Investigating geothermal heat resources of legacy mine workings, why are some mine waters hotter than others ?

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Abstract

Mine-water in abandoned mine workings in the UK constitutes a low-temperature geothermal resource that can be used for heating/cooling purpose. Using open-loop ground source heat pumps, heat can be extracted from the large volume of warm water stored in mining voids, generally located in densely populated areas.

However, little is known about the heat sources and the recharge mechanisms in mine workings, hence the overall heat resource which can be accessed. Temperature measurements in several mine shafts in the UK have shown the lack of correlation between the measurement depth and the mine-water temperature, suggesting that it does not only depend on the geothermal gradient.

We are developing conceptual hydrogeological and heat transport models of mine workings in order to identify the potential factors influencing the mine-water temperature. The OpenGeoSys software is used to solve numerically for heat transfer in the mines, to understand the temperature distribution and the extent of the heat available over the long-term within mine workings.