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The Mean Residence Time (MRT) of exfiltrating groundwater in the Southern Vienna Basin (Fischa-Dagnitz spring area)

Stefan Wyhlidal (1), Dieter Rank (), Katharina Schuster (), and Martin Jung ()

(1) AIT, Austrian Institute of Technology, Vienna, Austria (Stefan.Wyhlidal@ait.ac.at), (2) Center for Earth Sciences, University of Vienna, Austria (Dieter.Rank@univie.ac.at), (3) Vienna Univerity of Technology, Austria (kathi.schuster@gmx.at), (4) AIT, Austrian Institute of Technology, Vienna, Austria (Martin.Jung@ait.ac.at)

The “Mitterndorfer Senke” in the youngest zone of subsidence in the Southern Vienna Basin contains an important groundwater body used by regional water-supply facilities. The depression is filled with Pleistocene gravels and sands and is about 40 km long, up to 8 km wide and 50 to 150 m deep. Up to 13 m3/s of river water infiltrate in the alluvial cones in the most southern part of the “Mitterndorfer Senke” by the crossing rivers. The contribution of local precipitation to groundwater recharge is very low due to high evaporation in this area (up to 500 mm/a) compared with to an mean annual precipitation amount about of 500 mm/a in the southern Vienna basin. This sedimentary filling in the “Senke” acts very much like a pipeline, transmitting water readily from the main recharge area south-west of Wiener Neustadt to locations of surface discharge in the northern part of the basin. For many years a plume of chlorinated hydrocarbons has been moving from the industrial plants in the most southern part of the depression towards the Danube. In this context the determination of the groundwater flow velocity in the depression became important.

The Fischa-Dagnitz spring is situated in a distance of some 20 km from the infiltration section and discharges about 350 l/s. A long-term environmental isotope monitoring record from 1964 - 2012 exists for this spring. The result of the evaluation of ^{3}H time series using the dispersion model leads to a mean residence time between 13.5-16.5 years for the base flow of the Fischa-Dagnitz spring. This corresponds to previous studies, however, the present results are based on a more complete data set and therefore they are more significant.

There is also evidence of occasional short-term influences of storm waters in the Fischa-Dagnitz spring. Normally these effects may be neglected. The difference between the δ18O values of precipitation of Gloggnitz (altitude 512 m) and the Fischa-Dagnitz spring leads to the conclusion, that the catchment area of the spring must be situated at a much higher altitude (e.g. mountains of Rax and Schneeberg). This also indicates that local precipitation plays only a minor role in recharging the groundwater body.