



Landforms and sedimentary archives of late Quaternary processes in the Miaoli Tablelands, Northwestern Taiwan

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Sedimentary terraces represent the combined processes of deposition, tectonic uplift, and subsequent erosion. In the western mountain foreland of Taiwan, several landscape units show well-developed terraces called “Tablelands”, which are different in their sedimentological compositions and elevations. The Miaoli Tablelands are a representative case with terraces formed by uplift and river incision during the Quaternary. The purpose of this study is to describe and to analyze the sedimentary sequence, spatial pattern, as well as the processes forming the present-day reliefs by integrating different datasets. Accessible and well-preserved outcrops in the terrace remnants were studied. Results from previous studies were integrated into the outcrop sketch. Characteristics of layers are studied by grainsize analyses by a laser diffraction reader. Open source deep borehole data from public road and rail constructions were combined to develop cross sections across the river catchments. Our results allow the identification of a sequence with different sediment layers. They represent a transition of various depositional environments from shallow marine (clay loam dominated) followed by a lagoon-beach system (alternations between clay loam and sand loam) to beach sediments (sand loam dominated), and to an alluvial fan (gravel bed). We found three main types of sediment profiles: Type A: All layers; Type B: The gravel bed is missing; Type C: Thin gravel bed is < 2m or two thin gravel beds. In combination with geomorphological mapping, the spatial distribution can be shown. Type A represents most parts of the Tableland; Type B is occurring in terraces; Type C is mostly in the river banks and coastal plains, representing redeposited material, which is only seen in the borehole data. After a shallow marine environment on a passive continental margin, the orogeny of Taiwan island as well as the marine regression caused the deposition of a massive alluvial fan, which covers the whole region. Fluvial response eroded the surface of the Tablelands. The eroded material was deposited again in the present-day river banks and coastal plains. This model explains the variation of depositional sequences at the different sites.

Keywords: Geomorphological Mapping; Quaternary sediments, Tableland Terraces; Western Taiwan