

MINERALOGY, HYDRO- AND ISOTOPE CHEMISTRY OF THERMAL WATER AND SCALINGS IN HYDROGEO THERMAL PLANTS

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The aim of the research project NoScale is to assess the risk of precipitation (scaling) and corrosion in the use of deep thermal groundwater. On the basis of comprehensive and complex chemical and mineralogical experiments and building upon detailed hydrochemical modeling the potential impact of the use of the thermal waters on the technical components of hydrogeothermal systems are to be shown. 15 hydrogeothermal plants were sampled in Austria as well as in Bavaria. At six plants, scalings could be sampled and analysed. The sampled plants are located in different (hydro)geological settings; the purpose of the geothermal plants (thermal, electricity, balneological) and therefore the exploitation depths varied to a great extent, therefore the isotope and hydrochemistry as well as the encountered scalings were different in each plant. The scalings were mostly carbonate scalings in pipes and on heat exchangers, but also precipitation of elemental sulphur occurred. In two plants, the scalings were so massive that they completely blocked the groundwater pump and the heat exchanger which subsequently led to a temporary shut-down of the plants after only one year of operation (Fig. 1). In ongoing laboratory experiments accompanied by thermodynamic-kinetic modelling, the nature and kinetics of the scaling processes shall be clarified. The investigated scaling processes in the different plants will result in recommendations for plant operators how to avoid scaling with the best suitable operating conditions.



Figure 1: Precipitation of elemental sulphur on plate heat exchangers (left). Massive scalings of Mg-calcite at a heat exchanger (right).