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Title:

**Precipitation trends in the Caribbean and surrounding region during the regional sea surface temperature warming period from 1982-2012**

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Abstract:

Precipitation trends were analyzed for the Caribbean and surrounding region for the 1982 – 2012 period. A recent warming trend of sea surface temperatures (SST) has been detected in this region for the same period, which could have potential implications for precipitation variation. Results show that SSTs are increasing annually for the region and slightly faster than the annual global rate of 0.011°C per year. The two Caribbean rainy seasons, the Early Rainfall Season (ERS) from April to June and the Late Rainfall Season (LRS) from August to November, also show an increase in SSTs for the 30-year period. Increases in SSTs during the LRS are of particular importance because temperatures during this season reach 26°C and above, which is the threshold for deep convection. Within this temperature range, the atmosphere becomes the principal modulator of thermal convection. In this way, SSTs influence Tropical precipitation. The precipitation analysis, using the Global Precipitation Climatology Project (GPCP) monthly precipitation dataset, shows that the past 15 years (1997-2012) average precipitation for the LRS has been slightly above the climatology calculated from the year 1979 to 2012. Results suggest that the observed increases in SSTs may be connected to the changes in precipitation for the same period. SST daily anomalies reflect a warming trend over the past 15 years, which further suggests the significant influence that SSTs potentially have on precipitation. During the ERS, warming SSTs in the region North of South America

and above the threshold for vertical convection were found to be highly cross-correlated (0.79) with precipitation. For the LRS, cross-correlation with precipitation and the SSTs near South America also show a high, positive cross-correlation (0.78), similar to ERS results. Our results show that the positive correlation is potentially marked by an increase in precipitation over the latter half of the period (1997-2012). Furthermore, linear and nonlinear analyses of precipitation trends reveal that the areas determined to be statistically significant are primarily over ocean versus trends observed over land.

# Precipitation trends in the Caribbean and surrounding region during the recent sea surface temperature warming period, 1982-2012

- SST warming detected for the past 30 years
- Most intense warming during the past 15 years
- Rainfall increase during the LRS during the latter half of the

