



## **Lightning occurrence related to various atmospheric circulation types in Europe**

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Lightning has been studied extensively in Europe in the last years as a result of the denser lightning network sensors however, few if none had studied the connection with circulation types on the continental scale. In this study we are using ZEUS lightning network (Kotroni, 2008) data available at every 3 hours per day for the period of 2005-2015. Since the atmospheric instability is more frequent during the summer season, we used six months from each year (from April to September). We extracted data at every 6 hours from Climate Forecast Reanalysis System (Saha et al, 2010) at a resolution of 0.5 degrees for 12 parameters related to atmospheric instability. In order to check their relevance in lightning occurrence, we build a linear model where we included each of them. Then, a step-wise regression was used to check their importance. Based on their statistical significance, we selected only the parameters that are relevant to the model. Finally, a Principal Component Analysis was used in order to remove the autocorrelation between the parameters as well to reduce the data dimension. We assigned the principal scores explaining the variance of data in proportion of  $\sim 90\%$  to a daily classification of atmospheric circulation types obtained after using the cost733class software (Philipp et al., 2016) and check their correlation with lightning frequency upon each cell. The first results are indicating meridional circulation types as being more frequent in atmospheric instability as well in producing more lightning in central to south-eastern Europe. Also, the instability indices are linearly correlated with the lightning frequency.

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