



The Penghu Submarine Canyon – A canyon shaped by submarine erosion and tectonic forces

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Located at the juncture between the passive Chinese continental margin and the convergent Taiwan submarine accretionary wedge offshore southwest Taiwan, the Penghu submarine canyon is a complex submarine canyon system that was formed by submarine erosion but its development was strongly influenced by the active tectonics of the region. A high-resolution digital elevation model (DEM) generated from swath bathymetry data was used to create a complete drainage pattern of the Penghu submarine canyon system. This drainage map reveals that the main canyon system covers an area over 6,000 km² and can be divided into 3 zones. Zone 1 covers the upstream portion of the submarine canyon system that consists of numerous sub-parallel small tributary canyons and gullies developed at the shelf edge and upper continental slope area. Down slope sediment flows and slumping and sliding processes are the major processes in this zone, as this zone presents the steepest gradient on the regional gradient map. Zone 2 covers the mid-stream portion of the canyon system where 7 major tributaries confluent into a single submarine canyon. The paths of the tributary canyons in this zone are strongly controlled by the active tectonic processes of the accretionary wedge that encroaches on the passive Chinese continental slope. Zone 3 covers the down stream portion of the Penghu submarine canyon that flows along the toe of the accretionary wedge southeastward, and merges into the Manila Trench at about 21°30'N where the Penghu submarine canyon meets with the Formosa submarine canyon. The total length of the Penghu submarine canyon from the head of the most upper reach tributary to the place where it merges into the Manila Trench is about 185 km. It has been suggested that the Penghu submarine canyon lies along the boundary between the southeast-dipping passive Chinese continental slope and the southwest-dipping accretionary Kaoping slope. However, the long wavelength dip-

direction map of the region generated from the DEM reveals that the major portion of the Penghu submarine canyon system actually lies on the accretionary wedge side, and the turns of the tributary paths are mostly controlled by structures, a clear indication that the tectonic forces plays a major role in shaping the canyon development.