

TIMELY INFORMATION

Agriculture & Natural Resources

June 2011

Climate Variability Associated with La Niña or El Niño phases: Introducing the Climate Risk Tool

Agricultural production and profitability depend highly on climatic conditions and weather patterns; therefore understanding deviations from average climate conditions is important to implement specific management strategies. Traditionally, farm management relies on historic climate averages and crop responses to local soil conditions, however, farmers must account for seasonal and year-to-year climate variability when making management decisions.

In the Southeastern U.S., climate variability in most cases has been linked to the phase of El Niño – Southern Oscillation (ENSO) which may vary within and among years. ENSO is a natural condition that results from complex interplay among clouds and storms, regional winds, oceanic temperatures, and ocean currents along the Equatorial Pacific. ENSO has two main phases called **El Niño** and **La Niña**. In general, warming of sea surface waters along the equator in the Pacific Ocean, the El Niño phase, results in lower winter temperatures and high winter-spring rainfall in Gulf Coast states. In contrast, cooling of sea surface waters along the equator in the Pacific Ocean, the La Niña phase, causes climate conditions in the Southeast to be warmer and drier than the normal from fall to spring, having the strongest effect in the winter. These general trends can be used to describe the regional climate variability, however, the impact of ENSO episodes on rainfall and temperature changes with location.

ENSO forecasts and seasonal ENSO status updates are frequently issued by different climate centers, however, the average expected rainfall and temperature deviations associated with ENSO are sometimes not well understood. In order to help stakeholders assess monthly differences in rainfall and temperature between ENSO phases at the county level, the Southeast Climate Consortium (SECC) developed the Climate Risk Tool. This web-based tool provides users with graphic information on climatic variables such as monthly rainfall and average minimum and maximum temperatures.

Using the Climate Risk Tool from the Agroclimate Website

The Climate Risk Tool is one of various web-based decision support tools included in the Agroclimate website (www.agroclimate.org). This tool provides users with information presented in various ways to address the influence of ENSO on climate variability in the Southeast. The tool allows the user to assess the average expected conditions of rainfall and temperature for a given ENSO forecast. The information in the tool is the result of analyses of historic weather records including multiple years in which the climate was modified by either El Niño or La Niña. County level information is available for the states of Alabama, Florida, Georgia, North Carolina and South Carolina. Users of this tool should remember that in most cases the information presented by county has one or two weather stations as the source

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of weather data, therefore, a degree of variation at a specific location within the county might exist respect to the average conditions.

Using a graphic method, the type information in the Climate Risk Tool available by ENSO phase includes:

- Average expected monthly values of total rainfall and average minimum and maximum temperatures as well as deviations of expected values from the average conditions. (A)
- Probability (or likelihood) of occurrence of a specific range of rainfall or temperature for a specific month. (B)
- Probability (or likelihood) of exceeding a specific value of rainfall or temperature. (C)
- Monthly values of rainfall and temperature observed in the last most recent five years. (D)

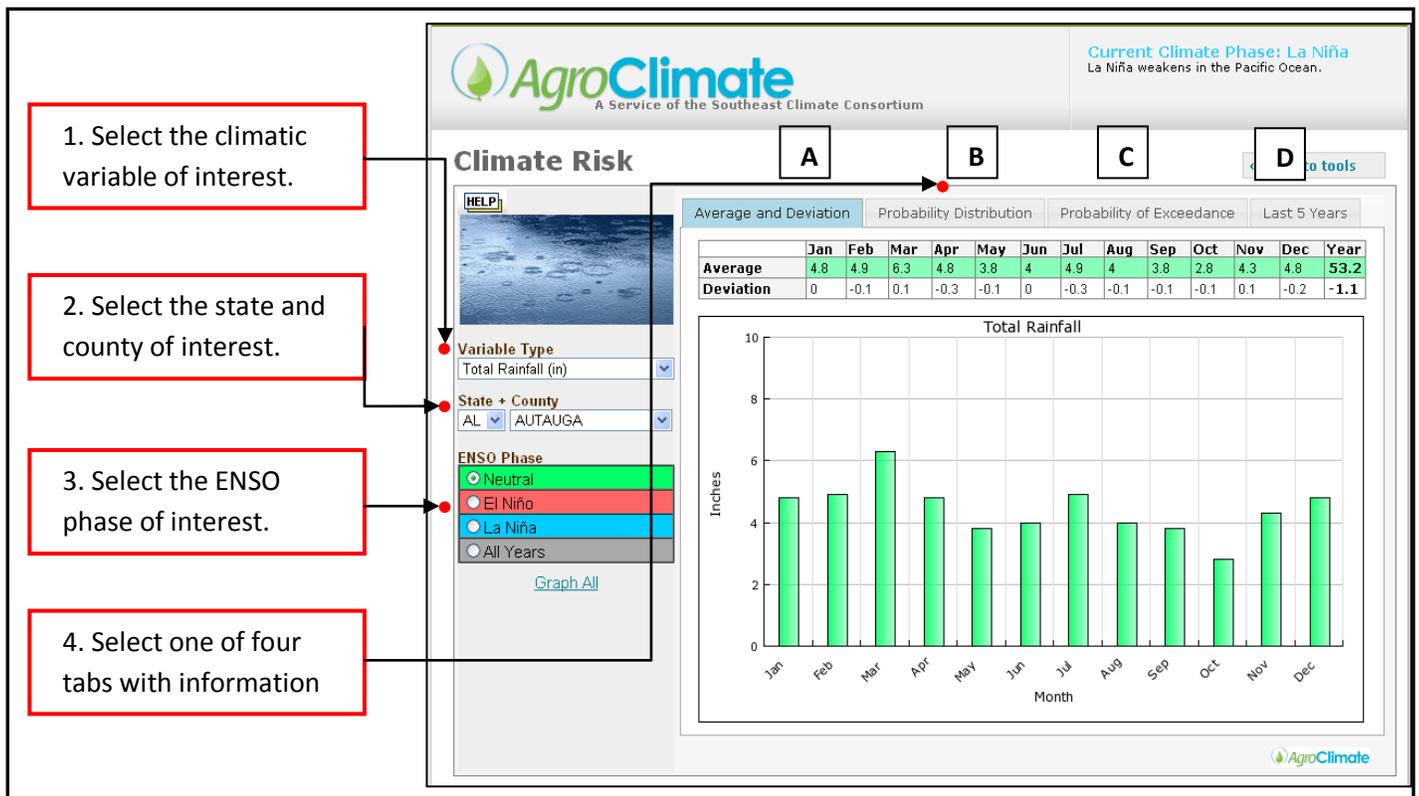
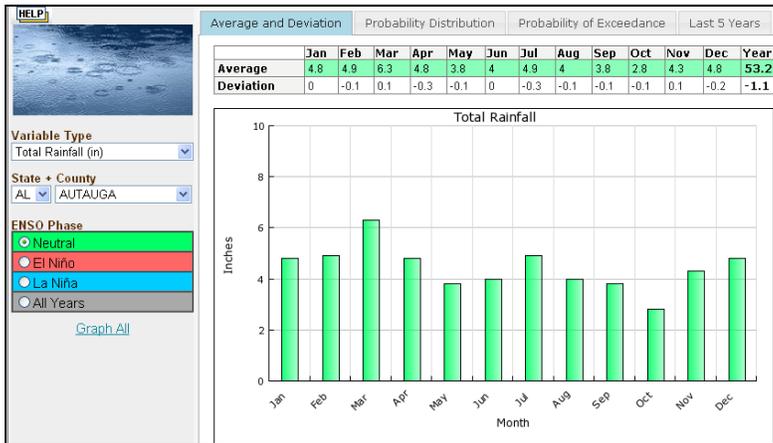


Figure 1. Steps to start searching for climatic information by ENSO phase using the Climate Risk Tool.

Information available in the Climate Risk Tool

1. Average and Deviation

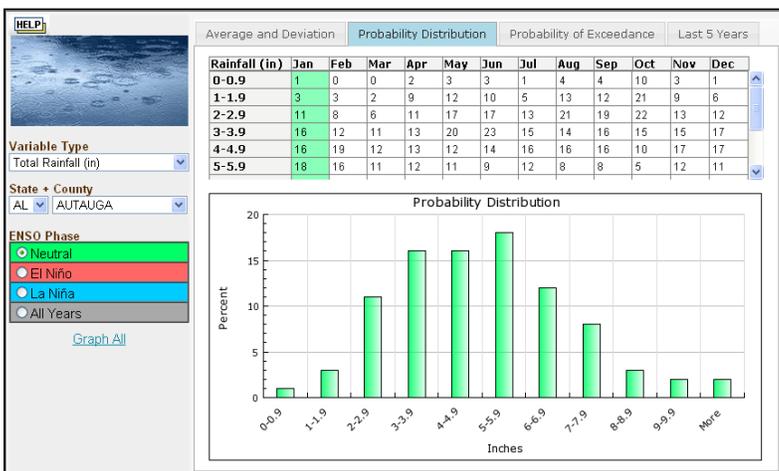
The information on the **Average and Deviation tab** allows the user to assess the average expected monthly climatic conditions (rainfall or temperature) for a specific county. Understanding how monthly rainfall and temperature might change under an ENSO phase could be used to adjust or change management strategies such as planting and harvest date, variety/hybrid selection, irrigation, fertilization, pesticide and fungicide application, and water store, among others. By clicking on the **Average and Deviation tab**, a bar graph and table are displayed with average monthly information of the historic total rainfall or average minimum and maximum temperature values by ENSO phase.



The deviation values correspond with the amount by which the historic average values for a specific ENSO phase differ from the average conditions for all years (Niño, Niña, and Neutral) where data is available. A positive deviation indicates increased rainfall or temperature respect the expected normal while negative deviations indicate a deficit.

2. Probability Distribution

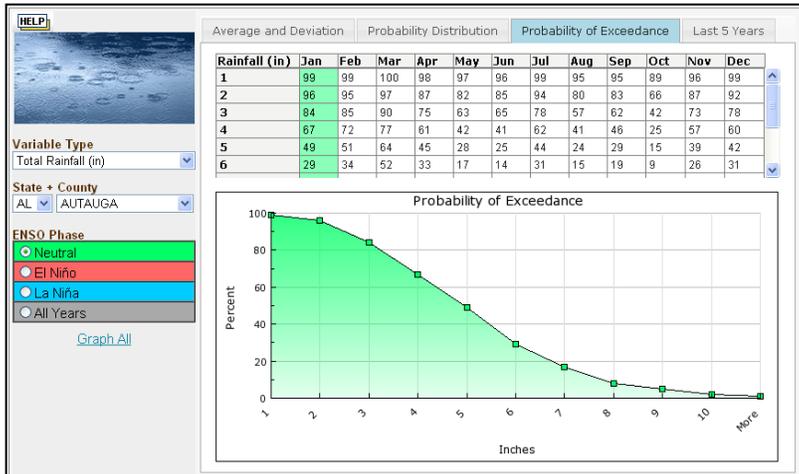
The probability or likelihood of occurrence of rainfall or temperature within a specific range of values is presented month by month. The values on the table indicate the likelihood of occurrence of a specific rainfall or temperature range within a specific month. The higher the likelihood value, the greater the chance of occurrence of an expected condition. Climate-sensitive decisions that farmers make routinely, such as adjusting irrigation and fertilization strategies, planting date, application of fungicides or pesticides might be tailored by using the information presented through this option.



By selecting a month/column on the table, the monthly likelihood values for various ranges of rainfall or temperature amounts are displayed on a bar graph. *While average values provide an estimate of what to expect, the probability distribution highlights the risk that exists in basing the forecast solely on that average; specifically the possibility that the actual value of the variable will be more or less than the average.*

3. Probability of Exceedance

The average expected conditions for a specific ENSO phase are presented in the Average and Deviation tab. On the Probability of Exceedance tab, the probability or likelihood that an expected value will be exceeded is displayed. The values on the table indicate the likelihood/chance of exceeding a specific rainfall or temperature value within a specific month. The higher the likelihood value, the greater the chance of having a higher amount of an expected condition (e.g., rainfall or temperature). For example, on the figure below, for the month of January, there is a 99% likelihood of receiving rainfall higher than 1 inch and in contrast only a 39% likelihood of receiving more than 6 inches.

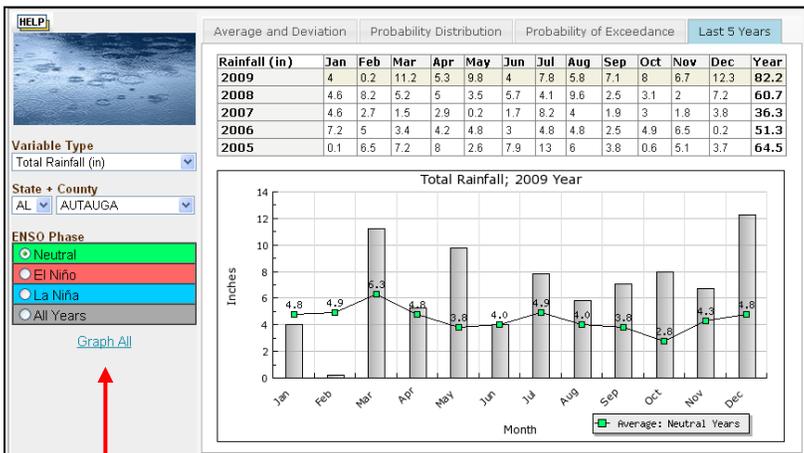


By selecting a month/column on the table, the monthly likelihood of exceeding a specific value of rainfall or temperature is displayed on graph.

The risk of flood occurrence, drainage requirements, risk of heat stress, or opportunities for water storage, could be assessed by using the information presented in this option.

4. Last 5 Years

Learning from past climate events could help us to prepare for the future. The option “Last 5 years” in the Climate Risk Tool allows assessment of monthly deviations in rainfall and temperature occurred in the past with respect to average conditions under a specific ENSO phase.



The values on the table correspond to the observed values of monthly total rainfall or average temperature for the last most recent five years.

On the graph comparisons can be made from the observed values with respect to the average values of either rainfall or temperature for each ENSO phase.

Note: Graph All option: In all tabs users can compare the information for all ENSO phases by clicking in the “Graph all” link provided underneath the ENSO selection menu.

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