



## **New perspectives and applications of lightning jump**

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In the last decade, the approach based on lightning data to investigate hail, severe wind and tornadoes has been developed. The method is based on a mathematical model which is detecting sudden increases in lightning activity known as a lightning jump. So far, the lightning jump was successfully used as a proxy for severe weather detection in nowcasting, since it occurs several minutes to roughly 60 minutes prior to severe events (e.g. gusts or hail...). Now, we are expanding the applicability of lightning jump towards climatological assessments of severe events in cases where no radar data are available.

The tested area contains the Istria peninsula which is a part of the northeastern Adriatic coast, an area in the Mediterranean known for its strong convective activity. For the area, lightning data from the LINET network and hail data from the national meteorological service in the 2008-2015 period have been used. Taking into account the specific method objections, the original model for a lightning jump was tailored to handle lightning data without the help of radar. Namely, we developed a 2D lightning strike database with a 2 min time step on a resolution of 4km and we compute lightning jumps for each point of the grid. Using station hail measurements as ground truth at corresponding grid points and statistical methods as mathematical links, the probability distributions of lightning jumps and hail measurements have been connected. Applying these distributions we were able to fill the gaps between station measurements and obtain two-dimensional climatology of hail frequencies based on lightning jumps.