

Evolution of the recharge and aquifer-river interaction in the town of Milano (Italy) in the XX Century

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A finite differences model of the aquifer system beneath the town of Milano (Italy) permits the simulation of groundwater flow in the XX Century. Two crucial aspects for the model calibration are the parameterization of the recharge terms and the relationship of rivers and channels with the aquifer system.

We study the natural undisturbed condition of the aquifer system, which corresponds to the late XIX Century. The first version of the model predicted for this condition that some depressed areas, mainly located around river and channel streams, were flooded. Therefore sink terms are added to the cells crossed by streams; these terms simulate the effect of draining from the rivers and channels. In the XX Century the exploitation of the aquifer system to collect water for the town produces a deepening of the water table. As a consequence, this causes a different relationship between surface and subsurface waters in different areas, since rivers and channels can recharge the aquifer system in the northern areas and drain groundwater in the southern areas.

Water extraction from public wells is quite well monitored, at least in the last decades of the XX Century; estimates of water extraction from private wells are also available. Instead, the aquifer recharge is very uncertain. It is given by infiltration of precipitation, losses from rivers and channels, losses from underground pipes (distribution network of the aqueduct, sewage network). A detailed and accurate parameterization is proposed for these terms and the model calibration is reviewed to evaluate the coefficients that quantify the losses from the aqueduct and sewage networks.