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## Characterisation of a highly heterogeneous geothermal reservoir based on geophysical well logs

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For successful exploitation of geothermal reservoirs, temperature and transmissibility are key factors. The Molasse Basin in Germany is a region in which these requirements are frequently fulfilled. In particular, the Upper Jurassic Malm aquifer, which benefits from high permeability due to locally intense karstification, hosts a large number of successful geothermal projects. Most of these are located close to Munich and the “Stadtwerke München (SWM)” intends to use this potential to generate most of the district heating demands from geothermal plants by 2040.

We use geophysical logging data and sidewall cores to analyse the spatial distribution of reservoir properties that determine porosity, permeability, and temperature distribution. The data are derived from six deviated wells drilled from one well site. The reservoir rocks are separated by faults and lie in three different tectonic blocks. The datasets include image logs, GR, sonic velocities, temperature, flowmeter- and mud logs. We not only focus on correlations between rock porosity and matrix permeability, but also on how permeability provided by fractures and karstification correlate with inflow zones and reservoir temperature. In addition, we correlate individual parameters with respect to their lithology, dolomitisation and the rock’s image fabric type, adapted from Steiner and Böhm (2011).

Our results show that fracture intensity and orientations vary strongly, between and within individual wells. However, we observed local trends between fracture systems and rock properties. For instance fracture intensities and  $v_p$  velocities (implying lower porosities) are higher in rock sections classified as dolomites without bedding contacts. As these homogeneous-appearing dolomites increase, from N to S, the mean fracture intensities and  $v_p$  velocities also increase. Furthermore, we observed most frequently substantial karstification in dolomites and dolomitic limestones. Nevertheless, an opposing trend for the percentage of substantial karstification can be also found, i.e., the amount of massive karstification is higher in the northern wells. The interpretation of flowmeter measurements show that the main inflow zones concentrate in those Upper Malm sections that are characterised by karstification and/or intense fracturing.

In the next step, we will correlate laboratory measurements of outcrop- and reservoir samples (e.g. porosity, permeability, and mechanical rock properties) with the logging data. The aim is to

test the degree to which analogue samples can contribute to reservoir characterization in the Upper Jurassic Malm Aquifer (Bauer et al., 2017).

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