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Using lightning and microwave satellite rainfall retrievals to obtain continuous rainfall fields

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A new methodology for combining microwave retrievals from (Low Earth Orbiting) LEO satellites with ground-based lightning observations to obtain rainfall estimates continuous in time was proposed during the EU FP6 FLASH project (www.flashproject.org). The first encouraging results (Dietrich et al., 2011) were achieved by exploiting lightning data from ZEUS network to propagate rain field estimates obtained from the multi-frequency brightness temperature measurements by the AMSU/MHS microwave radiometers onboard NOAA/EUMETSAT LEO operational satellites. Specifically, the method allows inferring the development (movement, morphology, and intensity) of convective rain cells from the spatial and temporal distribution of lightning strokes following any instantaneous observation by a satellite-borne microwave radiometer.

This technique, particularly attractive for real-time operational purposes, is here further investigated through the analysis of a number of recent storms occurred in different parts of the world and hence observed with lightning networks having different detection efficiency and location estimate accuracy (LINET, WWLLN, WSI-GLN). Sensitivity studies, also using different MW retrieval techniques for the instantaneous rainfall estimates, will be discussed as well, in order to understand and evaluate the expected degradation performances for less instrumented areas around the world.