Geophysical Research Abstracts, Vol. 9, 05328, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-05328

Investigating dominant processes controlling the hillslope response in a Mediterranean Basin

G.B. Chirico (1), P. De Vita (2), R. Masciale (3), I. Portoghese (3), N. Romano (1), B. Sica (1), M. Vurro (3)

(1) Dipartimento di Ingegneria Agraria, Università di Napoli Federico II, Italy, (2) Dipartimento di Scienze della Terra, Università di Napoli Federico II, Italy, (3) Water Research Institute - National Research Council (IRSA-CNR) (gchirico@unina.it/Fax: +390812539412)

Understanding water dynamics across different landscape elements of a catchment is fundamental for a sustainable water resources management in Mediterranean regions. A typical Mediterranean landscape, resulting from the co-evolution of climate-soil-vegetation interactions, is characterized by large valley with braided channels and gravelly sediments, deriving from alluvial and colluvial fans at the foot of the surrounding steep hillslopes. Along the slopes landuse ranges from Mediterranean macchia, pasture, forest and heterogeneous agriculture landuse. At medium and large catchment scale, runoff is mainly generated by the saturation excess mechanism occurring in the coarse alluvial aquifer at the valley bottom, which in turn is fed by lateral surface and subsurface flows along the hillslopes.

The mechanism characterizing the water balance partitioning and flows through the catchment units is under investigation in an experimental 100 km2 sub-humid catchment in Southern Italy, where surface and groundwater flows are conveyed into an artificial reservoir.

Intensive field campaigns have been conducted, covering both the dry and the wet seasons, aiming at understanding the dominant mechanisms controlling the hillslope response and their contribute to the water balance partitioning at the catchment scale. The experimental activities have been focused into two small catchments (drainage area of 5 and 18 ha, respectively). The former is mainly covered by Mediterranean macchia, whereas the latter is characterized by various agricultural landuses. Laboratory tests have been performed on undisturbed soil cores collected within the top 30

cm, to evaluate superficial hydraulic properties of soil. Meteorological data are monitored by a complete weather station. Surface flows are measured at the catchment closures with V-notch weirs. Superficial soil water content is measured on a regular grid across the catchments on a monthly base. Subsurface lateral flow dynamics is monitored by piezometric monitoring in numerous irrigation wells.

Preliminary results show a strong seasonality of the hillslope response, with a clear switching from dry to wet seasons. During the dry season, rainfall is stored and redistributed locally, by vertical processes of infiltration and evapotranspiration. During the wet season, the response is mainly controlled by lateral subsurface flow within the top soil horizons, enhanced by vertical heterogeneity, with time-scales of a few days.