

**Experience from the FATES-HYPERS (FAte of Terrestrial/Nonterrestrial
SEdiments of High Yield Particle-Export River-sea Systems) Research Program
in Taiwan**

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Located in the tropic to subtropic climatic zone, straddling between two colliding tectonic plates, having a rugged terrain and prone to earthquakes, and also situated on the paths of typhoons, all these factors contribute to the disproportionately high sediment load delivered to the sea by small mountainous rivers on the island of Taiwan. These rivers also deposited sediment along the river courses and formed alluvial plains on the west coast of Taiwan, whose source areas could extend high above sea level in the Central Range.

The multidisciplinary research program FATES-HYPERS is the Source-to-Sink research program in Taiwan that focuses on the sediment dispersal in two river-sea systems in Taiwan. The Gaoping River (GPR) and Submarine Canyon (GPSC) in southern Taiwan connects the catchment of a small mountainous river and the deep South China Sea basin. The Zhuoshui River system in central Taiwan connects the high mountain source area to the shallow Taiwan Strait. We have made significant progress on the understanding of basic characteristics of how the modern GPR-GPSC functions dispersal system from the source to sink perspective. The GPR is an efficient system to deliver terrestrial sediment and carbon to the GPSC, which is an effective conduit for the trapping, transport, and sink of not only the terrestrial sediment, but also biogenic particles of marine origin. In rare opportunities we captured the passing of hyperpycnal turbidity currents in GPSC triggered by typhoon related floods GPR. We have documented the presence of turbidites and hyperpycnites in the GPSC.

FATES-HYPERS also drilled two bore-holes on the upper modern Zhuoshui River delta and the upper tidal flat immediately north of the delta and obtained two 100-m long cores to study the past history of the Land-Sea Interactions. This multi-disciplinary research is on-going and through AMS C-14 dating of over 140 samples, we have established a reliable time model. The preliminary results indicate that there was a major shift from terrestrial sedimentary phase (mainly flood plains and paleosol-like facies) to shallow marine phase at the time around ~10,000-12,000 BP at the coring sites about 47 m below the present sea-level.

The absence of deltaic facies is unexpected in the shallow marine phase. A preliminary explanation is that when the sea-level rose to inundate the paleo-delta of the Zhuoshui River,

the strong currents not only eroded the delta but also created a hiatus in the core record. Another independent study of the sediment dispersal of the modern Zhuoshui River shows that the sediment discharged by the river actually bypasses the delta and the tidal flat system immediate to the north. This might also be a factor why the deltaic signals are missing in our cores.

The FATES program published a special issue in *Journal of Marine Systems*, volume 76, issue 4, entitled 'The Fate of Terrestrial Substances on the Gaoping (Kaoping) Shelf/Slope and in the Gaoping Submarine Canyon off SW Taiwan Shelf/Slope and in the Gaoping Submarine Canyon off SW Taiwan'. The articles of this special issue can be download at: <http://www.mgac.nsysu.edu.tw/liu/>.