Geophysical Research Abstracts
Vol. 14, EGU2012-10088, 2012
EGU General Assembly 2012

Sedimentary Processes of a Slope Ridge on the Northern South China Sea Continental Slope

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In the context of source to sink, continental slope is generally regarded as a zone where sediments pass through from shelf to continental rise and deep sea basin. However, in the area offshore of southwestern Taiwan, the passive South China Sea continental margin receives considerable amount of terrigenous sediments that deposited on the continental shelf and lower continental slope. Morphological characters of the continental slope here are numerous short, straight submarine canyons which erode the slope surface to form a series of down-dip trending slope ridges. Most of the slope ridges are narrow, with width < 5 km, and have steep flanks on either side, but a few ridges are relatively wide and present sediment waves on top. BSRs, which may indicate the presence of gas hydrates, are widely observed here. This study analyzed a dense (with 400-m line spacing) seismic reflection data set conducted in a 13-by-23 km area over a wide slope ridge. The width of this slope ridge is about 12 km at water depth below 1500 m. The erosional truncation and slump features observed on seismic sections indicate that ridge flank is erosional. Depositional features are prevailing on top of the ridge with sediment wave and cut-and-fill channel deposits. The shelf-ward dipping strata in the middle of ridge are probably linked to topographic or sediment wave evolution. Clear and continuous BSRs with high amplitude reflections below BSR are common within the sediment wave structures. Seismic images also reveal that the wide ridge consists of two basement highs, named the northeastern hill (NEH) and the southwestern hill (SWH), respectively. We interpret that these two hills could be formed by erosion and deposition processes. From morphology and seismic stratigraphic analyses, we propose two models for the formation of this wide ridge, one is that this ridge was formed by filling up a submarine canyon between two adjacent slope ridges, and the 2nd model is that this wide ridge is part of the continental slope which has not been incised. Further investigation will be conducted to better understand the relationship between erosion and deposition processes which shape the slope ridges in the study area.