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An investigation of lightning/microphysics relationships by means of a cloud electrification model: Application to the FLASH project case studies

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We use the one-dimensional cloud electrification model EMTM (Explicit Microphysics Thunderstorm Model) to investigate the electrical and microphysical properties of a large number of thunderstorm case studies, that have been selected within the European Union FP6 FLASH project, which aims at improving the monitoring, nowcasting and forecasting of the hazardous, flood-producing storms that intermittently strike the Mediterranean coastal regions.

Specifically, the EMTM model is used to analyze the behavior of the various microphysical components of the cloud (especially, within the charging zone) when lightning activity occurs, and to study their relationships with lightning occurrence and characteristics. In addition, the EMTM microphysical profiles are used as an input to a Radiative Transfer scheme, so as to compute the upwelling brightness temperatures (TB's) that would be measured by a satellite-borne microwave radiometer. Finally, these model simulations are compared with actual lightning and TB measurements to assess the model performance.