ic displacements of the 2003 M_w 6.5 Cheng Kung, Taiwan earthquake derived from GPS measu

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earthquake occurred in Cheng Kung, eastern Taiwan. The earthquake is well-defined crustal-scale listric thrust: the Chihshang fault. We use GPS e Cheng Kung earthquake to estimate the coseismic displacements in Bureau (LSB) of Taiwan collected 133 GPS observations within 6 and 3 ismic periods, respectively. The original goal of this investigation was to nts network for surveying engineering purposes, in that the observation time about 1.5 hrs in most sessions. The Bernese 4.2 software was used to orbits data were obtained from International GPS Service (IGS) data center. d on the station USUD in Japan, which is part of the IGS network. For the agnitudes of horizontal displacements increase from 7-8 cm in the west to 4- all. The horizontal displacements in the southern part of the network are ctions on the hanging-wall. On the footwall the measurements are only 1-3 fter correcting for the secular motion, the resulting coseismic horizontal eismic deformations along the hanging wall and footwall of the Chihshang motion, respectively. This appears to contradict to the focal mechanism by the mainshock and subsequent larger aftershocks. A layer-elastic tes that the observed large fault parallel motions along the hanging-wall can ust faulting. We will present the coseismic displacements of a thrust an arc-continent collision boundary.

ents associated with 2003 Cheng Kung, Taiwan, earthquake base on GPS

ake

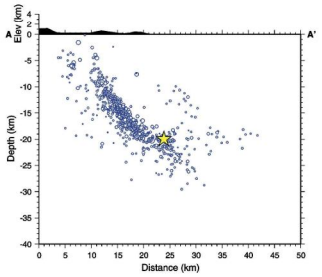

Figure 2 Cross section of hypocentral locations of the mainshock and aftershocks of Cheng Kung earthquake by double difference approach. Star is the epicentral location of the mainshock.

ral locations of the mainshock and aftershocks of Cheng Kung ce approach. Earthquakes are coded for magnitude (scale at al location of the mainshock.

Data and Method

1. 2003/5-11: 133 stations **(pre-earthquake data)**
2. 2003/12/17-12/19 and 2003/2/4-2/5: 74 stations **(post-earthquake data)**
   2003//2/20-2/25: 59 stations **(post-earthquake data)**
3. Coseismic displacements: Bernese software v.4.2 (Hugentobler *et al.*, 2001)
4. Inversion model: Layer-elastic dislocation model (Zeng and Chen, 2001)

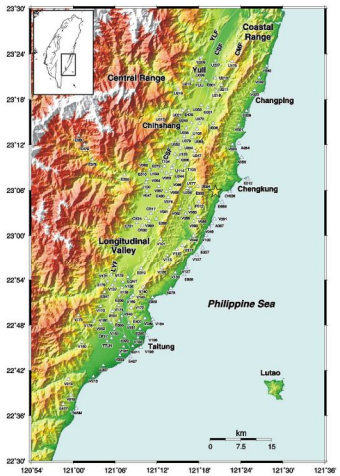

Figure 3 GPS stations in south-eastern Taiwan. Triangles are GPS stations. Yellow star is epicentral location of the mainshock. CMF: Chimei fault; CSF: Chihshang fault; LYF: Luyeh fault; YLF: Yuli fault.

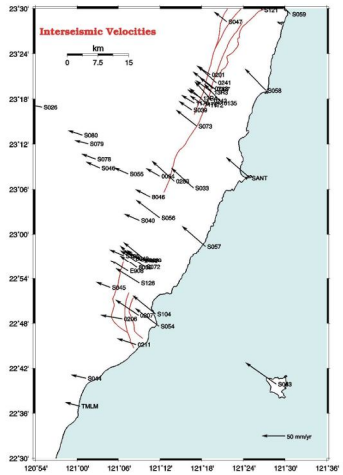

Figure 4 Secular GPS velocities relative to the stable continental margin (S01R), in study area from1992 to 1999 (Yu *et al.*, 2001). The correction of secular motion for each station is determined from interpolation value.

Coseismic Displacements

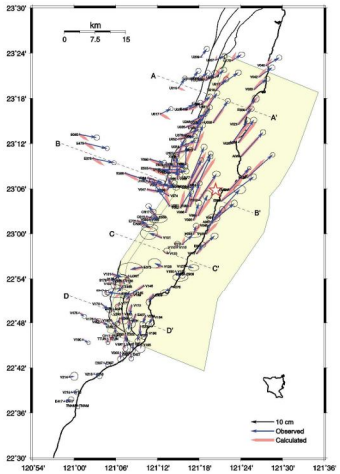

Figure 5 Observed (blue vectors with 95% confidence ellipses) and predicted (red thick vectors) coseismic displacements relative to station S01R. The yellow square is surface projection of model fault plane. Four black dash lines are locations of GPS profiles shown in figure 8.

Inversion Model

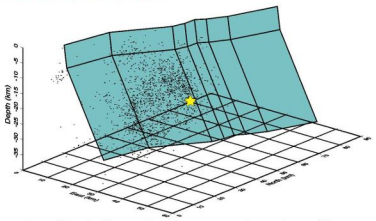

Figure 6 Modeling fault geometry for Cheng Kung Earthquake. Dip of the upper fault plane is 76° (73°- 79°); Dip of the lower fault plane is 43° (41°- 45°);Hinge depth is 7 km (6 km - 9 km). Circles are locations of aftershocks. Yellow star is location of the mainshock.

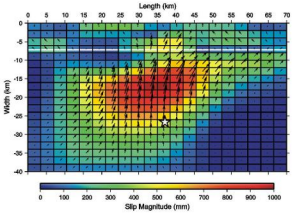

Figure 7 Slip distributions on the fault plane. White star is location of the mainshock. Rupture area is 2394.00 km^2. Average slip is 30.16 cm. Geodetic moment derived from this model is 2.2 × 10^{25} dyne-cm.

GPS Profiles

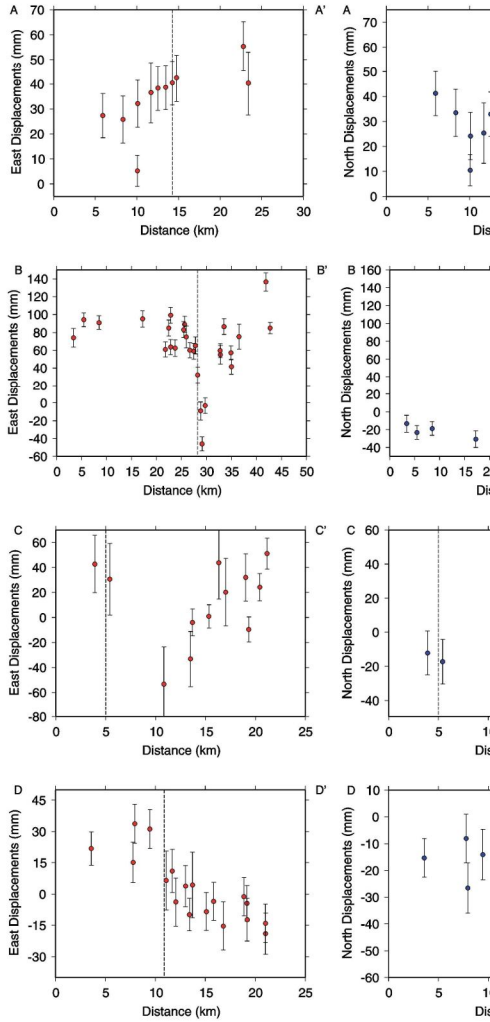

Figure 8 Spatial variations in East and north components for Che displacements of four 110°-trend profiles shown in figure 5. Dash lines a

Discussion and Conclusions

1. Fault dip-angle variation controls the pattern of surface displacements.
2. Coseismic displacements of Cheng Kung Earthquake were induced by a large

Reference

Hugentobler, U., S. Schaer, and P. Fridez, (Eds.) (2001). *Bernese GPS Software* University of Berne, 515 pp.

Yu, S.B. and L. C. Kuo (2001a). Present-day crustal motion along the Longitudin *Tectonophysics* **333**, 199217.

Zeng, Y. and C. H. Chen (2001). Fault rupture process of the 20 September 1999 *Seism. Soc. Am.* **91**, 1088-1098.