

Evaluation of Potential and Surface Deformation Associated with Earthquake by Differential Radar Interferometry, Chiayi, Southwestern Taiwan

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Abstract

Uncertainties in the length of active faults and the styles of deformation often hampered the evaluation of seismic potential in a region. In area near Chiayi City of southwestern Taiwan, where there were many historical strong earthquakes, complex fault and fold systems produced by regional tectonic force and the subsequent deformation were frequently obscured by vegetation and anthropogenic effects, and therefore the detail deformation information was not available for evaluation of seismic potential. By stacking the results from Differential Interferometry and removing ambiguity of interferogram using GPS data, we were able to retrieve surface deformation information of the area near Chiayi City. In our result, we found that the Meishan fault to the north of the Chiayi City extended 10 km to the west of its currently documented area and served as a geological boundary separating the northern part where sediments were thicker to the southern part. Chiayi City was under active deformation by a double plunging fold with vertical uplift rate at approximately 1 cm/yr. Frequent seismicity, active deformation, and uplift potential that was not observed in the data delineated the complicated geological components in the area, which allowed the tectonic stress to permute between strike-slip and thrust in nature. Continuous folding of the Chiayi City and episodic large earthquakes along the Meishan Fault posed a serious concern of seismic hazard in this region and would call for continuous monitoring of the area.