

Holocene landscape evolution driven by sea level change and tectonics in the northeastern of Coastal Range, eastern Taiwan

*Yu-Hao Cheng¹, Shyh-Jeng Chyi¹, Jia-Hong Chen²

1. Department of Geography, National Kaohsiung Normal University, Kaohsiung, Taiwan, 2. Department of Natural Resources and Environmental Studies, College of Environmental Studies, National Dong Hua University, Hualien, Taiwan

The terraces in coastal area of eastern Taiwan are considered being formed since the end of the last glacial period. The materials that cover the platform are mostly coarse gravel and cobbles. However, we observed thick fine sediments with no exposed bedrock on the terrace risers around the Shuilian estuary and Niushan beach.

In this research, we focus on the coastal area of Shuilian and Niushan, and determine the landscape evolutionary history by surveying landforms, analyzing sediments, and applying radiocarbon dating methods. Our research indicates that the landscape evolution history can be divided into 4 stages. I) From the last glacial period to early 8 ka, the sea level raised quickly, causing the coastline to retreat. Then, both systems had estuarine marshes near the current coastline. II) A regression was caused by rapid fluvial depositing over hundreds of years, and at least 20-meter-thick sandy deposits filled up the incised valley in Niushan. A series of narrow coastal plain raised up. III) The sea level dropped steadily and gradually, and fluvial erosion stabilized, shaping the main terraces in the Niushan basin and the coastal terraces of the Shuilian River. IV) Since not later than 1.3 ka to the present, the fluvial process transitioned to incision and lateral erosion, which formed the current river terraces of the Shuilian River, and up to 10 meters high from the riverbed. Moreover, a landslide occurred, and the colluvium was deposited on the southern bank of the Niushan basin.

In summary, we report the first uplift rate data as possibly 0.97-1.35 mm/yr on average since 8.6 ka for this region, and reconstruct the landscape evolutionary history. Furthermore, we also confirm that the landscape evolution was influenced by rapid sea level rise and a low uplift rate during the Holocene.

Keywords: Fluvial landscape, Sea level change, River terrace, Coastal Range (eastern Taiwan), Radiocarbon date