Geophysical Research Abstracts, Vol. 8, 01271, 2006
SRef-ID: 1607-7962/gra/EGU06-A-01271

Exploratory analysis with the data of observations around in Tangshan area

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Basis on the geophysical and hydrologic process, the several kinds of factors were influenced and commixed within the water level records. The various data of the Tangshan well are observed starting in more than 30 years ago. The especially phenomena, fluctuation of the water level in Tangshan well were induced by 63 teleseismics ($M \geq 7.0$, NEIC catalogue) in 2001.10-2005.10, at the same time the groundwater temperature were reduced. The influence factors, such as the rainfall, atmospheric pressure and earth tide were analyzed and removed by nonlinear analysis methods from the records of Tangshan well groundwater level. The exploitation of underground water, and the seismically induced fluctuation are recognized. To compare the data of among the data of earth deformation, data of volumetric strain and the residual of groundwater level to understand what the mechanism is for the variety of Tangshan groundwater level. The individuality feature of the Tangshan well groundwater level is discussed.

The nonlinear methods is considered and explored to analyze the influence factors from all the data of groundwater in Tangshan well based on the physical mechanism, and the relation among them is discussed. Except the common features of the groundwater, there is the individuality feature for the Tangshan well. The earthquake precursors can be found from the groundwater level if the all influence factors of the ground water level can be cleared up from the observation data.

A part of the supports was provided by NSFC programs (40574020, 10371012).