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A new microwave-lightning cooperation method to provide frequent rainfall scenarios of heavy convective storms: Application to the EU FLASH project

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The close connection between lightning occurrences and convection is the foundation for the employment of ground-based lightning location network data as proxies of storm position and evolution. Weak statistics support their direct use for quantitative precipitation estimation, while the usefulness of information related with the position and frequency of lightning strokes arises forcefully by the visual inspection of maps. On the contrary, passive-microwave (MW) precipitation retrieval techniques, recognized as a good tool to quantify the instantaneous rainfall amount, suffer from low spatial and most low temporal resolution related to the orbital characteristics of the low-Earth-orbit (LEO) satellites accommodating MW sensors.
Within EU FLASH project, a cooperative microwave-lightning system has been developed that exploits lightning network data to propagate rain fields estimated using multi-frequency brightness temperatures acquired by AMSU microwave radiometers. The method both drives the movement of the rain cells using lightning occurrences as well as modifies the morphology and the intensity of the storm according to the course of spatial and temporal distribution of lightning strokes. In this paper, we present the successful application of this method to the analysis of some severe storms of the FLASH project.