Measuring Rotational Motions from Local Earthquakes at the HGSD Station in Taiwan

Liu, C.C. [1], Hunag, B.S.[1], Lee, W.H.K. [2], Teng, T.L. [3]

[1]Institute of Earth Sciences, Academia Sinica, Taipei, Taiwan
[2] U.S. Geological Survey, Menlo Park, CA 94025, USA
[3] Southern California Earthquake Center, University of Southern California, Los Angeles, California 90089-0740

ABSTRACT

In July, 2004, Liu and Huang began measuring rotation motions using an R-1 rotational sensor made by PMD/eentec, and obtained rotation velocity values at PBOT HGSD station in eastern Taiwan. In addition to the R-1, the configurations of instrument installation at HGSD include a downhole broadband seismometer, a Sacks-Evertson type borehole strainmeter, and as well as a continuous GPS station, but lacked a traditional accelerometer or a surface velocity seismometer. Our preliminary observations from several earthquakes suggest that angular rotation is important in the mid- and near-field of an earthquake, but since the deployed R-1 sensor has not been rigorously calibrated, W. H. K. Lee recommended that R. L. Nigbor of UCLA and Liu of IES launch a series tests in laboratories and field for the newly ordered of rotational sensors. The results indicate that the instrumental noise of R-1 might be at most about several micro-radians per second, and therefore it should be able to record rotational motions at the milli-radian per second or higher levels with a significant signal-to-noise ratio (Nigbor and W.H.K. Lee, 2006).

A new seismic vault was constructed at the HGSD station in August of 2006. A CWB's 6-channel K2 accelerographs (that were manufactured by Kinemetrics Inc.) with an internal 3-component accelerometer and an external 3-component rotational sensor (an calibrated R-1) was deployed in April, 2007, along with an episensor, an L4-3C 2-Hz short period seismometer with two Q330 24-bit data logger have been installed on the pier of new vault. To verify the measurements made by the R-1 rotational sensor, a dense accelerometer array will be deployed at this site in the near future.

.