

## ABSTRACT

Caribbean Precipitation Variability:  
“Another Look at its Relationship with the Tropical Atlantic–Pacific SST Gradient”

Leonardo Adalpus Clarke

Studies examining the year-to-year fluctuations in Caribbean rainfall have discovered relationships between its variations and the variability in sea surface temperatures (SSTs) of the equatorial Pacific and the tropical North Atlantic. Early studies proposed a Caribbean – El Niño Southern Oscillation (ENSO) relationship in which equatorial Pacific SST anomalies influence the Caribbean late rainy season. These studies show a tendency for reduced rainfall on the late (September to November) rainy season in an El Niño year. More recent studies have also shown a wetter early (May to July) rainy season in an El Niño +1 year. With respect to the tropical North Atlantic, studies have also revealed that warm SSTs in this region are associated with more extensive warm pools and more rainfall over the Caribbean.

This study investigates the link between Caribbean rainfall variability and variations in a “tropical North Atlantic – equatorial Pacific” SST gradient. Statistical analysis confirms that a positive gradient index represented by a warm Atlantic and cool Pacific enhances rainfall over the Caribbean and Central America. The RegCM model is used to further investigate the SST gradient- Caribbean rainfall relationship. The model is, however, first validated for the Caribbean region. A ‘best configuration’ of the model in terms of its convection and ocean flux schemes is determined. Thereafter, Caribbean rainfall is simulated under differing scenarios of modified SST in the tropical North Atlantic and/or equatorial Pacific representing different gradient configurations. The role of a warm tropical Atlantic in preconditioning the region for rainfall is confirmed. It is also shown that a positive gradient otherwise constituted (e.g. a normal Atlantic and cool Nino 3) does not yield an enhancement of Caribbean rainfall.

Keywords: Leonardo Adalpus Clarke; SST gradient and Caribbean rainfall.