Factors influencing runoff generation, and estimates of runoff in a semi-arid area, SE Spain.

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The aim of this work is to improve a hydrological model for prediction of runoff in medium-scale semi-arid catchments in SE Spain. The impact of different landscape elements on runoff was investigated; and runoff was estimated within two catchments; Rambla Nogalte and Rambla de Torrealvilla. These areas have been studied since early 1990's with data on rainfall (at 7-9 sites), and runoff (at 2 – 3 sites) collected regularly. The approach is to use the concept of Hydrologically Similar Surfaces (HYSS), which are defined as areas with similar 1-D (vertical) partitioning of net rainfall between infiltration and overland flow, to develop and improve the understanding of runoff generation in semi-arid areas. The objectives are to investigate the influence of geology, landuse and seasonality on infiltration rates and to classify the Rambla Nogalte into HYSS categories. HYSS are identified from field measurements of soils and infiltration rates, using data on micro and macro-topography, which have been combined with analysis of Remotely Sensed (RS) data.

HYSS characteristics were based on measurements of plot characteristics, and have been scaled up to cover larger areas. Most storms within these catchments are intense bursts of rainfall lasting 30 - 60 minutes. The overall sampling strategy for measurements was to undertake constant intensity rainfall simulator measurements within provisional HYSS categories, and to augment this data set with a large number of minidisk infiltrometer measurements. A spray sprinkler was chosen and Green-Ampt: $f = A + B/S$ was used to estimate the infiltration rate (f). A simplified Green-Ampt model was run with estimated parameters A and B for each HYSS. These parameter values were put into the model for each HYSS category, and the model was run with

rainfall data from each rain gauge (7). Based on seasonal differences, infiltration data was corrected for viscosity effects to 15˚C.

Analysis of infiltration data and model runs supported the identification of three main HYSS categories in the Rambla Nogalte , based on the difference in cultivation level. Runoff data produced by the model was linked to mapped categories (34 combinations). At-a-point runoff data was accumulated downstream, however transmission losses reduced the channel flow.