



Lightning Power Index: A new tool for predicting the lightning density and the potential for extreme rainfall

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A "Power Index" was derived from simulated Weather Forecast and Research Model (WRF) cloud fields and shown to correlate well with simulated model precipitation. The Power Index is a measure of the potential for charge build-up that leads to lightning flashes in convective thunderstorms. It is calculated in the charge separation region of simulated clouds between the 0°C and -20°C isotherms, in which the non-inductive charge separation mechanism is most effective by collisions of ice and graupel particles in the presence of super-cooled water. Several historical cases in Israel, Italy and Spain were simulated to demonstrate the potential for this index to be used in conjunction with lightning observations to predict the onset of heavy convective rain that resulted in extreme hydrological discharge (flash flooding).