Effects of ground motion and geological setting on coseismic groundwater level changes caused by the 1999 Chi-Chi Earthquake

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The groundwater level changes induced by the 1999 Chi-Chi earthquake and aftershocks were well recorded at the monitoring network around the Choushuishi alluvial fan near the source region. The spatial distribution of the coseismic groundwater level changes in each well reflect the site effects related to properties of well-aquifer systems and ground motion.

Based on the analysis of hourly groundwater level records, the amplitude of coseismic changes closely related to the permeability of aquifer. In the lower permeability aquifers where located in off-fan area show the coseismic drops or minor coseismic rises. In the higher permeability aquifers where located in typical fan area show the larger coseismic rises. Comparison between the different geological settings of aquifers and coseismic changes of groundwater levels had been carried out. The result shows the good fits between each geological divisions of fan area and off-fan area. These different coseismic groundwater level changes reveal the characteristic responses of pore fluid pressure to seismic wave in aquifers composed by different alluvial sediments.