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Comparison of the sediment dispersal routes between offshore SW Taiwan and Huon Gulf west of Papua New Guinea in incipient oblique arc-continental collision zones

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Two similar plate convergence zones occur in offshore southwest Taiwan and Huon Gulf west of Papua New Guinea (PNG) both showing distinct seafloor features such as submarine canyon, deep-sea channel and oceanic trench in the subduction transition to collision zones. In the northern South China Sea, the incipient Luzon Arc-Chinese Continent oblique collision occurs in south of Taiwan with development of a foredeep in offshore SW Taiwan. The prominent Penghu Submarine Canyon develops along the intersection between the active Taiwan margin and the Chinese continental margin, and extends along the distal front of the marine foreland basin of Taiwan and parallels the strike of the Taiwan orogen in a N-S direction. In the west Solomon Sea west of the triple junction (Solomon Sea Plate, South Bismarck Plate, and Australia Plate), the Bismarck Arc-Australia Continent collision is occurring along the Ramu-Markham Fault. The Markham Submarine Canyon runs along submarine extension of the Ramu-Markham Fault, extending southeast from the mouth of the Markham River and then turning gradually eastwards towards the 149º Embayment. The axial submarine canyons parallel to their orogens such as the Penghu Canyon and Markham Canyon can be regarded as the main sediment transport route, delivering terrestrial sediments derived fro nearly uplifted orogens to deep-sea region in the convergent zone.

The offshore SW Taiwan and the Huon Gulf west of PNG are counterparts in the marine longitudinal sediment transport system consisting of the interconnection of canyon, channel and trench. The former region is characteristic of morpho-sedimentary features including the Kaoping Canyon, Penghu Canyon, a deep-sea channel, and the northern Manila Trench to form a linear sediment dispersal route. The tributary Kaoping Canyon linked to the Kaoping River mouth in southern Taiwan extends more than 260 km long and finally join to the lower Penghu Canyon, downward to a deep-sea channel. The deep-sea channel extends 80 km long downslope and southward, and merges into the northern Manila Trench. Similarly, the later region has characteristic features including the Markham Canyon, Markham Channel, and the western New Britain Trench which are interconnected to form a longitudinal sediment transport route. The 235 km long Markham Canyon links to Markham Channel downslope of 55 km long, and finally debouches into the western New Britain Trench.

Morpho-sedimentary features that characterize the offshore SW Taiwan and the Huon Gulf of east PNG have remarkable similar linear sediment dispersal route in collision zones. Based on the comparison of these sediment dispersal systems as well as other examples, we suggested that the comparison of sediment transport routes may aid in elucidating longitudinal sediment transport processes and the source-to-sink system in collision zones. The source-to-sink systems in both offshore SW Taiwan and Huon Gulf of east PNG are ideal natural laboratories allowing a direct observation of sediment route, from small mountainous rivers, via submarine canyons and deep-sea channel, finally to oceanic trench.