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A new conceptual model for evaluating interannual variability in West Africa.

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West Africa, notably the region termed the Sahel, experiences extreme interannual variability of rainfall that is coherent on quasi-continental scales. Teleconnections among various regions of the continental are therefore strong. This is particularly true for the semi-arid Sahel and humid Guinea Coast to the south of it. Building on many years of research experience in the region, we have developed a new paradigm or conceptual that builds on a certain simplicity of the patterns of interannual variability and that allows a complex set of factors (including land and ocean) to be fit into a comprehensive picture. This paradigm is developed using two principal configurations of rainfall anomalies, one in which anomalies are of uniform sign throughout the Sahel and Guinea Coast and one in which a dipole, with anomalies of the opposite sign in the Sahel and Guinea Coast, characterizes the region, Roughly 80% of the years fall into one of these patterns.

The essence of the conceptual model is that these patterns can be explained by a combination of a latitudinal displacement of the African Easterly Jet and associated disturbances and rainfall plus a general intensification or weakening of the tropical rainbelt in the region. We are validating this paradigm through a combination of observational studies and numerical modelling efforts. These involve studies of general circulation features, wave development and evolution, and precipitation. The basic questions are what pushes the AEJ and rainfall northward into the Sahel and what governs the intensity and structure of the "rainbelt". Temperatures in the Atlantic Ocean (particularly the Gulf of Guinea) are important in the former question, and the interrelationship between the AEJ and TEJ are important in the latter.