Abstract

Examining the Effect of Concurrent Sea Surface Temperature Anomalies on Caribbean Rainfall

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Enfield and Alfaro (1999), hereafter EA-99, found a relationship between enhanced rainfall over the Caribbean basin associated with oppositely signed anomalies over the Pacific and Atlantic, in particular a cool Pacific/ warm Atlantic scenario. They use the singular value decomposition (SVD) technique to achieve their results.

Their analysis is repeated in this study but with the year divided into four periods, namely two dry (November to January and February to March) and two wet (May to July and August to October) seasons. This is instead of one mean wet and dry season spanning May-November and December to April respectively as was done by EA-99. The aim is to see whether the relationship between Caribbean rainfall and the presence of concurrent and oppositely signed SST anomalies in the tropical Atlantic and Pacific holds true throughout the course of the year. This is done as (i) later research shows that the primary modulators of Caribbean rainfall changes as the rainfall season progresses (ii) little work has been previously done on modulators of the Caribbean dry season.

The first two modes from the SVD analysis are shown to represent variability due to ENSO and the north tropical Atlantic (NATL) respectively. ENSO appears to have greatest impact on the late rainfall season and the early dry season while the tropical Atlantic controls variability in the early rainfall season, MJJ.

We find that the configuration of concurrent but oppositely signed SST anomalies in the equatorial Pacific and the equatorial/north tropical Atlantic, (in particular a cool Pacific-warm Atlantic scenario), is only associated with rainfall enhancement in the late Caribbean rainfall season and the early Caribbean dry season.

Keywords: Caribbean; El Niño, tropical Atlantic sea surface temperature; anomalies; rainfall; singular value decomposition.