

Groundwater level changes associated with earthquakes -its mechanisms and unsolved problems-

Norio Matsumoto[1]

[1] GSJ, AIST

Several mechanisms, unsolved problems of groundwater-level changes before and after earthquakes are introduced in this paper.

Pore pressure in isotropic porous medium is a function of applied stress and increment of fluid content in poroelastic theory (eg., Wang, 2000). Coseismic changes in groundwater level are proportional to changes in strain field due to the earthquake if there is no increment of fluid content in the medium. Meanwhile, the coseismic changes are greatly affected by amount of fluid flow and permeability change if large fluid flow occurs from the medium after the earthquake.

Coseismic changes in groundwater level are sometimes 10 - 100 times larger than inferred changes from response of groundwater level to earth tide. There are several models to explain the phenomena (Roeloffs, 1998; Brodsky et al., 2003), however, there models cannot fully explain the phenomena.

The models have been applied for coseismic changes in groundwater level in shallow wells whose depth are less than about 1 km. The models and knowledge are also important to understand changes in groundwater level in deep wells whose depth are near the seismogenic zone.