

The Observation of the Tidal Deviation of Groundwater Level Act as the Precursory Changes of Earthquakes

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Abstract

Using the ocean tidal force to act as naturally recurring stimuli to provide a sufficiently varied distribution of excitations in time and space, we need to study the responses and the mechanisms of groundwater to the earthquake processes. The purposes of this study are to analyze the recently observation results of the earthquake induced tidal deviation of groundwater level in observation wells around Hulien city, eastern Taiwan. The analysis of the tidal responses and the atmospheric pressure responses also will be used to estimate the mechanical properties of the aquifer. Comparison the observation between the sea level and the groundwater level changes in the each event, offers the opportunity to discussion the possible mechanism of the hydrologic response to earthquake.

The different response by various natural stimuli and processes (tidal force, barometric loading, ground shaking and crustal strain) will be use as the elements of the hydraulic information fusion in the earthquake induced groundwater level changes. The results support the “Predictable” groundwater level responses except to other non-structural factors. Curiously pre-seismic groundwater level changes in the pattern of tidal deviation occurred repeatedly in several local seismic events nearby the Hulien observation well. The Wave Propagation Model and Structural-Sensitive Zone were issued from Hulien observation results. We hope this study will offer the good ideas and experiences for the developments of the hydraulic tomography techniques.