

Sediment storage and dispersal system of west and southwest Taiwan deltas: millennial to decadal time-scale changes

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The natural setting of Taiwan with high mountains, steep slopes, high gradients of rivers, frequent earthquakes, erodible lithology, and heavy rainfall represents an ideal environment to determine the sediment dispersal from land to the sea over various time scales. Sediment transport from the small mountainous rivers can provide a large amount of sediment into the ocean. These small mountainous rivers of west and southwest Taiwan on the active narrow margin not only transfer terrigenous sediment to the ocean but also have the impact on both the short-term and long-term characters of the coast and seafloor (Syvitski and Saito, 2007; Milliman et al., 2007). Sediment storage, remobilization, and cycles of erosion may be accelerated in this tectonically active region. The west and southwest Taiwan deltas trapping sediments over time scales from millennia to decades showing about 4,700 km² of subaerial delta and 2,400 km² of the subaqueous delta. To assess the sediment storage in the deltas, the volumes of subaerial and subaqueous deltas were calculated since the last maximum flooding surface in 7 ka to present. Based on the 80 core sites and 112 radiocarbon dates, the volume of sediment deposited over the last 7 ka can be estimated. The volume in the west and southwest Taiwan deltas since 7 ka is 201.1 km³ and the accumulation rates have been high with averaging about 0.4 cm/yr. Besides, the modern (<100 years) sedimentation rates in average in the Taiwan Strait are ranging about 0.28-0.4 cm/yr (Huh et al., 2011; Hsu et al., 2014). However, the sediment trapping efficiency of the delta region is decreasing at present. The water depth of historical nautical charts allowed the reconstruction of the paleo-bathymetry and paleo-shorelines. The regional deepening and minus volume evaluation indicate the erosional/transport environment and seafloor instability at present. The extreme climate events and human activities in the west and southwest Taiwan may keep delta shrinking in the coming decades.

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