Comparing the stream flow response of two sub-Mediterranean mountain catchments with different land covers

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1. INTRODUCTION

Land abandonment and subsequent re-vegetation have significantly modified the hydrological behaviour of Mediterranean mountains (e.g., García-Ruiz and Lana-Renault, 2011). Assessing the hydrological effect of such land-cover change is particular relevant in this region where water resources are scarce and uneven, and water demand tends to increase (López-Moreno et al., 2008); for this purpose, it is essential to take a closer look at the hydrological behaviour of catchments with different land cover and understand the role of vegetation and soils on flood generation. Here we carried out a detailed analysis of the stream flow response of two neighbouring catchments differing in land cover, but with similar climatic conditions, lithology and topography, which enable us to separate the effects of soil and land cover on their hydrological responses.

2. THE CATCHMENTS

A paired samples t-test showed that peak flow specific discharge, the response time and the recession time index were statistically different, whereas storm flow depth was not. In the past agricultural catchment peak flows were always greater (usually one order of magnitude) compared with the forested catchment, the response was 2-3 fold faster, and the recession limbs were shorter (usually 1-2 orders of magnitude) (Fig. 2b,c,d).

Storm flow depth was slightly greater in the past agricultural catchment compared with the forested catchment (Fig. 2a), although this was not a general rule. For flood events of low-to-intermediate size the storm flow depth was greater in the past agricultural catchment than in the forested catchment, but smaller for large-sized events (Fig. 3).

6. CONCLUSIONS

Storm flow differences between the catchments were closely related to catchment wetness conditions. A marked seasonal pattern. Differences between their hydrographs characteristics were dictated by the contrasting dominant runoff generation processes operating in each catchment. These can be explain by differences in land cover, and especially soil properties (soil depth and permeability), and the presence of degraded areas, inherited from past human activities.

REFERENCES


