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The 3D conductive thermal field of the North Alpine Foreland Basin - Influence of the deep structure of the adjacent European Alps

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The European Molasse Basin is a wedge shaped Tertiary foreland basin situated at the northern front of the European Alps. The adjoining Alps consists of tectonic nappes composed of mostly limestone, sandstone and shale stacked since the Cretaceous. This nappe structures are disrupted by uplifted crystalline cores, of which the Tauern Body is a prominent example. The basin itself, filled with clastic sediments (the Molasse), is underlain by Mesozoic sedimentary successions and a crystalline crust of Paleozoic age. The Mesozoic sediments include the Upper Jurassic karstified aquifer (Malm), which is intensively used for geothermal energy production these days. Looking on the temperature distribution in the basin area, a distinct negative thermal anomaly can be found in the southeast of Munich within the Malm aquifer, which is poorly understood so far but is of big relevance for the geothermal energy production in this area.
With our study we aim to explain this thermal anomaly by investigating the structure of the basin and the temperature driving processes therein. Therefore, we used a data based lithospheric-scale 3D structural model of the basin and the adjacent Alpine area and calculated the present day conductive thermal field. Our results indicate that the pronounced negative thermal anomaly in the Malm aquifer is controlled by the position and the shape of the Tauern Body within the Alpine mass and the thermal conductivity contrast between the crystalline material of the Tauern Body and the Calcareous Alps.