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Depositional systems and event stratigraphy since the LGM of the Gaoping Canyon-Manila Trench system offshore SW Taiwan

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The river-connected Gaoping Canyon (GPC) and the Manila Trench (MT) system is the main sediment conduit that drains sediments derived from the southern Taiwan orogen into the deep South China Sea. This system has witnessed recent major floods (e.g., flooding during 2009 Morakot typhoon) and submarine landslides caused by earthquakes (e.g., 2006 Pingtung earthquake) in the form of turbidity currents and their ensuing deposits (event beds). The event beds enable us to reconstruct the spatial and temporal variability of the extreme events in the study area and the long-term variations in sediment delivery along the GPC-MT system. We utilize an array of data, including high-resolution bathymetry, sub-bottom profiles, reflection seismic profiles and sediment cores along the GPC-MT system to characterize depositional facies and event beds since the LGM in the study area. We identified the following geomorphic units with their characteristic sedimentary facies along the GPC-MT system: (1) the canyon-head hyperpycnites facies of GPC, (2) canyon-thalweg facies along the GPC, (3) canyon-terrace facies in the upper GPC, (4) canyon-bank facies in the upper GPC, (5) Channel-levee facies in the lower segment of the GPC, (6) overbanking facies on the Gaoping transient fan at the GPC lower segment, and (7) trench-infill facies of the Manila Trench. The establishment of sedimentary facies on modern canyon-head hyperpycnites, canyon-thalweg, canyon terraces, channel levees, overbanking areas and trenches sheds light on facies model for deep-sea canyons, channel-levee systems, and trench systems in active margins. Our results also bear important implications on sediment dispersals for river-connected canyons developed in active margins as well as return periods of large events, either mega-floods or great earthquakes since the LGM.

Keywords: Gaoping Canyon, Manila Trench, depositional systems, event stratigraphy