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Electrical Resistivity Tomography Monitoring of a Water Infiltration Test on Johannishus Esker, Sweden

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An artificial groundwater recharge (AGR) site constructed on the Johannishus esker (Karlskrona) was monitored with conductivity measurements and electrical resistivity tomography (ERT) during a nine week tracer infiltration test. The aim of the monitoring was to provide a quantitative basis to increase the efficiency of the AGR site. ERT provided useful results to understand the nature of the Johannishus esker and the pathways of the infiltrated water was mapped by time-lapse monitoring. The Johannishus esker follows a tectonically controlled paleo-valley which is evidenced by magnetic data and ERT. During the test, the infiltrated water was detected in the area close to the infiltration ponds, whereas far situated observation wells were less affected by the infiltrated water. ERT monitoring combined with the conductivity tests indicated that the location of the recharge wells and timing of the recharge are important factors for an efficient recharge. Natural groundwater flow direction was a determinant in the infiltration process as expected. The test showed that ERT can be efficiently used to monitor the functionality of the AGR sites. It is both useful for the sustainability of the sites and a good way to increase the knowledge on the AGR's geological, hydrogeological and structural characteristics.