

Effects of ground shaking and static volumetric strain change on earthquake-related groundwater level changes in Taiwan

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From 2001 to 2005, the Disaster Prevention Research Center of National Cheng-Kung University established a groundwater observation network composed of 16 wells, mainly along active faults for research on earthquake-related groundwater changes. These 16 wells were chosen mainly from the 550 groundwater observation wells of the Water Resources Agency (WRA), which monitors and manages groundwater resources. The groundwater level was observed with a resolution of 0.2 mm at the wells. In the wells, the depths of well screens ranged between 80 and 252 m. We analyzed groundwater level data at 6 of the 16 wells from 2003 to 2006 and evaluated the ability to detect earthquake-related groundwater level changes. At the 6 wells, strain sensitivities of the groundwater level range between 0.1 and 0.5 mm/10⁻⁹. This means the 6 wells can detect volumetric strain changes on the order of 10⁻⁹. We also analyzed coseismic and/or postseismic groundwater level changes related to 17 earthquakes in and around Taiwan whose magnitudes were 6 or greater. The analysis showed that ground shaking seems the main reason for earthquake-related changes but the acceleration of it cannot always explain the observed groundwater level changes.

Reference

Lai, W.-C., K.-C. Hsu., C.-L. Shieh., Y.-P. Lee., K.-C. Chung., N. Koizumi. and N. Matsumoto, Evaluation of the effects of ground shaking and static volumetric strain change on earthquake-related groundwater level changes in Taiwan, Earth Planets Space, 2010, in press.

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