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des Tombe, Bas; Bakker, Mark; Schaars, F; van der Made, KJ; Calje, R; Borst, L.

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A passive heat tracer experiment to determine the seasonal variation in residence times in a managed aquifer recharge system with DTS
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Des Tombe Bas, Delft, Netherlands

b.f.destombe@tudelft.nl

Bakker Mark, Delft University of Technology, Delft, Netherlands

Schaars Frans, Artesia, Schoonhoven, Netherlands

Van Der Made Kees-jan, Wiertsema & Partners, Tolbert, Netherlands

Caljé Ruben, Artesia, Schoonhoven, Netherlands

Borst Lucas, PWN, Heemskerk, Netherlands

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Targeted provisional session N°8.01 The seasonal variation in residence times is determined in a managed aquifer recharge system using a passive heat tracer test. The managed aquifer recharge system consists of a sequence of alternating elongated recharge basins and rows of recovery wells. The temperature of both the water in the recharge basin and the surface influence the temperature in the aquifer. The flow field changes when the temperature changes, as the hydraulic conductivity is a function of the temperature. Fiber optic cables were inserted up to a depth of 20 meters with direct push equipment to measure vertical temperature profiles with DTS. In this fashion, the fiber optic cables are in direct contact with the aquifer and the disturbance of the aquifer is minimal. The measured spatial and temporal temperature variations in the subsurface were modeled with SEAWAT, a coupled flow and heat transport model. MODPATH was used to compute flow paths and residence times. During the winter, a larger fraction of the water moves through the warmer lower part of the aquifer, thereby increasing the residence time. The opposite happens during the summer, when most of the water moves through the warmer upper part of the aquifer, resulting in shorter residence times.

