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Chronostratigraphic Constrains on the Occurrences of Gas Hydrates off Southwest Taiwan

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This study presents the chronological constraints on these gas hydrate occurrences based on calcareous microfossil bioevents and regional tephrochronology. Gas hydrates were found within a shallow depth interval of 15-42 mbsf and below 100 mbsf at the southern summit of Formosa Ridge on the passive continental margin of the north South China Sea. Enriched gas hydrates exist particularly in sandy layers below 100 mbsf, which can be attributed to the sealing effect of carbonate precipitation at 85-95 mbsf (Bohrmann et al., 2023). The last occurrence of pink Globigerinoides ruber is designated at 87.65 m with an assigned age of 127 ka (Chuang et al., 2017). Therefore, the enriched gas hydrates are contained in layers slightly older than 127 ka. At the Four-Way Closure Ridge on the accretionary wedge, gas hydrate presence starts at 65 mbsf and continues downward with saturation rates ranging 1–29% in fine-grained homogenous clay whereas much higher gas hydrate saturation values (up to 80%) were found below 109 mbsf where silty and sandy turbidite layers are intercalated ferquently (Bohrmann et al., 2023). In Core MeBo23 drilled on the summit the last occurrence of Pseudoemiliania lacunosa was identified at ~62.4 m bsf with an age of 476 ka. The enriched gas hydrates layers are contained in the stratigraphic interval between 0.47 to 0.89 Ma in age. No signs of gas hydrates were found in the long MeBo core 29 during Cruise Sonne 266, but a piece of a massive specimen of gas hydrate was recovered from the giant piston core MD214-3523. The shallow occurrence of gas hydrates (~6 m in depth) represents a very unique preservation caused by an extremely high flux of upwelling hydrates accumulated in the top wedge beneath a local diagenesis front where disseminated, massive pyrite was formed at the sub-depth of 3.1 to 3.4 m in MD214-3542.

Keywords: gas hydrates, bisostratigraphy, chronostratigraphy, Taiwan Strait