



High Density Lightning Cluster and Satellite Detected Fire Events in India

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Every year, there are major fire events in India initiated by lightning strokes. Due to the effect of climate change, there is a significant increase in lightning-initiated disaster events. We perform a detailed study to correlate lightning and fire events in India. We examine the lightning stroke-count data provided by World Wide Lightning Location Network (WWLLN) and Active Fire Data (AFD) by Moderate Resolution Imaging Spectroradiometer (MODIS) aboard the Aqua and Terra satellites. We carry out a density-based analysis using DBSCAN clustering algorithm. The clustering algorithm is applied on daily lightning stroke level data from specific period of interest. A minimum of three lightning strokes in 20 km radius are taken as minimum points and epsilon distance parameters in our algorithm, respectively. We focus on high density clustering because of the higher probability of lightning initiating fire. From our analysis and visualization in Spyder Python environment, it is observed that lightning stroke clusters having stroke-counts/20 km² greater than 150 have higher probability to initiate a number of fire events. The clusters are tracked for days rather than hours, in order to create a better visualization of lightning stroke cluster movement. This way we can predict possible fire events, especially in dry zones. We are working on a lightning stroke cluster tracking algorithm to predict the spatio-temporal evolution of the active thunderstorm cells. With the help of low-latency live lightning data, and proper fine tuning of our algorithm, we can prevent any major fire-related disaster from gaining momentum in the future.

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