

**Progress in American monsoon research: Droughts over South America based on the U. S. CLIVAR drought experiments**E. Hugo Berbery<sup>†</sup>; Kingtse Mo<sup>†</sup> University of Maryland, USALeading author: [berbery@atmos.umd.edu](mailto:berbery@atmos.umd.edu)

This study employs observations and the model simulations from the U. S. CLIVAR Drought Working Group to examine the underlying large scale forcings that favor drought and wet spells that persist more than one season over South America. These events tend to persist over northeastern Brazil, the Guianas and the west coast of Colombia, Ecuador and Peru. They are least likely to persist over southeastern South America, which includes Uruguay, southern Brazil and northeastern Argentina. The U.S. CLIVAR simulations, particularly those of the NCAR CAM3.5 model, capture satisfactorily the impact of El Niño-Southern Oscillation (ENSO) and the North Tropical Atlantic (NTA) Sea Surface Temperature Anomaly (SST) signals on persistent extreme events and reproduce the known mechanisms inducing the teleconnection patterns, particularly related to the modulation of the Walker circulation and the regional Hadley cell. The cold (warm) ENSO favors wetness (dryness) over Venezuela, Colombia, and northeastern Brazil and dryness (wet spells) over southeastern South America and southern Argentina. The NTA SSTAs alone tend to have a more local impact affecting mostly northern South America. However, the simulations show that when opposite phases of the two modes (ENSO and NTA) are present, the effects may become noticeable in different and remote areas of the continent, as they shift the probability of drought and persistent wet spells over different regions of South America. The case of southeastern South America is emblematic. Previous assumptions have been that La Niña effects alone are responsible for drought. It is shown here that stronger dry anomalies develop when the cold Pacific is complemented with a warm Tropical Atlantic. In general, for the cold (warm) Pacific and warm (cold) Atlantic, droughts (persistent wet spells) are intensified over southeastern South America, while persistent wet spells (droughts) are favored over the northern part of the continent. The changes in the patterns are regional and not as intense when both oceans are warm (or cold).