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Retrieval of extreme Mediterranean storms using dual-polarization radar observations at X- and C-band

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The operational weather radars managed by the Italian Department of Civil Protection are used to describe several storms that hit eastern Sicily (Italy) in the recent years.
All of them caused severe effects on the ground, as the flash flood of the eastern Sicilian coastline, including Catania and Siracuse.

The dual-polarization capabilities has enabled, on one side, to characterize the microphysical governing processes, on the other side, to successfully reconstruct the corresponding rainfall fields.

The presence of hail associated to strong updrafts was clearly identified by the so-called “ZDR columns” and abnormal path-attenuation, that sporadically has lead to signal extintion. Indeed, it is remarked that extintion, especially at C-band, in very short range paths is an indisputable indicator of storm severity and presence of hail.

The implemented polarimetric rainfall algorithm, based on a weigthed combination of Z-R and R-KDP techniques, allowed to retrieve fairly well the precipitation patterns.

Summarizing, this work demonstrates the effective use of polarimetric C- and X-band radar measurements to monitor severe storms in the Mediterranean basin.