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PM-GCD - A combined IR–MW satellite technique for frequent retrieval of heavy precipitation: Application to the EU FLASH project

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Precipitation retrievals based on measurements from microwave (MW) radiometers onboard low-Earth-orbit (LEO) satellites can reach a high level of accuracy – and especially so, for deep convective precipitating systems. However, these observations do not provide a satisfactorily coverage of the rapid evolution of intense precipitating systems. As a result, the obtained precipitation retrievals are often of limited use for many important applications – including support to authorities in activating flood alarms. To avoid this problem, several techniques have been developed that combine accurate MW estimates with frequent infrared (IR) observations from geosynchronous (GEO) satellites, such as the European Meteosat Second Generation (MSG).

Within the European Union FP6 FLASH project, we have developed a new combined MW-IR technique for producing frequent precipitation retrievals from space (which we call PM-GCD technique). This technique uses passive-microwave (PM) retrievals in conjunction with the Global Convection Detection (GCD) technique that discriminates deep convective clouds within the GEO observations, based on the difference between the water vapor (6.2 μm) and thermal-IR (10.8 μm) channels. In essence, within the PM-GCD technique, deep convective areas are defined from MSG observations, then calibrated using MW-AMSU precipitation retrievals and finally propagated over time with a simple tracking algorithm. In this paper, we describe the PM-GCD technique and discuss the results of its application to a flood event that occurred on September 12-15, 2006 over the north-western Mediterranean coastal areas, and that has been selected for joint research by the EU FLASH and HYDRATE projects.