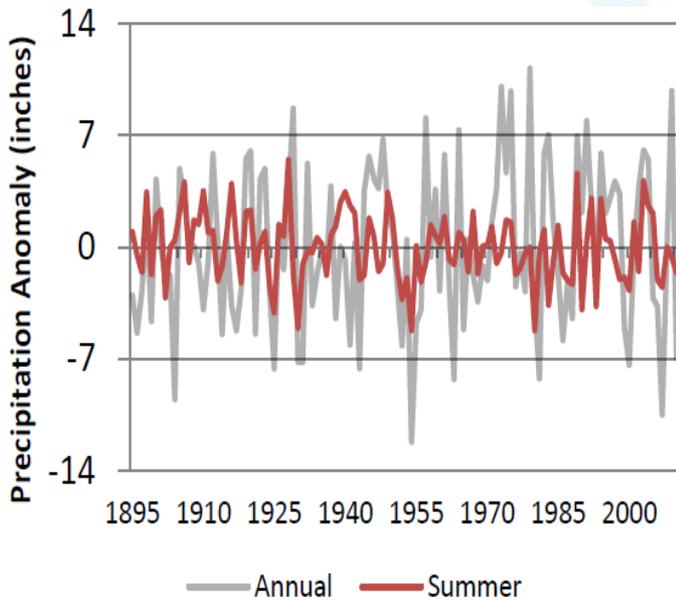


Figure 2.5. Annual and summer season precipitation anomalies for the SE based on cooperative observer data from the National Climatic Data Center.

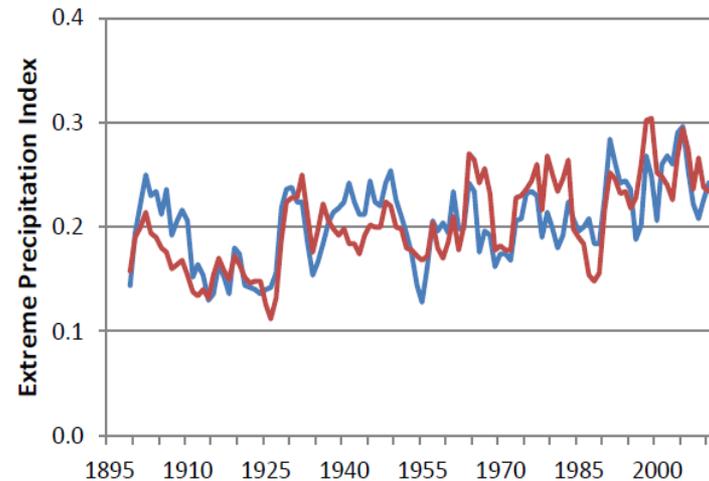


Figure 2.6. Time series of the extreme precipitation index (using a 5-year running average) for the SE for the occurrence of 1-day, 1 in 5 year extreme precipitation events (red) and 5-day, 1 in 5 year events (blue). Based on cooperative observer data from the National Climatic Data Center and updated from Kunkel et al. (2003).

Future Climate Projections

- **Temperature** projections indicate an overall increase across the SE through the end of the 21st century
 - Increases in the length of the growing season
 - More cooling degree days
 - More consecutive hot days
 - Greater interannual temperature variability
- Through the first half of the 21st century, mean annual **precipitation** is expected to
 - *Decrease* across the southern tier of the SE, including the Caribbean
 - *Increase* across the northern tier of the SE
 - However, the model disagree on the sign and magnitude of these changes, except for the Caribbean

Future Climate Projections

Sea Level Rise - Mean relative sea level rise across the SE coast is generally consistent with the global trend. Sea level is expected to rise from 1 to 7 ft during the 21st century

- local land motion (e.g., subsidence) will be significant in areas

Hurricanes - The *frequency of major* hurricanes is projected to increase in the Atlantic Basin

- while the *overall number* of tropical cyclones is projected to decrease through the end of the 21st century

Droughts - there is much uncertainty because of model deficiencies and variations in the projections

- Some models project a greater likelihood of increased drought across the lower Mississippi Valley and Gulf Coast, with fewer droughts across the northern tier

Tornados and Thunderstorms

- Future projections in the frequency and intensity are uncertain

Water Resources : Vulnerabilities and Impacts



Figure 11.3 from SE Technical Report

- Water Supply Stress
 - Climate change will lead to hydrologic alterations
 - Water use and demands by key economic sectors will increase as population continues to grow, especially for domestic water supply, irrigated agriculture, and power plants
 - Most severe stress will occur during the summer season
 - Salt water intrusion in coastal areas
- Natural Ecosystems
 - Increasing temperatures and decreasing precipitation are expected to increase uptake of soil water by forests and reduce streamflows
- Aquaculture and Human Health
 - Warming water temperatures are expected to increase foodborne and waterborne pathogens associated with molluscan shellfish harvest and consumption

Sea Level Rise : Vulnerabilities and Impacts



Figure 11.4 from SE Technical Report

- Built Environment
 - Damage and loss of homes, businesses, and roads
- Human Health
 - Disruptions to infrastructure and ecosystems caused by increased storm surges
- Natural Ecosystems & Aquaculture
 - Land loss caused by SLR, subsidence, and coastal inundation is expected to lead to loss of vital habitat for juvenile estuarine finfish and crustacean shellfish
 - Tidal salt marsh conversion to open-water areas
 - Fisheries productivity may decrease

Adaptation to Climate Change

- Activities in the early stages of the adaptation process
 - Identifying relevant climate impacts
 - Assessing significant risks and vulnerabilities
 - Creating partnerships to support planning
 - Less on risk assessment and implementation
- Activities at all scales
 - Local communities, NGOs, state, and federal agencies
- Most activity found in coastal areas
 - Influenced by risks associated with SLR, severe storms, and salt water intrusion
- Extension, Outreach, Education and Training capacity in the Southeast is significant
 - Increased coordination is necessary for improving the efficiency and success of efforts

Report Availability

- Technical Report is available at NCA
http://downloads.usgcrp.gov/NCA/Activities/NCA_SE_Technical_Report_FINAL_7-23-12.pdf
Final Version is will be published by Island Press this Spring
- Electronic version will be free to download at
<http://cakex.org/NCAreports>
- Island Press will sell print on demand





Thank you!