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Tracking and validation of surface rain rate from Mediterranean storms using microwave satellite and surface weather radar network observations.

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Measurements of the rain amount released by a storm is fundamental for detecting and alerting the risk of severe weather, flash floods, and landslides. In an ideal case one observation system, such as a weather radar, is able to monitor a storm originating, developing, and fading off. However, storms may travel covering significant distances and it is likely that the life cycle cannot be monitored by a single weather radar. Nowadays, weather radar networks offer the opportunity to monitor rainfall over extended regions, though these networks are limited to land and coastal areas. On the other hand, satellite passive microwave observations offer a tool for monitoring rain rate at lower temporal/spatial resolutions – with enhanced accuracy over ocean where other estimates usually do not exist. Therefore, satellite microwave observations and ground-based weather radar networks seem complementary for monitoring and tracking the rainfall from Mediterranean storms.

In this work we show results from the operational rain rate estimate developed at IMAA-CNR in collaboration with CETEMPS based on the satellite observations of the Advanced Microwave Sounding Unit B (AMSU-B) and Microwave Humidity Sounder (MHS) on board of the U.S. NOAA 16-18-19 as well as the European EUMETSAT MetOp A satellites.

The rain rate estimates from satellite are coupled with the composite of the Italian ground-based radar network with the addition of ancillary infrared observations from the Meteosat Second Generation (MSG) to characterize the rainfall temporal/spatial evolution of Mediterranean storms.
Moreover, where AMSU-B and ground-based weather radar network observations are nearly simultaneous and collocated, the measurements from the ground-based weather radars are used to validate the rain rate values obtained from satellite, providing quantitative evaluation of the consistence between these two source of rainfall information.