

The Vaisala logo is displayed in white, bold, uppercase letters on a blue background.

ILDC/ILMC Strikes Again
Network with lightning
experts from around the world

April 27-30, 2020
Broomfield, Colorado, USA

www.vaisala.com/ILDC



Characterizing Lightning Activity Across the Caribbean

Authors

Dr. Andre Coy - University of the West Indies, Mona

Ms. Cherri-Ann Farquharson - University of the West Indies, Mona

Prof. Michael Taylor - University of the West Indies, Mona

Dr. Tannecia Stephenson - University of the West Indies, Mona

Ms. Candice Charlton - University of the West Indies, Mona

Abstract

Seventy-eight percent (78%) of global lightning production occurs in the 30°S – 30°N band, which includes the Caribbean, located between 10N – 19N. While lightning events are widely studied throughout the world, there is very little documented work done in the Caribbean. Using data from January 2014 to December 2018, this study seeks to characterize lightning activity across the Caribbean by examining:

- the temporal and geographical variations of lightning over the islands;
- the relationship between lightning activity and stability indices and
- lightning climatology across the region.

Previous studies of lightning activity across Jamaica have provided a starting point for the current study. Spectral analysis revealed significant 24hr and 12hr periodicities in lightning activity over land and near shore. More than 90% of lightning activity occurred during May to November with most strikes occurring during August and September. This coincides with the highest temperatures and the early and late rainfall seasons on the Island. Spatial analyses revealed the predominance of lightning activity where convection was aided by the prevailing winds and topographic lift. These analyses will be performed for the Caribbean region in order to have a comprehensive understanding of lightning activity in the Caribbean.

From the previous studies, several stability indices were found to have significant relationships with lightning occurrence in Jamaica. The current study significantly extends the previous work done in Jamaica by exploring the relationship between these indices and lightning activity in the entire Caribbean region. A database of lightning data from the Vaisala GLD360 lightning data set, for the years 2014-2018, is employed in the study. This work is the first to perform a comprehensive analysis of lightning activity across the Caribbean. The analysis highlights the changes in lightning activity across the region and attempts to identify the drivers of this variability.

The product of convective available potential energy and precipitation rate has been shown to be related to lightning flash rates and has been used as a proxy for future lightning activity under climate change. However, there is no evidence that this proxy is suitable for the Caribbean. Further analysis of relevant stability indices is undertaken, to determine a suitable proxy for lightning flash rates in the Caribbean. Projected changes in the proxy are used to estimate long term changes in lightning activity under various atmospheric warming scenarios.

Topic Areas

Lightning Climatology

Submission Format

Oral