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The Zhouzhi Deep Well in Central China Exactly Recorded the Sumatra Earthquake

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As the seismic waves from the 26 December 2004 Sumatra-Andaman earthquake swept across the Chinese mainland, the water level of Zhouzhi well oscillated as seismogram. The Zhouzhi well, with well-confined aquifer and more than 3, 002 meters depth, is located in central China 3629 km away from the Sumatra earthquake epicenter. The water level observed by instrument of LN-3 with hydraulic sensor. The water level data were collected in 50 samples per second digitally by 16 bits digitizer for high frequency. We carefully compared the high frequency sampled water level oscillations with 3 components seismograms recorded in Xi'an CDSN seismic station (XAN), which is 74.5 km east away from the Zhouzhi well, and 3652 km north away from the Sumatra earthquake epicenter. We found that the raw data graphs from water level and from ground motion are comparable in both shapes and phases from P and S wave, and the amplitude was amplified by later surface waves. Especially, we found that the water level changes are more correlated to the South-North direction seismogram of XAN station. We calculate the frequency spectra and wave velocity both from groundwater and from ground motion. The results are all comparable. Then we concluded that the well confined Zhouzhi well can be considered as one kind of seismometer. This experiment was funded by China National Science Foundation under contract No.40374019.