

What Does The Lightning Flash Rate Measure ?

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Storms that produce lightning are more vigorous than storms that do not; storms that produce much lightning are more vigorous than storms that produce less. Yet lightning data is largely ignored in meteorological models. Perhaps this is because we have not said more quantitatively what "more vigorous" means. There are quantitative theories, involving density or fluxes of precipitation and cloud ice, but as yet these theories have not caused most meteorologists uninterested in atmospheric electricity to use of lightning data to improve diagnoses of meteorological parameters.

In an attempt to show how much we already know, I should like to show variations in lightning flashing rates of "meteorologically equivalent" storms, for various definitions of "meteorologically equivalent". The variation will quantitatively describe how much we already know about what the flashing rates tell us about meteorology. An examination of what is correlated with that variation will hint how we might improve our theories of what causes lightning. In particular, I shall discuss the variation with variation in the meteorological regime (forcing, adjusted state, density of other convection) that produced this storm. The "meteorologically equivalent" storms will be drawn from a database of 100000 storms viewed by the TRMM satellite and related to NCEP analyses of the environment of those storms.