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Modelling of Fractured Carbonate reservoirs – outline of a novel technique via a case study from the Molasse Basin, southern Bavaria (Germany)

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Fault and fracture zones are intrinsic to many geological systems which are relevant to the extraction and utilization of their georesources such as hydrocarbons, water, and geothermal. Depending on their formation mechanisms, their tectonic history, and the in situ stress field, fault zone show a complex architecture and geometry. This complexity makes studies of fractured reservoirs challenging. This is particularly the case for geothermal applications in low permeable reservoir rocks where fault zones belong to the major targets. Before drilling an estimate for the reservoir productivity is required. Due to limitations in available data, a characterization of such reservoirs can be successfully achieved by numerical techniques. The requirements of such models must encompass a full integration of the actual fault geometry, comprising a characterization of the dimension and properties of the fault damage zone and of the fault core, as well as of the individual population with properties of fault zones in the hanging and foot wall and the host rock. This paper presents a novel and improved technical approach to develop such a model. The case study describes a deep geothermal reservoir in the western Central Molasse Basin in southern Bavaria, Germany. Results from numerical simulations indicate that the well productivity can be enhanced along compressional fault zones if the interconnectivity of fractures is lateral caused by crossing synthetic and antithetic fractures. Therefore, the model allows a deeper understanding of production tests and reservoir properties of faulted rock.