

DETERMINATION OF GROUNDWATER FLOW AND TRANSPORT PARAMETERS BY GEOELECTRICAL METHODS

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In this study we use geoelectrical borehole measurements to determine groundwater flow and transport parameters (e.g. dispersivity, porosity, permeability). A salt tracer will be injected into the aquifer and transport of the tracer with natural groundwater flow will be geoelectrically observed. Aquifer parameter can be calibrated by numerical simulation of the tracer movement. Three different single-well-techniques will be discussed: the double wall packer, geoelectrical electrodes installed in the annulus of a groundwater well and fluidlogging by cartridge salting.

The double wall packer is a portable system where on the packer shell a number of electrodes are installed. The tracer is injected through the outer porous packer wall into the aquifer. With geoelectrical tomography the position of the tracer cloud is determined for various times. In a similar way the position of the tracer cloud injected by a fixed installation in the annulus of a groundwater well will be determined. Although this system is much more inflexible it is useful for long-time records of groundwater parameters.

For fluidlogging by cartridge salting the electrically conductive tracer is diluted in a borehole and the tracer transport into the aquifer by groundwater flow is measured by logging technology. Depth specific salting of the borehole water without pumping is possible. Special regard is given to the different logging technologies including salinity log, latero log, induction log and dipmeter log. From these measurements Darcy velocity, flow direction and under certain circumstances average velocity of the water in the aquifer can be concluded.