



Perched groundwater-surface interactions and their consequences in stream flow generation in a semi-arid headwater catchment

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In semi-arid headwater catchment, it is usually admitted that stream flow comes predominantly from Hortonian overland flow (infiltration excess overland flow). Consequently, subsurface flow processes, and especially perched or shallow groundwater flow, have not been studied extensively.

Here we made the assumption that perched groundwater flow could play a significant role in stream flow generation in semi-arid catchment. To test this assumption, we analyzed stream flow time series of a headwater catchment in the Tunisian Cap Bon region and quantified the flow fraction coming from groundwater discharge and that from overland flow. Furthermore, the dynamics of the perched groundwater was analyzed, by focusing on the different perched groundwater-surface interaction processes : diffuse and local infiltration, diffuse exfiltration, and direct groundwater discharge to the stream channel. This work is based on the 2.6 km² Kamech catchment (Tunisia), which belongs to the long term Mediterranean hydrological observatory OMERE (Voltz and Albergel, 2002).

Results show that even though Hortonian overland flow was the main hydrological process governing the stream flow generation, groundwater discharge contribution to the stream channel annually accounted for from 10% to 20 % depending on the year. Furthermore, at some periods, rising of groundwater table to the soil surface in bottom land areas provided evidences of the occurrence of saturation excess overland flow processes during some storm events.

Reference

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.