



Submarine landslides in the northeastern South China Sea: distribution, geomorphologic parameters and genesis mechanism

Kun Zhang (1), Haibin Song (1), Shaoqing Sun (1), and Jinyao Gao (2)

(1) State Key laboratory of Marine Geology and School of Ocean and Earth Science, Tongji University, Shanghai, China(kunsir1995@foxmail.com), (2) Key Lab of Submarine Geosciences and Second Institute of Oceanography, Ministry of Natural Resources, Hangzhou, China(gaojinyao@sio.org.cn)

Submarine landslides is a widespread marine geohazard and an important part of the global “source to sink” system. Gas hydrate is considered to be a factor for the weakening of sediment strength so that it is highly relative to submarine landslide. Because of the special tectonics and sedimentary environment, the northeast part of South China Sea is a well gas hydrate developed area and a high risk area of submarine landslide. According to multi-channel seismic and bathymetric data, we studied the distribution, geomorphologic parameters and genesis mechanism of submarine landslides in the northeastern South China Sea.

In the study area, one hundred and one landslides are identified, with a total area of 2,358 km². The statistics results show that the water depth of these landslides is in 500-2000 m, the area of the landslides are mostly smaller than 15 km² and the slopes of the landslides are relatively steeper and most of them occurring at 2-4° and 6-8°. The distribution map of submarine landslides, submarine canyons, gas hydrates and fluid activities in the study area shows that the distribution of gas hydrates and submarine landslides is concordant and most of the landslides have occurred near the submarine canyons and the mud volcanos/diapirs. We also find that the position where the base of gas hydrate stability zone exposed to the seabed matches with the headscarps of the landslide well by calculating and interpreting seismic profiles.

According to structural features, the study area is divided into the passive continental margin province and the accretionary wedge province. The submarine landslides show different characteristics in the two provinces. In the passive continental margin province, the scales of landslides are relatively smaller, the slopes are relatively steeper and the landslides mostly distribute in the flank of the submarine canyons. While in the accretionary wedge province, the landslides are a little larger, the slopes are relatively general, and the landslides can be found both in the flank of the submarine canyons and the mud volcano/diapir developed areas.

In summary, gas hydrate dissociation, canyon evolution and fluid activities are considered as the main influencing factors controlling the landslides in the study area. In the passive continental margin province, landslides are mainly controlled by canyon evolution, while in the accretionary wedge province they are dominated by canyon evolution and fluid activities simultaneously.