Land subsidence due to induced water pressure changes in aquifers and confining layers

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Abstract

Any change in pore pressure (and thus also in the piezometric heads) may induce consolidation if the geological formations are compressible. Effective stress and water pressure variations at depth are explained for given drawdowns in confined and unconfined conditions. Geomechanical aspects are fully coupled to groundwater flow equations with specific storage coefficients dependent on the medium compressibility. The induced change in hydraulic conductivity may also be expressed by a non-linearity in the considered equations. Examples of land subsidence processes in famous 'sinking cities' are given. The outline of the talk is the following:

Introduction
Definitions of aquifers and confining layers
Piezometric heads and water pressure
Terzaghi principle
Consolidation processes
Land subsidence in unconfined aquifers
Land subsidence in confined aquifers
Other causes of land subsidence
Non linear effects on the hydrogeological properties
A few example of sinking areas/cities: the crucial truth

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