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Properties of lightning in Eastern Mediterranean thunderstorms

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We present an analysis of thunderstorm and lighting properties in Israel and in the Eastern Mediterranean region based on data obtained by the Israel Lightning Location System (ILLS) during one year (1.8.2009-31.7.2010). We computed the multiplicity, the percentage of single stroke flashes and the land-sea distribution of single vs. multiple-stroke flashes and the stroke current distribution. Results show that for the commonly used North American Lightning Detection Network (NALDN) thresholds (e.g. 0.5 seconds and 10 km range between strokes), the percentage of single stroke flashes above Israel was 37% and the average multiplicity was 1.7. When using modified thresholds of 0.2 s and 2.5 km (based on the average time interval between successive return strokes being several tens of milliseconds, and a mean range of less than 2.5 km between two ground terminations of strokes in the same flash), we find a mean multiplicity of 1.4 for negative CGs and a percentage of 58% of single stroke flashes. Case-study analysis of a unique storm in 30.10.2009, which had 20696 strokes in 24 hours, shows that most positive CGs (93.2%) are single stroke flashes, while for negative CGs this value is 41.3%. In multiple-stroke negative flashes, the average current is always larger and wider distributed in the first stroke (-37 kA) and decreases and narrows in subsequent strokes, the final one being the weakest. The average inter-stroke time is 0.078 seconds, which seems to justify the use of the new threshold for calculating the multiplicity. We suggest that present values used for clustering strokes into flashes seem to be too large and can potentially misclassify independent flashes as subsequent strokes of a single flash. This may lead to lower values of flash densities than occur in reality.

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