



## **Diffuse versus concentrated groundwater recharge during flood events at the scale of a Mediterranean catchment.**

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It is generally assumed that groundwater recharge is mainly concentrated in arid and semi-arid zones and diffuse in humid zones. Nevertheless, it is not clear whether diffuse or concentrated recharge is the main mode of recharge in the Mediterranean hydrological context, which is intermediate between the arid and humid contexts. Indeed, in such zones, the range of watertable fluctuation is large with an alternation of periods of shallow levels, in favour of diffuse recharge, and periods of deep, in favour of concentrated recharge, or even periods of shallow levels in some parts of the catchment and deep levels in other parts. For many environmental purposes, including water resources assessment and risk analysis of groundwater contamination, it is important to assess the main mode of groundwater recharge.

The purpose of this study was to quantify both diffuse and concentrated recharge for two recharge events in autumn in a farmed Mediterranean catchment which includes a dense network of ditches.

The study was led in the Roujan catchment (Hérault, France), which belongs to the long term Mediterranean hydrological observatory OMERE (Voltz and Albergel, 2002). We equipped 27 ha in the central part of this catchment, corresponding to the catchment depression in order to estimate its global hydrological budget and the relative importance of diffuse recharge through the field soils and concentrated recharge through the ditch beds. The equipment included networks of: i) rain gauges, ii) ditches-gauging station, iii) piezometers, iv) neutron probes, v) eddy correlation mast including a 3D sonic anemometer and a fast hygrometer.

For the two studied runoff events, the contribution of concentrated recharge to groundwater recharge was significant: on less than 10% of the catchment area, namely the area covered by the ditches network, 40 to 50% of the groundwater recharge occurred. A thorough error analysis was performed with Monte Carlo simulation. It showed that the uncertainties associated with the recharge estimates are large. It indicated specifically that diffuse recharge is better estimated than concentrated recharge. But, even with large uncertainty intervals, the estimated value of concentrated recharge confirms its significance in the context of Mediterranean hydrological conditions. At last, this study demonstrates the major role of ditches networks in groundwater recharge in Mediterranean catchment and illustrates the necessity to monitor all the terms of the hydrological balance at the catchment scale and to have a detailed knowledge of soil properties and their spatial distribution.

.Voltz , M. and Albergel , J., 2002. OMERE : Observatoire Méditerranéen de l'Environnement Rural et de l'Eau - Impact des actions anthropiques sur les transferts de masse dans les hydrosystèmes méditerranéens ruraux. Proposition d'Observatoire de Recherche en Environnement, Ministère de la Recherche.