

Behavior of methane hydrate affected by environmental and geological variations, with a special emphasis on double BSR creation

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Methane hydrate can be formed in the sea floor sediment, if there is enough methane, if the temperature is low enough and if the pressure is high enough. The phase transition temperature between hydrate and free-gas increases with increasing pore pressure, and the bottom of hydrate layer (i.e. top of free-gas layer) is defined as an intersection between the phase transition curve and geothermal gradient curve.

The base of gas-hydrate stability (BGHS) can be observed as BSR (Bottom Simulating Reflector) in the Multi-channel seismic data. Recently a double BSR has been discovered in the eastern Nankai Trough region. This study numerically test the hypothesis that the double BSR can be created as a transient phenomenon due to crustal upwelling or sea-level descent.

However, the double BSR could not be formed by a simple 1-dimensional conduction regime with only methane hydrate taken into consideration. It is because the latent heat for phase transition is so large that it cannot happen until enough is supplied from upper or lower formation. Fluid or gas migration or some other mechanisms would be necessary to create double BSR.