

Ripple scalings in geothermal facilities, a key to understand the scaling process

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Scalings are a widespread problem among geothermal plants which exploit the Malm Aquifer in the Bavarian Molasse Zone. They effect the technical and economic efficiency of geothermal plants.

The majority of the scalings observed at geothermal facilities exploring the Malm aquifer in the Bavarian Molasse Basin are carbonates. They are formed due to a disruption of the lime-carbonic-acid equilibrium during production caused by degassing of CO₂. These scalings are found in the production pipes, at the pumps and at filters and can nicely be described using existing hydrogeochemical models. This study proposes a second mechanism for the formation of scalings in ground-level facilities.

We investigated scalings which accumulated at the inlet to the heat exchanger. Interestingly, the scalings were recovered after the ground level facilities had been cleaned.

The scalings showed distinct ripple structures, which is likely a result of solid particle deposition. From the ripple features the flow conditions during their formation were calculated based on empirical equations (Soulsby, 2012).

The calculations suggest that the deposits were formed during maintenance works. Thin section images of the sediments indicate a two-step process: deposition of sediment grains, followed by stabilization with a calcite layer. The latter likely occurred during maintenance.

To prevent this type of scalings blocking the heat exchangers, the maintenance procedure has to be revised.

References:

Soulsby, R. L.; Whitehouse, R. J. S.; Marten, K. V.: Prediction of time-evolving sand ripples in shelf seas. *Continental Shelf Research* 2012, 38, 47-62