



Warning thresholds for thunderstorm intensity based on lightning location data

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National hydro-meteorological services (NHMS) give routinely warnings regarding thunderstorm-related phenomena such as heavy rainfall, wind gusts and downbursts, tornadoes and large hail. One of the main challenges regarding these high-impact phenomena is the difficulty of reliable observations in warning perspective; for example, tornadoes and large hail practically always need human observer, and heavy wind gusts only rarely hit an observation station. Lightning is an essential element of any thunderstorm. Also, the amount of lightning has a correlation with the overall intensity of the thunderstorm in question; this is because the strength of the convective updraft governs both the intensity of the thunderstorm but also the electrification process. Because nowadays lightning can be observed with high performance in real time, it is possible to classify thunderstorms into intensity-classes according to the amount of observed lightning.

In this study we present a method to classify the thunderstorm intensity based on 15-minute accumulations of observed lightning. Besides describing the overall method, we demonstrate how it works in an operational weather and safety warning environment at the Finnish Meteorological Institute. Finally, we bring into discussion the different viewpoints regarding the classification of a non-normally distributed parameter such as the amount of lightning.