



## **Thunderstorm occurrence in Central Europe under variant atmospheric conditions**

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Severe weather associated with deep convection poses a significant threat to life, property and economy. Hence, the detailed knowledge of the occurrence of thunderstorms is important. A better understanding of the underlying thermodynamic process of thunderstorm development may improve forecasting of such events.

A high-resolution climatology of lightning allows assessing the local risk of thunderstorms. A 6-year analysis (including data of 36 million strokes measured by the LLightning detection NETwork LINET) of the spatial and temporal occurrence of lightning in Central Europe is used.

The data set allows studying local effects, e.g. the influence of orography on the occurrence of thunderstorms, and temporal development, e.g. the diurnal cycle. The analysis reveals spatial and temporal patterns. Overall, the highest numbers of lightning strokes occur in the pre-alpine region of southern Germany; further local maxima exist in low mountain ranges. The lowest number of lightning is present in areas of the North Sea and Baltic Sea. On average a clear annual cycle (maximum June to August) and diurnal cycle (maximum in the afternoon) is present.

Additionally to a general assessment of thunderstorm occurrence, the data was analysed dependent on the predominant atmospheric conditions. The analysis reveals conditions favourable for thunderstorm development and highlights regions affected under different flow regimes. Furthermore, the temporal analysis shows regime-dependent structure of the diurnal cycle.

These analyses may support a better understanding of thunderstorm formation as well as improve forecaster's situational awareness.