Geomorphological Evidence for Upslope Canyon-forming Processes on the Kaoping Shelf, Offshore SW Taiwan

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Submarine canyons are deep incisions on the continental shelves and slopes, acting as conduits for the transport of large amounts of sediment from the land to the deep sea. At most regions of passive margin, heads of canyons incise only the edges of continental shelves. For some collisional margins or tectonically active margins with a relatively narrow shelf less than 50 km wide canyons may be nearly connected to a river mouth, effectively shortening the distance between sediment source and the shelf break and slope. This condition allows canyons directly transfer the fluvial sediment to the deep sea.

Using newly collected multi-channel seismic profiles, Chirp profiles and bathymetric data, this paper characterizes morphology and relates to structural and sedimentary processes in the Fangliao Submarine Canyon. The Fangliao Canyon consists of three distinct morphologic parts: A canyon head, a lower canyon and a distal fan lobe. The canyon head indents into and begins at the shelf edge and extends downslope in a relatively straight course for a distance of about 5 km and ends at water depth of about 600 m where the canyon turns sharply to the southwest. The deflection of canyon course is caused by the presence of a structural high of diapiric mud ridge. The lower canyon runs southwestwards along the western edge of the elongate ridge for a distance of about 30 km and is in water depth of about of 900 m where the canyon mouth opens and sediments disperse laterally and downslope, forming a relatively small submarine fan of about 80 square kilometers.

On the active margin of southwest Taiwan, the Fangliao Canyon excavates the Kaoping Slelf and Slope flanked along a liner SW trending of mud diapir ridge

before it feeds into the Fangliao fan near 900 m deep. The Fangliao Canyon cuts deeply into a narrow, tectonically active, island shelf, but is remote from the mouth of a sediment-charged river. Instead, the source of shelf sediments that have cut headward to retain their sediment supply. The sediment source of the Fangliao Canyon is mainly derived from the canyon head indenting the shelf edge where neither major rivers nor deltas are close to or present, resulting in limited sediment supply from the shelf to the canyon head. Therefore, the Fangliao Canyon serves as a sediment pathway fed by limited sediments from the shelf edge, allowing transport shelf sediments and depositing them at the upper continental slope in water depth of about 1000 m, forming a small fan, the ultimate sediment sink.
Key words: submarine canyon; active margin; sediment transport; Taiwan