



Evaluation of the potential use of lightning features as a storm severity indicator in Basque Country.

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The main goal of the present work is to provide evidences of the potential use of lightning characteristics in order to provide the basis for an early detection system of convective storm severity in the ground. In such a way that they can be applied to surveillance tasks and for nowcasting purposes in Basque Country. Particularly for the diagnoses of hail, heavy rain, and other severe phenomena in real-time.

Different studies from different places all around the world indicate that rapid increases in total lightning activity, termed “lightning jumps” (LJ) are produced some minutes (between 1–30 depending of thunderstorm type) prior to the occurrence of severe weather on the ground. Such phenomenon is the basis for the implementation of nowcasting tools for severe weather in different meteorological services.

Lightning data, accessible in Basque Meteorology Agency (Euskalmet) today, comes from a lightning detection system (LDS) that covers our territory with 4 antennas, and are part of LINET lightning detection network. Such a network operates in VLF/LF frequencies and provided different lightning information including cloud to ground (CG) and intra cloud (IC) strokes. Independently of the controversy about some aspects related with the system (very weak CG strokes detection, IC-CG discrimination . . .), we check its utility and usability in order to detect some lighting features potentially precursors of severity. For example, as observed in other countries during thunderstorms events, the increasing ratio of more CC than CG lightning strokes, the sudden rise of total lightning ratio (CG+IC) or the maintenance of a large lightning rate during a relatively large period.

In this study we check relations between surface severity and different lightning indicators calculated each minute, and particularly on LJ during storm episodes that have produced very intense showers (over 30 mm in one hour) and/or very strong wind gusts (that exceed 90 km/h) and/or relevant hail size that exceeds 2 cm in diameter. For this analysis we use several events of severe weather that take place in the Basque Country during the operational period of the LDS available in Euskalmet since 2009.