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MODELLING GROUNDWATER PUMPING AND COUPLED HEAT TRANSPORT IN A ALLUVIAL AQUIFER: TESTS USING DIFFERENT CODES AND OPTIMISATION

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Summary. Various aquifers are studied in terms of low temperature geothermal potential. The feasibility and impact studies of these systems imply very often a numerical simulation of groundwater flow and heat transport. Nowadays, some finite element or finite difference codes are able to deal with such non linear simulations. On a synthetic case study and then on a real case study, a detailed comparative sensitivity analysis is performed using three different codes (MT3DMS, SHEMAT and HYDROGEOSHERE). For low temperatures and relatively small temperature changes, it appears rapidly that the uncertainty affecting values of the main hydrodynamic parameters (i.e. hydraulic conductivity) influences more the results than taking into account any coupling or non linearity. For a case study, the pumping and associated groundwater flow and heat transport are modeled in an alluvial aquifer interacting with a main river in order to assess feasibility of a low energy air cooling /heating system for a large office building. The worst case scenario corresponds to hot summer conditions simultaneously with river maximum temperature and the model leads to an optimization with intermittent pumping in minimum 6 wells. Numerical codes are ready to simulate complex groundwater flow, solute transport and heat transport situations in aquifers, however efforts must be realized to obtain reliable experimental in-situ measured values for the hydro-thermal properties.