

Assessment of Submarine Slope Stability on the Continental Margin off SW Taiwan

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The abundant gas hydrate reservoirs are distributed in the southwest (SW) off Taiwan. To explore this new energy, geological methods were systematically used and mainly emphasized on the storage potential evaluation. On the other hand, the correlation between gas hydrate dissociation and submarine slope stability is also an important issue. In this study, three submarine profiles on the active and passive continental margin were selected and assessed their slope stabilities by considering two influence factors (seismic forces and number of sedimentary layers). The gravity corers obtained from these three sites (Xiaoliuqiu, Yuan-An Ridge, and Pointer Ridge) to conduct soil laboratory tests. The physical property tests and isotropically consolidated undrained (CIU) triaxial tests were carried out to establish reference properties and shear strength parameters. Before the stability analysis is performed, it is also necessary to construct the seabed profile. For each submarine profile, data from P-waves and from S-waves generated by P-S conversion on reflection from airgun shots recorded along one line of ocean bottom seismometers were used to construct 2-D velocity sections. The seabed strata could be simplified to be only one sedimentary layer or to be multilayer in accordance with the velocity structure profile. Results show the safety factors (FS) of stability analysis are obviously different in considering the number of sedimentary layers, especially for a very thin layer of sediments on a steep slope. The simplified strata condition which treated all seabed strata as only one sedimentary layer might result in the FS lower than 1 and the slope was in an unstable state. On the contrary, the FS could be higher than 10 in a multilayer condition.