



The Submarine Hazards Off Southwestern Taiwan: from 2006 Pingtung Earthquake to 2009 Morakot Typhoon

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In the past several years, many international research teams pay close attention to the submarine hazards off southwestern Taiwan. The large earthquakes and stormy weathers, including Pingtung Earthquake (December 26th, 2006), Morakot Typhoon (August 7th-9th, 2009) and Jiashian Earthquake (March 4th, 2010), induced a series of submarine landslides and turbidity currents in this area and triggered over 30 submarine cables broke during or after the natural disasters invaded period.

The southwestern Taiwan offshore is mainly composed of a narrow Gaoping Shelf, broad Gaoping slope and connected to the northern South China Sea abyssal plain. Two major submarine canyons, the Gaoping Submarine Canyon (GPSC), and the Fangliao Submarine Canyon (FLSC), develop on the shelf and slope and influx into the northern termination of the Manila Trench. Owing to the GPSC directly connected to the Gaoping River and received large input of sediments from the river, traditionally was deemed as the major transport path for the sediments in southern Taiwan. Furthermore, the submarine cables broke after the Pingtung Earthquake and Morakot Typhoon were also following the major route of GPSC from the middle reach segment to the Gaoping deep-sea Fan and northern Manila Trench. All the evidences seem perfectly point out the GPSC should pay an important role on the forming and transportation of the turbidity currents or debris flows of submarine landslides which triggered the submarine cables break events in the study area.

The detailed offshore investigation was initiated after the Pingtung Earthquake. Integrated all the new evidences from core analysis results with geophysical explorations, the geological setting play an important role on producing the submarine landslides, slumping or debris flows. For the flooding event like Morakot Typhoon, besides the turbidity currents or hyperpycnal flows plunging from the river system may trigger the submarine cable break events, the instability of the seafloor which may caused by the faulting or liquefaction also can be an important element for the forming of submarine hazards. In this study, the submarine cable break events off the southwestern Taiwan can be divided into two types. One is located in the upper reach or the upper-middle reach of the GPSC which may relate to the seismic or flood events induced canyon wall failures or turbidity (hyperpycnal) currents from river. Another type of the cable failure events is located at the deep sea off southwestern Taiwan. The Gaoping Shelf and Slope which near the FLSC is the potential area where may triggered the submarine landslides and debris flows.