Lightning Frequency over the Bulgarian Black Sea Coast

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Analyses of the annual global lightning distribution show that, depending on the underlying surface, lightning frequency over continents is 1–2 orders of magnitude higher than over oceans. However, studies in specific regions indicate that lightning frequency over water surfaces can exceed that over land, depending on orographic features, the respective season, and the diurnal cycle. This highlights the need for regional-scale studies.

In addition, each coastal zone is a unique transitional area between land and sea, characterized by its own diurnal wind circulation. Therefore, it is of particular interest to study the distribution of lightning over the Bulgarian Black Sea coast, which is the aim of this work.

The results show that the annual lightning frequency over the Bulgarian Black Sea coast is higher than over the entire Black Sea coastline and the Black Sea itself, but lower than over the land territory of Bulgaria.

According to the seasonal distribution of lightning frequency:

- In spring and summer, lightning activity over the coastal areas (the Bulgarian Black Sea coast and the entire Black Sea coastline) follows the annual trend—being higher than over the sea, but lower than over land.
- In autumn, lightning is most frequent along the entire Black Sea coastline, with activity over the Black Sea exceeding that over both the Bulgarian coast and the territory of Bulgaria.

The monthly lightning distribution reveals that July is characterized by the highest lightning frequency over the Bulgarian coast, while December has the lowest.