



The super typhoon Morakot-induced sediment export: Implication for the enhanced denudation in Taiwan

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The record-breaking typhoon, Morakot, brought $\sim 2,500$ mm rainfall within 5 days (Aug. 6~10, 2009), which is almost identical to the annual rainfall amount in Taiwan ($\sim 2,515$ mm/yr). As the result of this unprecedented rainfall amount from Morakot, the landslide area in the Gaoping watershed was up to 226 km² (~ 10 % of the entire watershed, 3,257 km²), which $>80\%$ was newly-exposed, and contributed 5.6×10^4 Mm³ fresh sediment to the valley. Consequently, Gaoping River discharged ~ 700 Mt, roughly 20-fold higher than its mean annual sediment export and as large as Yangtze River's export.

It has been well-known the episodic events, e.g. typhoon and earthquake, play very important roles in sediment export, particularly in small mountainous rivers, like Taiwan rivers. The fairly good relationship between annual typhoon-induced rainfall and island-wide sediment export indicates the erosivity of episodic rainfall events dominates sediment export in small mountainous rivers. Besides, sediment export not only positively correlates to rainfall amount but exponentially owing to the enhanced sediment supply and fluvial transport capacity.

Historical records show the frequency of annual landfalling cyclones in Taiwan is increasing since 1970. Compared with 1970s (~ 3 typhoons/year) the frequency in recent decade is almost doubled, and the increasing trend mimics the increase of global mean temperature. Therefore, it needs our attention to reinvestigate the sediment-related problems and its linkage among relevant processes due to the expectation of global warming.