

3D VISUALIZATION IN GROUNDWATER HEAT TRANSPORT RESEARCHES (VENETO REGION, ITALY)

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Abstract: Numerical heat transport modeling is an essential tool for predicting the thermal impacts of open-loop geothermal heat pump systems in groundwater. The resulting temperature distribution in the simulated aquifer is not well represented through two-dimensional data visualization, missing the thermal plume expansion along the vertical depth. The classic cartographic representation often doesn't match with the model structure complexity and doesn't allow to identify the heat exchange between different model layers. In multi-stratified models including two or more aquifers or multiple wells with screens located at different depths, the 3D data analysis and display become a necessity for the correct interpretation of the results. A 3D postprocessing software has been used to process the datasets of two pilot geothermal plants in Veneto Region (Italy), previously modeled with FDM heat transport code. These specific case studies are presented and discussed in order to demonstrate the effectiveness of 3D interpretation and visualization of simulation results, considering the advantages both in the understanding of heat transport phenomena and in the time-predictive scenarios presentation.

Key words: groundwater heat transport, numerical model, 3D visualization, geothermal heat pump (open-loop)

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