

**KEYWORDS:** Finite Volume Point Dilution Method, Double packer, Single-well tracer test

The measurement of groundwater fluxes is the basis of all hydrogeological studies. Groundwater flux calculation with Darcy's law from piezometric gradient measurements and estimation of hydraulic conductivity with pumping/slug tests may lead to cumulated errors on spatial variability, in particular in heterogeneous contexts such as fractured aquifers. Alternative methods, such as point dilution tracer tests to obtain a direct measurement of local groundwater fluxes, are promising.

In this study classical Point Dilution Method (PDM) and Finite Volume Point Dilution Method (FVPDM) are compared on the fractured crystalline aquifer of Ploemeur, France. The manipulation includes the first use of the FVPDM in a fractured aquifer using a double packer. This configuration limits the vertical extent of the tested zone to target a precise fracture zone of the aquifer. The result of this experiment was a continuous monitoring of groundwater flux that lasted more than 4 days.

Measurements of groundwater flow rate in the fracture ( $Q_t$ ) by PDM only provide good estimates if the mixing volume ( $V_w$ ) (volume of water in which the tracer is mixed) is known precisely. Conversely, FVPDM allows for an independent estimation of  $V_w$  and  $Q_t$ , leading to better precision in case of complex experimental setup such as this one. The precision of PDM does not depend upon the duration of the experiment while FVPDM may require long experimental duration to guarantee a precise result.

Classical PDM should be used to rapidly estimate the groundwater flux using a simple experimental setup. However, FVPDM is a more precise method with great potential for development but it may require a longer experiment duration to achieve high precision if the groundwater flux investigated is low and/or the mixing volume is large.