

Dynamics and contribution of spring discharge to surface flow during Mediterranean floods

H. Jourde, A. Roesh, V. Bailly-Comte, C. Batiot.

The role of groundwater contribution to surface flow in karst watersheds is not well understood, although it may have a considerable impact on intense and rapid flooding in Mediterranean karst regions. A comparison of hydrogeologic and hydrologic processes is being carried out at the *Causse d'Aumelas*, a karst system near Montpellier (France), with the objective of obtaining better understanding of the dynamics and contribution of karst discharge to surface flow. The *Causse d'Aumelas* is traversed by an intermittent river, the Coulazou. The Coulazou basin is an ideal site for investigation of karst surface-water/groundwater interactions because of its unique geology: it underwent eustatism during the Messinian crisis, and is a multicompartamental aquifer system. The watershed has been instrumented with a dense monitoring network, which is being used to estimate the exchange between the *Causse d'Aumelas* aquifer and the surface drainage network.

This study was designed to answer many questions concerning flow within the aquifer, but focuses on determining the following:

- residence time of water within the karst system;
- conditions required for flow direction inversion (location of precipitation and local water table conditions);
- the principal direction of the underground drainage system; and
- flood wave routing.

An initial hydrologic model integrating a digital terrain model shows the inability of a standard rainfall-runoff model to replicate recorded flood hydrographs. Along the Coulazou, flood peaks are routed through the karstic system without a phase lag, but maximum discharges are somewhat modified. These results indicate initial karst system recharge followed by significant contribution to surface flow. The goal is to construct a hydrogeologic model at the aquifer scale that incorporates this hydrodynamic behaviour, and includes geometric and tectonic information. The knowledge of all karstic system outflows will give us qualitative information about intra-basin transfer between surface flow in the Coulazou and the underlying aquifer.