

5/15/01

## TAIWAN AND TURKEY DATA FOR THE PEER STRONG MOTION DATABASE

Bob Darragh  
Nick Gregor  
Sylvia Li  
Walt Silva

Of  
Pacific Engineering and Analysis  
311 Pomona Avenue  
El Cerrito, CA 94530

Strong motion data recorded during the September 20, 1999 **M** 7.6 Chi-Chi Taiwan earthquake (Lee et al., 1999; Shin et al., 2000) and from the August 17, 1999 and November 12, 1999 **M** 7.4 Kocaeli and **M** 7.1 Duzce, Turkey earthquakes (USGS, 1999; Toksoz et al., 1999; Youd et al., 2000) have been deglitched and processed using the Pacific Engineering and Analysis standard approach. This approach includes examining the Fourier amplitude spectra as well as the acceleration, velocity and displacement time histories. High- and low-pass casual filters are selected for each component and the examination process repeated until both high- and low-frequency noise have been eliminated. The final band-pass filtered acceleration records are baseline corrected (removing only small drifts) and integrated in the time domain to velocity and displacement time histories for a final visual check. Response spectra are computed for 9 damping values (0.5, 1,2,3, 5,7, 10, 15 and 20%) at 112 frequencies ranging from 0.05 to 100 Hz.

Peak values of acceleration, velocity and displacement are included in the strong motion catalog (Appendix A: Pacific Engineering and Analysis Processed Strong Motion Catalog). The high- and low-pass filter corner frequencies that define the band-pass filter are listed for reference. In addition, closest rupture distance and JB (Joyner-Boore) distances, Geomatrix, USGS and Central Weather Bureau (CWB) site classifications, and the site location on the hanging or foot wall of the rupture surface are given when known. Finally, the catalog lists information on the earthquake including magnitude, source mechanism, and dip of the rupture surface.

The **M** 7.6 Chi-Chi earthquake produced 422 three-component accelerograms (Lee, et al., 1999), of which 418 have been processed. The Chi-Chi data were recorded at closest rupture distances ranging from 0.24 to 185 km. Peak values of acceleration, velocity and displacement are 1.16g, 263 cm/sec and 430 cm. These are among the largest values recorded from an earthquake. These values of peak velocity and displacement were recorded at station TCU068 located 7 km from the northern end of the rupture on the hanging wall of the fault (Appendix A).

Thirty-two and twenty-three three-component accelerograms have been processed from the **M** 7.4 Kocaeli and **M** 7.1 Duzce earthquakes, respectively. These accelerograms were recorded and digitized by the Kandilli Observatory and Earthquake Engineering Research Institute of Bogacizi University (KOERI), the Earthquake Research Department of the General Directorate of Disaster Affairs (ERD), the Istanbul Technical University (TTU), and the Lamont Doherty Earth

Observatory of Columbia University. For the Kocaeli earthquake, closest rupture distance ranged from 3.4 to 183 km. Peak values of acceleration, velocity and displacement are 0.38g, 80 cm/sec and 71 cm. The Duzce strong motion data were recorded at closest rupture distances ranging from 0.9 to 193 km. Peak values of acceleration, velocity and displacement are 0.97g, 84 cm/sec and 52 cm (Appendix A).

## REFERENCES

Lee, W. H. K., T.C. Shin, K.W. Kuo, and K.C. Chen (1999). "CWB free-field strong-motion data from the 921 Chi-Chi earthquake: Volume 1. Digital acceleration files on CD-ROM, Pre-Publication Version (December 6, 1999). Seismology Center, Central Weather Bureau, Taipei, Twiwan.

Shin, T.C., Kuo, K. W, Lee, W.H.K, Teng, T.L. and Tsai, Y.B (2000). "A preliminary report on the 1999 Chi-Chi (Taiwan) earthquake." *Seism. Res. Lett.*, 71(1), 24-30.

Toksoz, M. N., R.E. Reilinger, C.G. Doll, A.A. Barka and N. Yalcin (1999). "Izmit (Turkey) earthquake of 17 August 1999: First Report." *Seism. Res. Lett.*, 70(6), 669-679.

United States Geological Survey (1999). "Implications for earthquake risk reduction in the United States from the Kocaeli, Turkey earthquake of August 17, 1999." U.S Geological Survey Circular 1193 (Version 1.0).

Youd, T.E., J-P Bardet and J.D. Bray (2000). "Kocaeli, Turkey, earthquake of August 17, 1999 reconnaissance report." *Earthquake Spectra*, 16 (Supplement A).

Peer/Taiwan 5/15/01