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Monitoring the anthropogenic heat impact on a shallow aquifer in Vienna

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In Austria authorities appraise licenses for shallow geothermal energy uses individually, following the principle “first come, first serve”. Operational monitoring is conducted based on case to case decision. Standard procedures or minimum criteria for monitoring existing ground source heat pumps (GSHP) are not available yet. Furthermore, an integrative management of the shallow aquifer Marchfeld regarding shallow geothermal energy is lacking.

Numbers of open loop systems are increasing in the shallow aquifer Marchfeld, especially where it underlies the city of Vienna. Here, an integrative management would be of high importance to allow considering cumulative thermal effects of open loop systems. This ensures a sustainable use of groundwater for heating and cooling. The Geological Survey of Austria started groundwater monitoring in 2014 at the urban development area Aspern in Vienna. For the INTERREG project GeoPLASMA-CE, the study area has been expanded. It comprises the eastern part of the city of Vienna overlying the Marchfeld aquifer. We developed a temperature logger to measure the groundwater temperature automatically in selected depth intervals and installed 11 loggers. The groundwater monitoring for GeoPLASMA-CE additionally includes manual temperature measurements in 20 observation wells.

Goals of the monitoring system in GeoPLASMA-CE include the creation of two groundwater temperature maps for heating and cooling season. They will provide input to estimate the potential for open loop systems. A numerical 3D hydrogeological model will simulate the anthropogenic heat impact on the shallow groundwater body.
Temperature monitoring will continue beyond the GeoPLASMA-CE project. In the case study area Aspern we will be able to detect the impact of newly constructed buildings on the groundwater temperature, since temperature measurements have started before the construction phase and will continue after finalization of this urban development area.

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