Lightning Attachment Estimation to Wind Turbines by Utilizing Lightning Location Systems - DTU Orbit (09/11/2017)

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The goal of a lightning exposure assessment is to identify the number, type and characteristics of lightning discharges to a certain structure. There are various Lightning Location System (LLS) technologies available, each of them are characterized by individual performance characteristics. In this work, these technologies are reviewed and evaluated in order to obtain an estimation of which technologies are eligible to perform a lightning assessment to wind turbines. The results indicate that ground-based mid-range low frequency (LF) LLS systems are most qualified since they combine a wide coverage with a good accuracy for downward lightning. Furthermore, advances in the technology indicate the detection of certain upward lightning events. A correlation between the size of the uncertainty ellipse and the peak current of the lightning detections is presented. Furthermore, lightning data from three different wind power plant locations are analyzed and the impact of varying data qualities is evaluated regarding the ability to detect upward lightning. This work provides a variety of background information which is relevant to the exposure assessment of wind turbine and includes practical examples regarding different LLS data qualities.

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