



Contribution ID: 156 Contribution code: S10-MG-207

Type: **Poster presentation**

Seasonal distribution of lightning over Bulgaria and Black Sea and its relationship with sea surface temperature

Monday, 29 August 2022 18:00 (1h 30m)

In this work the seasonal – diurnal variations of lightning over two different areas: continental (Bulgaria) and maritime (Black Sea) are analyzed based on a 10 year long dataset (March 2005-February 2015) provided by the ZEUS lightning detection network operated by the National Observatory of Athens. The number of recorded flashes and the flash density at time intervals (annual, seasonal, monthly and 3-hours) in grid boxes of 0.25x0.25 degrees over land and sea are determined. Analysis of the spatio-temporal distribution of the number of flashes and of the flash density highlights the locations and moments with maximum lightning activity over Bulgaria and the Black Sea for each season. The results show that during autumn (September, October and November) the flash density is higher over the Black Sea than over the land surfaces of Bulgaria, while during the other seasons the situation is inverted. These results lead to the next task in the present work: to investigate if there is a relationship between lightning activity and sea-surface temperature (SST) on the Black sea during autumn. For the analysis sea surface temperature (SST) retrieved from the ERA5 reanalysis of the European Centre for Medium-Range Weather Forecasts, for the autumn days in the period 2005-2014, valid at 0000UTC, 0600UTC, 1200UTC, 1800UTC, are used. The analysis reveals that the mean and median of SST over the Black Sea in autumn are higher for the cases when lightning occurred than when it was absent.

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Session Classification: Poster session

Track Classification: Scientific Sections: S10 Meteorology and Geophysics