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A vertically integrated 2D groundwater model of the Thuringian basin.

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One of the targets of the INFLUINS project is gaining better understanding of fluid circulation in the Thuringian basin in Germany. This requires good estimates of different unknowns, such as hydrological boundary conditions and sediment properties such as hydraulic conductivity. A further question is the spatial resolution necessary for the geometric model to be able to properly represent the subsurface. In order to estimate the input parameters and to carry out a sensitivity analysis of the model for a given resolution, it is useful to have an initial rough model from which the results can be quickly compared with real data. For this reason a first (depth integrated) model of the lower Triassic (Buntsandstein) for the whole Thuringian basin has been constructed, using the software Gocad. The resulting model allows for the 2D simulation of groundwater flow in the Buntsandstein which for the purposes of this study is considered to be the major aquifer.

We use the meshing software Gmsh with a constrained Delaunay algorithm to generate a mesh that includes rivers, faults and the unit boundaries as geometrical constraints. Further we use a QuadTree to manipulate the input file for the meshing tool, so that the triangular mesh is dense in regions where we have much information (e.g. from boreholes or from constructed cross sections). For this study the Buntsandstein is not subdivided into the different sub-units and averaged rock properties are taken for the whole unit. For estimating the groundwater recharge we distinguish between the areas where the lower Triassic outcrops and so is subject to direct infiltration of the precipitation and where other units are overlying it. The OpenGeoSys project is used for numerical modelling.

We discuss the choice of input parameters and results of sensitivity analyses and show the simulation results and compare them where possible to values known from literature.