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Suitability of standard rain-gauge networks for recording maximum intensity of rainstorms. Examples from the Mediterranean area.

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Heavy rainstorms often cause natural disasters with damage to the built up environment, injures and victims, strongly hampering social and economic development in the Mediterranean area. Accuracy in space and time of rainfall measurements is a pre-requisite for any attempt of hydrological modelling. Unfortunately, except for a few areas subject to experimentation, rain gauge networks are generally inadequate to describe the spatial distribution of the rainfall. Pluviometric data have hence to be integrated by considering other types of sources.
Thanks to its characteristics, mainly in terms of spatial and temporal resolution, the METEOSAT of second generation (MSG) allows for an accurate observation of clouds, and then of the rainstorms, over the entire European territory. More in detail, origin and development of clouds associated to extreme events can be monitored, and the peculiar structures of severe convective rainstorms can be characterized. By the way, several studies pointed out correlations among physical parameters obtained from satellite images and rainstorm intensities.
In the Mediterranean area, short rainstorm events are usually associated to cumulonimbus that exhibit a high vertical development. Their top may reach the stratosphere, at 12-13 km above the ground, where the the clouds diverge horizontally to form the typical "anvil". Such notable spreading of the anvil testifies a strong divergence, i.e. upwelling of the air, due to convection.
Moreover, due to the limited size of the rainstorm cells (generally, in the order of few tens of km), the maximum intensity can only rarely be recorded by traditional rain gauge networks. Hydrological analyses commonly point out wrong return periods estimations, especially for highly localized and spatially variable events.
Despite the huge amount of data, available computer power and storage capacity allow to include in a GIS environment all territorial information, including those derived from satellite images and from the rain gauge network.
In the present study, examples of application of rainfall data obtained from satellite images and calibrated by means of traditional rain gauge records are discussed, concerning recent catastrophic rainstorms that affected the Italian territory.