**Detection of Recent Regional Sea Surface Temperature Warming in the Intra-Americas Region, 1982-2012**

**Abstract**
We report a recent sea surface temperature (SST) warming trend occurring in the Intra-Americas Region (IAR) over the 1982 – 2012 period. The IAR, defined as the geographical region that includes the Caribbean, Mexico, Central America and parts of North and South America, is a distinctive region of dynamic climatological phenomena that is particularly sensitive to climate changes. Using an optimum interpolated SST (OISST), 0.25° resolution data product of the National Oceanic and Atmospheric Administration (NOAA), a 30-year climatological analysis was generated to observe annual, monthly, and seasonal trends. Results show that SSTs are increasing annually for the region at a rate of approximately 0.015°C/year. For the two Caribbean rainy seasons, the Early Rainfall Season (ERS) and the Late Rainfall Season (LRS), estimated trends at 0.0161°C/year and 0.0209°C/year were observed, with high statistical significance. Sub-regional gridded analysis revealed that warming is greatest in the Gulf of Mexico and North of South America during the ERS and LRS, also with high statistical significance. Additionally, LRS averages for 1998-2012 reflect an increase in magnitude and intensity of the Atlantic Warm Pool (AWP) since the 1983-1997 period reflected in the AWP Area Index. The AWP Area Index, the region with temperatures above the threshold of 28.5°C, shows a clear expansion of close to twice its size over this 1988 – 2012 period. Extreme increases/decreases in time series show potential correlation with El Niño and the Southern Oscillation (ENSO) while in the El Niño (positive) phase.

**Data Description**

<table>
<thead>
<tr>
<th>Product</th>
<th>Source</th>
<th>Mode of Retrieval</th>
<th>Availability</th>
<th>Resolution</th>
<th>Time Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>OISST (Optimum Interpolation SST)</td>
<td>NOAA NCDC (National Climatic Data Center)</td>
<td>Daily Data</td>
<td>Advanced Very High Resolution Radiometer (AVHRR) Satellite Data Sea Ice Data</td>
<td>Daily</td>
<td>0.25°</td>
</tr>
</tbody>
</table>

**Results**
IAR is a significant region of various climate activity and variability:
- SSTs and air temperatures show statistically significant regional and local warming trends within the IAR – annually and per season.
- OISST data can be used to detect the Atlantic Warm Pool (AWP) variability and intensity (Fig. 4); AWP has significantly increased in size over the 1982-2012 period.
- Cross-correlations analysis shows significant correlations between warming Caribbean SSTs and precipitation in areas experiencing the greatest warming.

**Future Work**
- Precipitation analysis for the same time period 1982-2012
- Upper atmosphere analysis using NCEP large gridded datasets to detect possible changes in the Caribbean Low-Level Jet (CLLJ)

**Methodology**
The SST analysis for this study was conducted on both a regional (spatial-average) basis and a per-grid basis using NOAA’s Optimum Interpolate sea surface temperature product (OISST). The regional analysis includes the estimation of annual, monthly (not shown), and seasonal trends (slopes) and the per-grid analysis includes estimations of annual and seasonal trends. The linear statistical significance (p-value) of each of these trends was calculated. Trend values were determined to be statistically significant if the calculated p-value was less than 0.025. The degree of change (slope) and the significance (p-value) were determined using a linear regression analysis and a two-tailed t-test, respectively. For this study, the February 29th leap year days were excluded (a total of 8 leap year days).

**Hypothesis**
The SST-driven Atlantic Warm Pool (AWP), The Caribbean Low Level Jet (CLLI) and other regional and global phenomena, such as ENSO, play a key role in controlling and modulating local climate changes that are affecting specific sensitive ecosystems.

**References**

**Acknowledgements**
This research and poster was made possible by the National Oceanic and Atmospheric Administration (NOAA), Office of Education Partnership Program award NA11SEC4810004 and by the US Department of Education – Earth Science and Environmental Sustainability (ESES) Graduate Initiative, award P031M105066. Its contents are solely the responsibility of the award recipient and do not necessarily represent the official views of the U.S. Department of Commerce, NOAA or the US. Department of Education.