## CONSTRUCTION OF A NUMERICAL MODEL TO ASSESS LAND SUBSIDENCE RELATED TO GROUNDWATER WITHDRAWAL IN THE VALLEY OF QUERETARO

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We present the use of georeferenced information for the construction of the geological setup to evaluate land subsdience in the Valley of Queretaro. A numerical model was established in order to simulate the groundwater flow and the ground deformation due the water withdrawal.

The Valley of Queretaro was formed as a graben made from orthogonal normal faults filled with different volcanic and sedimentary materials with variable distribution. The data was integrated from databases to georeferenced images: reported geological and geophysical data, geological mapping, correlation of litological logs. The information were arranged in an electronic file used to represent geological layers by the interpolation of available data. The interpolation was zone-restricted to consider geological discontinuities (from geological or geophysical profiles) or contacts mapped from field work.

The algorithms used to build the setup that includes the spatial distribution of geological materials, and to carried out the simulations, were developed in the Department of Methods and Mathematical Models for Applied Science (DMMMSA) of the Padua University in Italy. Our database consisted on 123 water extraction wells and different number of nodes were asigned to each well depending on its depth and lithological variations. The presented model includes 1225 nodes representing all the extraction wells with specific hydraulic properties. The permeability can be set for each geological material and transmisivity is calculated from equivalent thicknesses associated to each node. In the terms of the model a volume is delimitated by the geological discontinuities and layers, specific physical properties, such a permability and compresibility, were asigned to each volume. The accomplished setup of the model permits the evaluation of groundwater flow and of the deformation related to the increase of effective stress in the Valley of Queretaro.

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