ENSO Forecast for Early- to Mid-2014

The farming and natural resources community in the Southeast USA has been questioning the most recent weather events and looking for information on the climate forecast for the spring months. This short note presents a summary of the climatic conditions during the winter, spring, and summer of 2014.

2014 winter climatic conditions influenced by the Neutral phase of ENSO

Because the winter and spring climate across the Southeast USA is strongly influenced by the ocean-atmospheric conditions in the equatorial Pacific, an understanding of these conditions can help us understand the climate forecast and prepare for it. As of early January 2014, the ocean-atmospheric conditions, mainly sea surface temperatures (SST), in the equatorial Pacific region (Nino 3.4 region) that are constantly monitored to characterize an El Niño-Southern Oscillation (ENSO) event have been categorized as the Neutral phase of ENSO. In December 2013, the SST anomaly (departure from long-term average) in the Nino 3.4 region was in the neutral range (within ±0.5°C with respect to the long-term average). Also, the most recent weekly SST anomaly in this region was 0°C. These conditions indicated that the winter of 2014 lies in the Neutral ENSO phase, and our winter climate will be without a strong influence from El Niño (wetter and colder conditions in the Southeast) or La Niña (drier and warmer conditions in the Southeast), which suggests that the winter climate conditions can be less predictable and more variable.

The Neutral phase is expected to continue into the summer of 2014

There is a high likelihood of neutral ENSO conditions enduring through winter and into the summer of 2014. The probability of occurring the Neutral phase is more than 50% until the May-July period. Current forecast probabilities are still greatest for ENSO-neutral during summer (Figure 1). For more information, visit the website of the Climate Prediction Center: http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/ensouadvisory/ensodic.html
Figure 1. The probability of occurrence of each of the three ENSO phases during various time periods in 2013/2014 (source: [http://iri.columbia.edu/our-expertise/climate/forecasts/enso/2014-january-quick-look/?enso_tab=enso-cpc_plume](http://iri.columbia.edu/our-expertise/climate/forecasts/enso/2014-january-quick-look/?enso_tab=enso-cpc_plume)). This probabilistic forecast was made in early January (the 9th) 2014. This is a consensus forecast, which was produced after combining several multi-model generated forecasts. On the y-axis are probability values in percentage, and on the x-axis are various 3-month time periods. The DJF period comprises the period of December, January, and February; the JFM period comprises the period of January, February, and March; and so on. In all time periods shown in the figure, the Neutral phase (the green, tallest bar) dominates the other two phases, but significantly so until the period of MJJ, indicating that the Neutral phase will persist until this period. The forecast also shows that while the probability of Neutral is decreasing, that of El Niño (red bars) is increasing. The probability of La Niña (blue bars), however, is minimal until the period of ASO.

What can we expect for precipitation and temperature under a Neutral ENSO phase?

The ENSO signal is not the same in all areas of the Southeast. The strength of connection between the SST in the equatorial Pacific region and the weather condition in a location in the Southeast decreases as moved away from the Coast. For example, the ENSO signal is stronger in Florida and the southern parts of Alabama and Georgia than in the northern parts of Alabama and Georgia. Therefore, the effects of any of the ENSO phases phase in terms of precipitation and temperature varies not only across states within the Southeast but also across locations within a state. As discussed above, the Neutral ENSO phase is the current forecast for the upcoming months. Historical weather records belonging to the years classified as Neutral, do not show a strong trend for either colder-wetter or warmer-drier conditions during Winter and Spring months. For example at Belle Mina, North Alabama, for instance, years under the influence of a Neutral ENSO phase have recorded drier than average conditions in February, September, October, and November and wetter conditions in March, May, June, and August (Figure 2a). For Headland, South Alabama, on the other hand, years under the influence of a Neutral ENSO phase have recorded wetter conditions during January-March, May-June, August-September, and November and drier conditions in April and August. In terms of temperature, years under the influence of a Neutral ENSO phase have recorded warmer conditions in April, June, October, and November and cooler conditions in January, March, May, August, September and December for Belle Mina, whereas warmer conditions during February-April, July, and November and cooler conditions in January, August, September and December for Fairhope (Figure 2b).
Figure 2. Monthly departures of (a) precipitation and (b) temperature from their long-term averages for various months of the year for two locations in Alabama.

The above information can be obtained from the Climate Risk Tool (http://agroclimate.org/tools/climate-risk/) of the AgroClimate.org, a web-resource of tools and data on climate and crops that can be used to assist with decisions about the management of agricultural systems in the southeastern U.S. More information about using the Climate Risk Tool is available at: http://sites.aces.edu/group/timelyinfo/Documents/june_2011.pdf.

Although the weather conditions in the Neutral phase, relative to those of El Niño or La Niña, are closer to average conditions (no tilt towards wetter and cooler or drier and warmer), the Neutral phase years have been found to be associated with increased risk of damaging freezes. For instance, severe freeze occurred in Florida in 1894, 1815, 1899, 1934, 1940, 1962, 1981, 1983, 1985, 1989, and 1997, all Neutral years, and caused devastating damage to citrus (http://flcitrusmutual.com/render.aspx?p=/industry-issues/weather/freeze_timeline.aspx).

Climate outlook for winter (January through March) 2014

On December 2013, NOAA’s Climate Prediction Center issued its seasonal outlook for January through March 2014 (Figure 3). The outlook favors precipitation below normal in the Southwest and Southeast and above normal in Alaska. The temperature outlook favors warmer-than-normal conditions in northern Alaska and across parts of the South. Below-normal temperatures are favored in the Northwest and southern Alaska. Both maps have large regions with EC (equal chances), meaning there is no tilt toward either above- or below-normal temperature or precipitation.

The outlook shows that neither El Niño nor La Niña is likely to influence the climate during the winter. When the probability of either El Niño or La Niña is minimal, recent climate trends are generally used to get insight about the future climate. Previous 15 winters have not been much different from an average winter of 30 years (1981-2010). In the southern part of the country, the trend has been for slightly less precipitation. The trends for temperature have been even less significant than those for precipitation.
Figure 3. Maps showing the climate outlook for the period of January-March 2014. The contours on the map show the total probability (%) of three categories: *above* normal (indicated by the letter "A"), *below* normal (indicated by "B"), and *near* normal (indicated by "N"). Normal is the 1981-2010 period average. The letters "EC" stand for equal chances for A, B, and N. At any point on the map, the sum of the probabilities of the three categories is 100%. Once the climate forecasters decide about the most likely outcome (favored category), this category is assumed to exceed 33% probability and N is assumed to have 33% probability. Then, the probability for the other category is computed as 100 minus the sum of the probabilities of these two categories. Figure 3 shows that the probability of *below*-normal (B) precipitation for the Southeast during winter is 40%, which means the probability of N is 33%, and the probability of A is 100-(40+33) = 27%. For the central part of Alaska, the most likely category for precipitation is A (*above*-normal), with the probability of 40%. The probabilities of N and B in this region are then 33% and 27%, respectively. In the regions with EC (equal chances), the probability of each category is equal (33%).

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