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Instantaneous rain field propagation from combined MW-IR satellite measurements using the Precipitation Evolving Technique (PET)

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When using microwave (MW) brightness temperature from AMSU/MHS cross-track scanning radiometers on-board low earth orbit (LEO) sun-synchronous operational satellites, it is possible to generate instantaneous precipitation maps for each satellite overpass. To this end, we use a retrieval algorithm which is based on a neural network trained by a pre-computed cloud-radiation database, that has been built from the application of a radiative transfer model to a series of cloud resolving model simulations of different meteorological and environmental situations.

To fill the large temporal gaps between consecutive MW snapshots, several combined microwave-infrared (MW-IR) algorithms have been proposed in the past. Their aim is the generation of High Resolution Precipitation Products (HRPP's) using the IR measurements from geostationary (GEO) satellites to enhance the spatial resolution and the temporal sampling of the intermittent rain fields estimated from the satellite-borne MW radiometers.

The Precipitation Evolving Technique (PET) produces a quasi real time HRPP by driving the evolution (shape and intensity) of the last available MW-estimated rain field by means of an iterative and statistical multi-scale pattern recognition procedure which is computed over two consecutive IR images. This allows to effectively recognize homogeneous cloud structures and their movements in the system by combining together the displacements occurring at each spatial scale. Since such an approach is spatially limited by the extension of the last MW swath coverage and temporally limited by the quick evolution of precipitating cloud structures, an *ad hoc* calibration procedure completes the algorithm.

In this paper, we show the results of the application of our latest version of PET to the analysis of some Mediterranean severe storms.