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Integrated RTK GNSS Analysis of Surface Deformation in Yuli Following the 20220918 Chishang Earthquake

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This study assesses the surface deformation in Yuli, Taiwan, following the 20220918 Chishang earthquake, employing an integrated Real-Time Kinematic (RTK) Global Navigation Satellite System (GNSS) network. The Longitudinal Valley, positioned at the convergence of the Philippine and Eurasian Plate boundaries, is a hotspot for seismic activities. Our investigation reveals varied coseismic displacement patterns across the Central Range, Coastal Range, and Longitudinal Valley. The Central Range shifted southwestward by 1.17m with a vertical uplift of 1.1m, while the Coastal Range moved northwestward by 1.18m, experiencing a 0.65m subsidence. Notably, the Longitudinal Valley exhibited a partitioned response: its western segment, influenced by the Central Range, underwent a 0.79m southwestward displacement and a 0.63m uplift, whereas its eastern segment, closer to the Coastal Range, shifted northwestward by 1.02m with a 0.13m subsidence. The study also highlights the role of the Yuli Fault in the seismic processes suggesting a west-side-up motion of the Yuli Fault potentially linked to the Central Range Fault's westward dip. An extended survey to Ruisui indicated a deformation halt south of Wuhe Tableland, pointing to possible undiscovered geological structures. These insights underscore the complex dynamics between surface deformations and subsurface faulting, offering valuable information for earthquake mitigation and indicating avenues for further investigation with alternative methodologies.

Keywords: Coseismic surface deformation, 2022 Taitung earthquake, Yuli fault, Central range fault, Longitudinal valley