Geophysical Research Abstracts
Vol. 14, EGU2012-3992, 2012
EGU General Assembly 2012

Interferometric SAR time series analysis for measuring the surface deformation caused by the 1999 Chi-Chi earthquake in Taiwan

Y.-A. Chen (1), C.-P. Chang (2), and J.-Y. Yen (3)

(1) Institute of Geophysics, National Central University, (2) Center for Space and Remote Sensing Research, National Central University, (3) Department of Natural Resource and Environmental Studies, National Dong Hwa University

The 1999 Chi-Chi earthquake, the strongest earthquake in the 20th century in Taiwan, struck the central Taiwan seriously and caused heavily damages. The earthquake produced a north-south trending surface rupture of approximately 100-km-long, which is mostly along the previously recognized Chelungpu fault. In order to understand the space-time distribution of the deformation, this study implements the time series SAR interferometry to investigate the surface deformation in the epicentral area which is before and after the Chi-Chi earthquake. Thirty-two C-band radar images, acquired by the European radar satellite ERS-1/2 from October of 1993 to September of 2002, were used to analyze the time series deformation in the study area. From the results, there are several small and regional deformations in the study area before the earthquake. And the pre-seismic deformation rate of the hanging wall area over 5.8 years is nearly 5-10 mm/yr along the radar Line-Of-Sight (LOS) direction. The co-seismic displacement reveals the uplift on the hanging wall of up to about 10-30 cm along the fault in radar LOS and rapidly decreases eastward. However, the Puli-Wushe and Sun Moon Lake area show the relative co-seismic subsidence. In addition, the long-term post-seismic deformation is decreasing dramatically with time, and the displacement rate is different between the northern and the southern part of the fault, which is similar with the previously published continues GPS measurements. In contract, both geodetic results represent the higher displacement in the southern part of the main shock rupture, but lesser displacement in the northern section where is adjacent with the greatest co-seismic deformation area. Moreover, this study demonstrates that the capability of time series InSAR technique is not only good to monitoring the ground displacement in the subtropical area such as Taiwan, but also to analysis the long-term temporal and spatial deformation.