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Groundwater tracing in the karstic systems of eastern Taygetos Mt, Southern Peloponnesus, Greece

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The use of tracers in groundwater is a useful tool for solving hydrogeological problems by measuring and interpreting tracer concentrations in groundwater. The main parameters that can be identified are recharge areas, groundwater flow paths, velocities and direction of groundwater flow, groundwater residence time, hydrodynamic dispersion, delimitation of the hydrogeological basins and the rate of groundwater flow. Continued increases in fresh water demand and groundwater contamination by man-made factors call for a systematic investigation of the flow paths, groundwater system operation and the water catchment area. This necessity becomes more interesting in the case of carcass hydrosystems as they are characterized by high underground flow velocities and a reduced ability to self-defining qualitatively contaminated by surface, mainly landing agents.
This paper presents the results of a tracing experiment in the southern Peloponnese and specifically on the eastern slopes of Mt Taygetos in order to investigate the origin of the spring discharges of the karstic systems observed in the area as their supply is not explained by the*ι*r outcrops. In particular, there are large outcrops of carbonate rocks that do not have significant spring discharges or do not have any and small outcrops with very significant discharge. As label, Uranine was chosen due to its chemical properties (solubility, easily detectable, harmless to humans) which is preferred for research on karst systems. Thus, a kg of Uranine was fed in the stream west of Xirokambi, which flows through a large mass of carbonate rocks (marbles) without any spring. The attempt to trace the label was made in four springs and two wells that were within 3 to 23 kilometers distance from the point where the label was thrown. The analysis of the samples were made in IGME Labs by Asimina Vitoriou-Georgouli.
The results of the experiment show that there is hydraulic communication between the karst system west of Xirokambion and the coastal springs of Sternakles NW of Gythio. The average flow rate calculated is of 0.86km/day. These results combined with the distribution of the springs and geological mapping indicate that in the study area there are three independent karstic systems with their respective hydrogeological basins. These conclusions have to be taken into account in the area's development plans and in the groundwater protection zones.