



Environmental links to reduced cyclogenesis over the south-east Caribbean

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Cyclone formation over the Caribbean is not evenly distributed across the basin. Previous work identified the south-western sector as the area that dominates the hurricane activity of the whole basin. The south-eastern sector in contrast, exhibits a distinct suppression in cyclogenesis and the local hurricane activity there does not demonstrate the bimodal distribution found in the Caribbean as a whole. This study seeks to identify the restricting factors that differentiate the climatology, in terms of cyclogenesis, for the South-east Caribbean. It is based on statistical analysis of eight selected environmental variables using Principal Component Analysis. The first three components are examined in detail. The first component, accounting for almost 40% of the variance within the tropical North Atlantic represents the difference in the climatology between the South-west Caribbean, and the rest of the analysis region. The second component, accounting for 23.4% of the variability in the data, describes the differentiation of the cyclogenesis climatology in terms of the thermodynamic background and the meridional component of the low level wind-field within the tropical North Atlantic. The third component accounting for 13.2% of the overall variance, indicates the climatology of the Southern Caribbean as distinctive in terms of the high variability in the intensity of the easterlies that reach their peak in the central Southern Caribbean. The south-eastern sector in particular, is characterized by a strong signal in the third component, meaning high easterlies, and small values of the second component, because of the relatively low potential intensity and a local northward wind component. These are associated with a divergence pattern that appears to render the south-western, rather than the south-eastern sector as a favorable area for development of cyclonic vortexes within the trough of the Easterly waves.