



## **Investigation of Bank Filtration in Gravel and Sand Aquifers using Time-Series Analysis**

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Drinking-water wells in the vicinity of rivers may be influenced by infiltration of river water. In the context of drinking-water protection the decisive questions concern the fraction of river infiltrate in the pumped water and the residence time in the aquifer. For this purpose, tracer experiments may be performed. At larger rivers, however, such tests require the injection of large amounts of the tracer. As alternative to artificial-tracer tests, we present methods in which time series of electric conductivity and temperature are used for quantitative statements regarding mixing ratios and residence times. We recommend a multi-step approach consisting of: (1) a qualitative analysis of the time series, (2) the spectral determination of the seasonal temperature and conductivity signals, (3) a cross-correlation analysis, and (4) the non-parametric deconvolution of the time series. We apply these methods to two sites in the aquifer of the Thur valley in the Swiss Plateau. At sites without good connection between river and groundwater or where the river gains groundwater, the elaborate methods of time-series analysis are not applicable, but the time series indicate such conditions. At sites with continuous river-water infiltration, we can reconstruct the breakthrough curve of a tracer test without releasing an artificial tracer into the river.