



High-resolution climatology of lightning in Central Europe

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Lightning pose a significant threat to life, property and economy. Hence, the detailed knowledge of the occurrence of lightning is important. A high-resolution climatology allows assessing the local risk of lightning. A 5-year analysis (including data of >30 million strokes measured by the LIghtning detection NETwork LINET) of the spatial and temporal occurrence of lightning in Germany and neighbouring areas is presented. The analysis on a high-resolution grid with spatial resolution of 1 km enables identifying local features, e.g. this resolution is high enough to identify TV towers which trigger lightning. The data set allows studying local effects, e.g. the influence of orography on the occurrence of thunderstorms. The analysis reveals spatial and temporal patterns. 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.

Despite a high year-to-year variability of lightning rates, on average a clear annual cycle (maximum June to August) and diurnal cycle (maximum in the afternoon) is present. Additionally to this well-known annual and diurnal pattern, the data show that those are intertwined: the diurnal cycle has an annual cycle, visible in the time of daily maximum which occurs later in the afternoon in summer compared to spring and autumn. Furthermore an annual cycle of mean IC height, i.e. rising IC height during the year with a maximum in late summer, is shown.