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## Seasonal variability of lightning activity in the Mediterranean using the World Wide Lightning Location Network

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The Mediterranean Climate is the dominant climate in the Mediterranean region, and there are typically dry summers and wet winters. For this feature, the intensity of lightning activity in winter is stronger than one in summer in the Mediterranean region. In particular, winter thunderstorms are different from summer thunderstorms in terms of charge distributions for low altitudes of the tropopause. Thus, it is thought that the frequency of upward cloud-to-ground (CG) lightning flashes and the positive CG lightning flashes, transferring the large charge to ground, is high in winter than in summer. To fully understand lightning discharges in the Mediterranean region, we must recognize characteristics of their lightning activities. The World Wide Lightning Location Network (WWLLN) operated by the University of Washington has more than 50 sensors in the world and locates lightning discharges on the globe in real-time. In this study, we estimate monthly lightning distribution maps in the Mediterranean from 2007 to 2010 using the WWLLN. The lightning activity observed over the Mediterranean Sea in March moves to the European Continent from April to June. In July and August, we detect lightning flashes over inland of the northern Mediterranean and Algeria. Meanwhile, there is no lightning activity over the greater part of the Mediterranean Sea. The lightning distribution on the European Continent moves south from September to October. From November to March, we detect lightning flashes over the Mediterranean Sea. Meanwhile, there is no lightning activity on the greater part of the inland south European Continent and inland North Africa. In this presentation, we will show some case examples in winter, and compare them with winter lightning in Japan and sea surface temperatures of the Mediterranean Sea.

Keywords: winter lightning