Session: B5 Oral presentation

Developing rainfall onset information for agriculture in Senegal, including the distinction of true and false onset events.

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In the unimodal semiarid environment of Senegal (in the western Sahel), the start of the wet season is a crucial factor in deciding when and what crop to plant. Farmers in Senegal depend entirely on the start of the rain, the date for which varies substantially from year to year. Furthermore, the first rain event is often followed by a dry spell (termed a false start), which can result in farmers planting a crop only for it to fail due to the dry spell. Any reliable information on the actual start of the rainy season is of great potential value. The onset of the rainy season is the starting clock for many activities in Senegal from agricultural activities, population movement from rural areas to the city, emergence of certain diseases, and preparedness for seasonal flooding. This research is therefore targeted toward a weather/climate feature with great societal relevance, for which advances in understanding can be expected to lead to important product improvements. Using daily rain gauge data we identified two homogeneous onset regions over Senegal: a northern region with climatological late start of the onset (around end of June) and a southern region with earlier start around the end of May. Indices were calculated for the onset date each year in each region, including indices that identified false start events and true start events. The onset in each region is diagnosed in terms of (i) regional scale atmospheric features (from the NCEP/NCAR reanalysis) before and during the rainfall onset, and (ii) sea-surface temperature (SST) boundary forcing altering the probability of early versus late onset. For (i), at the synoptic time scale, we found the onset over Senegal is strongly controlled by the regional scale atmospheric system with clear eastward propagation around the onset, with a slower easterly propagating system for the southern region. We also identify distinguishing meteorological features of a false onset (i.e. early rain event followed by dry spell): a persistent negative anomaly of precipitable water located at the western fringe of Senegal, usually followed after the rainfall event by a strong advection of cold air from the North inhibiting convection. These diagnostics provide potential for enhanced products providing early warning of onset, including information about the risk of false onset. For (ii), the onset over the northern region has relationship with the large scale ocean-atmosphere signal developing in June-July throughout the global tropics, whereas onset over the southern region is influenced by the SST gradient over the tropical Atlantic around May. Thus the SST influence appears to change as the annual cycle advances from May to July. Again, the results offer the prospect of improved early warning products for rainfall onset.