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Precipitation analysis using disdrometric data to evaluate runoff and erosive processes

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The knowledge of the relationships among rainfall intensity, drop size distribution (DSD) and developed kinetic energy, has a remarkable importance for the study of the erosive process. To assess the influence of the rain characteristics on the amount of soil losses, an experimental site was set up on the Chianti hills (northern Tuscany, central Italy), in order to have simultaneous measurements of soil losses and rainfall parameters. The site is very close to a vineyard owned by the “Montepaldi Farm”, managed by the University of Florence, and the research has been carried on in the frame of a project funded by the Italian Ministry of the University (PRIN n. 2005070545). For the rainfall estimation and to study the hydrometeors dimensional characteristics, the site was equipped with raingauges and with two disdrometers of different conception: the classical electromechanical impact Joss-Waldvogel disdrometer and an X-band raingauge-disdrometer (Pludix), both with sampling time of one minute. A co-located system of runoff gauges provided soil erosion measurement in terms of runoff and amount of soil eroded by the rainfall event. Data from September 2006 to June 2007 have been collected. Several rainfall episodes have been classified in terms of dimensional parameters finding relationship between DSD parameters, rainfall rate and erosive effects on the ground. The estimate of the kinetic energy carried by the hydrometeors has been evaluated with different approaches and the results discussed. We analysed the precipitating events microphysical properties and also evaluated the reliability commonly used erosion indices, introducing new parameterizations.