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Lightning Characteristics in Relation to Hurricane Intensity

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Abstract

We focus on examining lightning trends for hurricanes that occurred during the 2018-2019 hurricane season. To do this, we utilize the Geostationary Lightning Mapper (GLM) to investigate total lightning activity in each hurricane relative to hurricane structure and evolution, similar to previous studies (Molinari,1999; Cecil,2002; Demaria,2012; Bovalo,2014; Xu,2017). GLM and ground-based data from the Earth Networks Total Lightning Network (ENTLN) are combined to leverage the strengths of each detection method. This methodology allows for a more complete estimate of lightning activity than one detection method can provide alone, and enables the derivation of the cloud flash fraction (CFF) and cloud pulse fraction (CPF) for each hurricane. In particular, details of the evolution of the CFF and CPF in time and space are presented. In addition, lightning stroke spatiotemporal trends are compared to lightning flash trends, and GLM flash characteristics are tracked and compared to wind-speeds. Results for each individual hurricane as well as average trends and correlations in lightning characteristics and hurricane intensification are revealed. This research represents a new application of lightning data that can be used in the future study of tropical cyclone intensification and weakening.

Topic Areas

Lightning Detection from Space: Performance, Research and Applications, Lightning and Weather

Submission Format

No preference