Earthquake-related Groundwater Level Changes in a Sensitive Well

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Abstract

The Pingding (PD) well, located at the northern tip of the Douliu Hill, was installed in an aquifer consisting of semi-consolidated deposits. The site is right on the axis of an anticline extending from north to south. The 206 m deep well has been monitored since 1997, and the water level is recorded at one-hour interval with a resolution of 1 cm. According to the monitoring data, the well water level usually changes very slowly, even during the rainfall. We analyzed the response of water level in the PD well to earthquakes of magnitude greater than 5.5 in the Richter scale from 1997 to 2005. Coseismic water-level changes were observed in 19 of 78 earthquakes; about half of the changes are water level rises. An abnormal water-level change was found approximately one hour immediately before the coseismic change during an earthquake. The phenomena imply that the well water level in PD not only reflects the change of tectonic stress induced by the earthquake, but also responds to the pre-earthquake crustal deformation.