



Permeability changes after large earthquakes: insights from co-seismic water level changes throughout China in response to four great earthquakes

Zheming Shi

China University of Geosciences, Beijing, China (shizm@cugb.edu.cn)

Co-seismic groundwater level responses induced by four great earthquakes beyond the near-field were collected from mainland China's network of groundwater monitoring wells. The large number of operational wells (164 wells for the 2007 Mw8.5 Sumatra earthquake, 245 wells for the Mw7.9 Wenchuan earthquake, 228 wells for the Mw9.0 Tohoku earthquake and 223 wells for 2012 Mw8.6 Sumatra earthquake) and co-seismic responses allow us to identify spatial patterns and also provide an opportunity to understand the mechanisms that cause co-seismic water level changes. Water level oscillations and abrupt changes are the two most common responses and nearly 33% of the wells show sustained post-seismic water level changes. Abrupt changes usually begin with the arrival of surface waves. Overall, the co-seismic water level responses are complex over large spatial scales, and there is great variability both in the sign and amplitude of water level responses in the entire data set. However, at any given well, the co-seismic water level changes usually have the same sign following the four events. These observations are consistent with changes in water level caused by changes in permeability, though the observations do not allow us to assess the magnitude of permeability change nor where they occur.