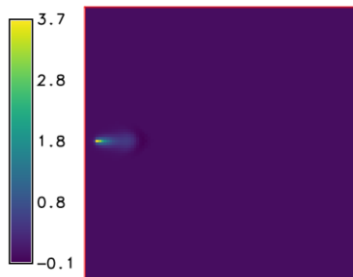Ex. 1) At an old industrial site the groundwater was contaminated for over 30 years of production. The contamination plume is now mapped through measurements at various probing wells. To avoid further contamination of the aquifer and drinking water wells a pump and treat installation is considered. Now suitable locations and pumping rates for such a treatment based on a numerical model of the situation need to be proposed.

Develop a conceptual model of the situation. Especially, draw a sketch of the geometry, define initial and boundary conditions and specify parameters and information you would need to conduct such a simulation.
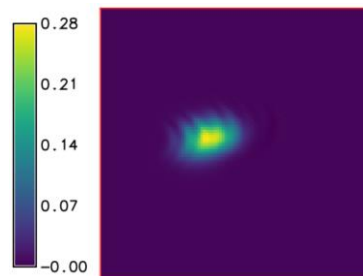
Ex. 2) In a heterogeneous, unconfined aquifer with properties listed below, a tracer test is conducted with a pulse injection through a well. A numerical simulation was conducted and the results shown in Fig. 1 have been obtained. Do you trust this simulation? Provide arguments for your decision.

Mean hydraulic conductivity: 0.001 m/s; mean porosity: 25%; WE hydraulic gradient: 1%; mean hydraulic head: 39m; modeling domain: 100x100m; initial concentration: 5kg/m³; diffusivity: 0.00001 m²/s; dispersive length 0.1m; retardation: 0;

Fig. 1: a) c after 1 day (kg/m³)   b) c after 10 days (kg/m³)   c) c after 20 days (kg/m³)