

日本海東縁の表層型メタンハイドレートの濃集帯形成に関する作業仮説

A working hypothesis on the accumulation of methane hydrate in gas chimneys developed in the eastern margin of Japan Sea

*角和 善隆¹、蛭田 明宏¹、柿崎 喜宏¹、松本 良¹

*Yoshitaka Kakuwa¹, Akihiro Hiruta¹, Yoshihiro Kakizaki¹, Ryo Matsumoto¹

1. 明治大学 研究・知財戦略機構 ガスハイドレート研究所

1. Gas Hydrate Laboratory, Organization for the Strategic Coordination of Research and Intellectual Properties, Meiji University

A lot of gas chimney structures are identified by a sub-bottom profiler as acoustic blanking in the eastern margin of Japan Sea. The acoustic blanking is caused by hard stuff such as carbonate nodules and gas hydrate that develop usually on the seafloor or very shallow depths. Therefore, the deeper part of the acoustic blanking or gas chimney structure was remained unknown. The coring of gas chimney structure of three topographic highs by R/V Hakurei in 2014 clarified that gas hydrate occur from the surface to the deep in the gas chimneys.

A series of observation of the recovered cores by necked eyes, X-ray CT photography and experiments such as sieving of carbonate nodules from mud clarified the close association of carbonate nodules and gas hydrate in the sediments of gas chimneys. This combination of carbonate nodules and gas hydrate occurs periodically and the calculated cycles are around 15 ky.

Preceding studies clarified the following subjects.

1. Carbonate nodules in the gas hydrate field of Japan Sea are interpreted to be formed in the sulfate-methane interface (SMI).
2. The carbon and oxygen isotopic ratios of the carbonate nodules demonstrated the thermogenic methane from the deep largely contributes the formation of the nodules.
3. Active faults and folds develop in the mobile belt of the eastern margin of Japan Sea and form many topographic highs.

Combining the above-mentioned preceding studies and acquired data, we propose the following working hypothesis: Methane gas has been periodically supplied from the depth by the movements of active faults, and the gas repeatedly formed both carbonate nodules and methane hydrate at around the depth of SMI that existed at or in the shallow depth of the seafloor.

Further studies are required if the proposed mechanism of the accumulation of shallow gas hydrate would be applied generally to the other gas hydrate-bearing topographic highs that distribute in the eastern margin of Japan Sea.

We express sincere gratitude to all the persons in JOGMEC who engaged to operate R/V Hakurei in 2014. X-ray CT photos of cored samples are taken under the cooperation program between Kochi Core Center and Akihiro Hiruta (14B013). This research is a part of the shallow methane hydrate exploration project of METI.

キーワード：表層型メタンハイドレート、炭酸塩団塊、日本海、海洋掘削、活断層

Keywords: shallow methane hydrate, carbonate nodule, Japan Sea, drilling, active fault