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Emergence of Holocene marine terrace in the Coastal Range, eastern Taiwan

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Longitudinal Valley Fault (LVF), which marks the collision boundary between the Eurasian and the Philippine Sea plate, consists of two fault systems—a locked fault in the north and a creeping fault in the south. On the hanging wall of these two fault systems, distinct staircase morphology of marine terrace is widely distributed along the Coastal Range. These Holocene marine terraces give access to compare fault behaviors between different fault systems in millennial time scale. Thus, this study aims to construct terrace sequences and obtain radiocarbon dates which increase understanding of tectonic uplift rate and marine terrace evolution.
By comparing differences of terrace sequences and uplift rates, marine terraces can be classified into two types. In the northern Coastal Range, uplift rates are generally lower, only 2-4 mm/yr. Marine terraces in this region possess a higher terrace riser and a narrower wave-cut platform, which may be produced by large earthquake event. In the central Coastal Range, uplift rates are two times higher than the north, ranging from 5-8 mm/yr. Marine terraces are mainly composed of a lower terrace riser and a wider wave-cut platform. Lower terrace risers are uplifted by coseismic deformation and interseismic creeping, and multiple steps of small terrace could be merged together, displaying as a wide wave-cut platform. The characteristics of deformation deduced from marine terraces denote that the northern and the central Coastal Range are deformed by locked and creeping faults, respectively. This result is consistent with fault behaviors of LVF that we observed during the past two decades, suggesting that LVF may act as the main contributor for the emergence of the Coastal Range marine terraces, and the characteristic of LVF remained quite stable in Holocene.