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Source Parameters of Regional Earthquakes in Taiwan: 1999-2000 Including the Chi-Chi Earthquake Sequence

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ABSTRACT

We report source parameters of 277 earthquakes that occurred during 1999-2000 in the Taiwan region, a time period dominated by the Chi-Chi earthquake sequence. We used an improved CMT inversion algorithm to handle high background noise and structural heterogeneity from complex tectonic settings near Taiwan. We also searched the best fitting solutions at an increment of 1 km of focal depths for all events that occurred after the Chi-Chi main shock on September 20, 1999. In general, central and northern Taiwan was seismically quiet before the Chi-Chi main shock. Aftershocks of this sequence dominated the regional seismicity for approximately 3 months afterward. The Chi-Chi sequence consists of a wide range of focal mechanisms, but the overall pattern is a west-verging thrust block bound by strike-slip tear faults near the northern and southern termini of the surface rupture - the Chelungpu fault. Seismicity outside of the source zone of the Chi-Chi sequence generally agrees with known active tectonics from previous studies. Nonetheless, under high elevations of the eastern Central Ranges, there are several intriguing cases of changing focal mechanisms from normal faulting near the surface to thrust at depth. To facilitate further research of the Chi-Chi sequence, results of our inversion and original waveforms from the Broadband Array in Taiwan for Seismology (BATS) of 170 events within this sequence are ready for distribution on CD-ROM. The dataset is also online at the BATS web site (http://bats.earth.sinica.edu.tw/Chi-Chi_CMT).

(Key words: BATS, Earthquake source parameters, Waveform inversion, Chi-Chi earthquake sequence)

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