



The role of the "chaser" in "push-pull" tests

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So-called "push-pull" tests are a suitable tracer test method to obtain information about chemical and hydraulic properties of an aquifer in a single-well setting. In literature, their application was frequently reported to investigate various research objectives.

In a push-pull test a known amount of different solutes - including a conservative tracer - is injected into the aquifer ("push") and afterwards extracted ("pull"). The measured breakthrough curves during the pumping back phase can then be analysed. In most published papers a so-called "chaser" was injected directly after the injection of the test solution. Generally, the chaser is not spiked with any tracer or additional solute. Its aim is to push the test solution out of the borehole or groundwater monitoring well and into the aquifer to minimize the influence of the infrastructure (tubes, pipes, and gravel pack) on the shape of the tracer breakthrough curve.

However, the role of the chaser on the shape of the acquired tracer breakthrough curves during the pull-phase is unknown. Also the determination of the right volume for the chaser is a difficult task. The volume should be enough to fill the whole well and gravel pack volume, but should not reach the aquifer. In most cases the exact effective porosity of the gravel pack and accordingly its volume is unknown and therefore has to be estimated.

In our project, push-pull tests are investigated for their applicability as single-well tracer test method. One target is its method development and standardization. Therefore, also the role of the chaser was investigated by conducting six individual tests, each with different injection volume.

By testing different chaser volumes, conclusions can be drawn about the optimal volume for the later field test campaigns. Furthermore, it seems to be possible to draw conclusions about the quality of the gravel pack and about potential dead volumes within the flow system.

It was shown that a chaser test campaign prior to the main push-pull test is a very fast and easy method, which significantly helps to improve the results of the main test.