



Investigation on sediment erosion and water runoff by means of simulated rainfall in Calabria (southern Italy)

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Soil erosion by water is a severe and extended issue affecting all European countries, although with different intensities. In particular, Calabria (southern Italy) is one of the Italian regions mainly affected by intense water erosion; in fact Calabrian soils are highly erodible due to soil composition and slope morphology; moreover climatic regimes display marked seasonality and intense rainfalls also in areas subject to water scarcity.

Simulated rainfall experiments, aimed at studying the interaction between rainfall and slope processes, were carried out in small watersheds of Calabria, characterized by different geological and climatic conditions. The experiments were mainly carried out by means of rainfall simulators and laboratory analyses. The rain simulator consisted of a pole 3 m in height, with an arm at the top which protruded 1.5 m and supported a nozzle (Fulljet HH50 and HH30, Spraying Systems Co.) which can sprinkle 6 m². Inside of the plots rainfall distribution was monitored with 5-6 manual gauges; discharge and sediment concentration were measured at 3 min intervals at terminal troughs and laboratory determinations of sediment concentration were made. Two tests were conducted on all plots: the first in dry antecedent moisture condition and the second, several hours later, in wet antecedent condition. The vegetal coverage of soil and the artificial rains intensities were such as to simulate the conditions typical of the dry season and summer storms. More in detail, experiments were designed to obtain rainfall intensities of approximately 85 mm hour⁻¹ (corresponding to a return time of 100 years) but, in some experiments, wind disturbance caused a change (from 70 to 120 mm hour⁻¹) in the wished rainfall intensity.

The rock types of the experimental plots are representative of wide areas inside the Calabria region. In particular, the influence of lithology, aspect, slope and vegetation on both surface runoff and soil erosion was investigated. The first study was conducted in a badland area incised in clays and characterized by bare steep slope; the second study was conducted in a catchment carved into clays, gravels and sands characterized by low relief and poor vegetation; the third study was conducted in a clay, silty clay and silt with local intercalations of sandy slope characterized by vineyard whit rows parallel to the maximum slope. The first and second experiment was carried out in May and June (dry season), the third in November (wet season) and May.

The results show that the spatial variability of runoff and sediment production obtained in the three investigated areas is related to the lithological and morphological characteristics of the plots as well as to land use.