AOGS 2006

The Hydrological Process of Earthquakes in North China

FUQIONG HUANG
China Earthquake Network Center

The monitoring of groundwater aimed for earthquake prediction in North China had been carried out since 70s of the Twentieth Century. The depth of the wells is more than hundreds meters. The aquifers of most of the observation wells are well confined. Most of the wells can record the earth tide clearly. But very few wells set up in the early times are still in service now. In this paper, we collect the long time observation data of the wells which experienced moderate to strong earthquakes with magnitude 5-7 occurred in North China and investigate the correlation between the hydrograph and the seismicity of north China since 1970. We found that the seismic period is closely related to the hydrological period. Relatively high water level period is consistent with the seismically active period, and low water level is consistent with relative earthquake quiescence. If we consider the well-aquifer system as sensitive strain meter according to the theoretical research of Bodvarrsson (1970), we can inferred from the observation that high water level means high strain accumulation induced by earthquake preparation. In other words, high strain accumulation makes us see the precursor from ground water before earthquake therefore we can predict earthquakes using information from groundwater observation. Our observation is consistent with that of Costain et al (1996) in Virginia at the "hydroseismicity Homepage". While Costain et al inferred the conclusions from "downward continuation" of the surface stream flow record to depth of 8 km in the crust, which was derived from the diffusion equation, and its correlation with earthquakes in the central Virginia seismic zone. The observation mentioned above implies that regardless the fluid is from the deep crust or from surface of the earth it plays a very important role during the earthquake preparation and occurrence. Whether the fluid flow induces strain accumulation or strain accumulation induces fluid flow is not a simple topic. This Research is Funded by NSF40374019