

Relationship between WWLLN lightning, ERA5 CAPE, and CP over Northern Region of India

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Abstract

Lightning activity is considered as one of the natural hazards that poses serious risks on human life. Globally lightning activity has been increased drastically and it is directly associated with different thermodynamic parameters. A number of studies have been carried out to examine the relationship between lightning with different meteorological and thermodynamic parameters. Recent study reported that climatology of north India has been significantly changed in last decade due to strengthening of south-westerly monsoon wind, which lead to more rainfall over northwest India. In this study we have examined the association between WWLLN lightning with ERA5 CAPE and CP over the northern region of India. Monthly gridded worldwide lightning location network (WWLLN) data, ERA5 CAPE and CP datasets have been used from 2010 to 2021 for the analysis, which depicts the different relationship between lightning with CAPE and CP in pre-monsoon and monsoon season over the region. Lightning shows the good relationship with CAPE in monsoon season (correlation coefficient = 0.4) as compared to pre-monsoon season (correlation coefficient = ~ 0.001), whereas lightning shows strong correlation with CP in pre-monsoon season (correlation coefficient = 0.8) as compared to monsoon season (correlation coefficient = 0.2). Strong relationship between lightning and convective precipitation in pre-monsoon season is probably due to strong vertical updraft as a result of surface heating over the region. Furthermore, in monsoon season increased amount of rainfall cools the surface more which leads to lower association. Availability of more moisture during monsoon season could be one of the reason for the good association between CAPE and lightning.

Early Career Scientist

YES, I am an early career scientist.

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