Japan Geoscience Union Meeting 2015
(May 24th - 28th at Makuhari, Chiba, Japan)

MIS24-05 Room:101B Time:May 27 17:15-17:30

Report on the drilling results of gas chimneys by R/V Hakurei (HR14) in the eastern margin of the Japan Sea

KAKUWA, Yoshitaka[1*] ; MATSUMOTO, Ryo[1]

[1]Gas Hydrate Research Lab., Meiji Univ.

Several gas chimney structures, which develop on the topographic highs in the off Joetsu and the off Akita - Yamagata areas in the eastern margin of the Japan Sea, were drilled and a lot of sediment, gas and water samples were collected by R/V Hakurei belonging to JOGMEC from 21st of June to 10th of July 2014. This cruise is named HR14. The drilling depths of the Joetsu knoll in the off Joetsu and Tobishima West in the off Akita - Yamagata areas is as deep as 122 m and 111.5 m, respectively, and the drilled cores penetrated through the expected base of gas hydrate stability zone (BGHSZ). By this, we could know the constituents and structure of the gas chimney structures from the surface to the BGHSZ.

Two neighboring sites are selected to drill on a small mound of Tobishima West by the results of the SBP in order to characterize the gas chimney structure; the one shows a clear stratified structure (RC1408) and the other shows a sonic blanking zone that is called a gas chimney structure (RC1407). The drilling results show the stratified part bears no methane hydrate as deep as around 48 m and consists of alternated thinly laminated and bioturbated layers that is the typical sediments of the Japan Sea. On the other hand, the gas chimney structure is found to be composed of silty clay with methane hydrate and carbonate nodules.

The occurrence and the vertical distribution of methane hydrate in the gas chimney structure show characteristic features. The surface methane hydrate obtained was subdivided into massive, granular, platy and veined types by the occurrence in the cores. Massive and granular types are common in the shallower horizons, while the platy and veined types develop well in the much deeper horizons. Methane hydrate was abundant in the shallower horizons than 40 m to 60 m in two long cores. Gas is also found as well as solid methane hydrate within both methane hydrate and mud.

A model of the subsurface distribution of the shallow gas hydrate and gas in the gas chimney structure is proposed by the drilling results. The proposed model of the gas chimney structure of the shallow gas hydrate, although, has a weak point that it is based only on the three different drilling sites and the lateral changes in the occurrence and amount of methane hydrate within each gas chimney structure is not clarified yet.

Observed vertical distribution of the types of methane hydrate denies a concept that a constant and continuous supply of gas in a stable stability zone of methane hydrate as long as a few hundreds of thousands of years. Instead a catastrophic methane event that occurred in recent years such as the last glacial maximum should have caused the distribution pattern of the types of methane hydrate observed.

We express sincere gratitude to all the persons in JOGMEC who engaged to operate R/V”Hakurei”. This research is a part of METI’s project entitled ”FY2014 Promoting research and development of methane hydrate”.

Keywords: shallow methane hydrate, Japan Sea, gas chimney, drilling