Seafloor characteristics and potential gas-hydrate formation off SW Taiwan

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Abstract

Due to the wide spread distribution of Bottom-Simulating-Reflector (BSR), the area off SW Taiwan is considered as a highly potential area of gas-hydrate formation. High methane concentration is also shown in the bottom water near the seafloor. To have a better understanding, we have conducted deep-towed survey of side-scan sonar and sub-bottom profiler in several potential areas. Pockmarks are found in several places. Some are related to gas seeping. The gas seeps are especially obvious in high-resolution sub-bottom profilers. The high pore-pressure due to the charging of the gas has clearly uplifted a top layer of sediments. The pockmarks area usually accompanies the presence of authigenic carbonate. In the image of side-scan sonar data, the irregular patterns of strong backscatter signal are associated with the gas seeping or pockmark sites. The presence of pockmarks or gas seeps could be related to structural faults. Because the NW convergence of the Philippine Sea plate relative to the Eurasian plate, the area off SW Taiwan in fact is under compression and has caused folds and faults. These structural faults provide efficient conduits for fluid to migrate upward. Thus, the pockmarks frequently appear near faults. In the water depth of about 450m, the upward gas could even go into water column and creates clear gas plume image in EK 500 data. The gas is inferred to be dissociated from gas-hydrate and may get into the atmosphere directly. The dissociation of gas-hydrate has probably also induced the instability of the seafloor off SW Taiwan and caused submarine landslides. We have also conducted a controlled-source electromagnetic survey off SW Taiwan. Some gas seep areas have revealed the features of relatively high resistivity.