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Characteristics of thunderstorms that produce flash floods

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Characteristics of thunderstorms, related to their lightning activity, have been analyzed over the Mediterranean Sea during a 12 month period. Lightning observations are provided by the ZEUS ground-based VLF lightning detection network operated by the National Observatory of Athens. We have analyzed storm size, storm lifetime, storm lightning activity, and storm velocity of more than 2000 thunderstorms throughout the year. The statistics indicated that 90% of thunderstorms are smaller than 115 km^2, have a lifetime less than 3 hours, have CG flash frequencies less than 5 flashes/min/50km^2, and move at less than 50 km/h. The storms that produced flash floods across the Mediterranean region were significantly different in their lightning activity characteristics. It was found that the largest difference between the climatological storms and the flash flood storms was in the lightning frequency, with thunderstorms that produce flash floods having $\sim$20% higher flash frequencies. In addition, the flash flood storms also showed longer lifetimes and faster propagation speeds.