

Identification of gas hydrate "concentrated horizons" in Umitaka Spur, off Joetsu, the eastern margin of Japan Sea

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Gas hydrate reservoir is confirmed in Umitaka Spur, off Joetsu, the eastern margin of Japan Sea. By combining the results of three research methods such as the Longing-While-Drilling (LWD), the coring for sample collection and the high-resolution 3D seismic survey (HR3D) reveal several horizons of gas hydrate "concentrated horizons" are identified that can be traced aerially.

How to recognize the "concentrated horizons"

The Vp values that are one of the continuous digital data of LWD from some drilling sites show several horizons of higher values occur in the background of low values. The samples collected by the coring being performed adjacent to the LWD sites confirmed that the high values of Vp zones correspond to the horizons. The observed pieces of gas hydrate mainly consist of the platy, veiny and granular types that occur in mud either densely or dispersedly. The abundance of the pieces of gas hydrate varies depending on the coring depths and drilling sites, and they are abundant where the Vp values are high. Carbonate nodules are scarcely found by the visual core description. The pattern of the variation of the Vp is almost common to many LWD sites and higher peaks or bumps occur almost the similar stratigraphic horizons. The patterns of the vertical change in Vp values give hints to correlate among different LWD sites, but they are hardly traceable inside the zone where Vp keeps abnormally high values for a long stratigraphic interval that is common in some mounds.

Corroboration by the HR3D

The analytical results by the HR3D confirmed that the correlation of "concentrated horizons" among the different LWD sites estimated by the pattern of Vp change was almost correct, and the correlation of this specific "concentrated horizons" can be traced as far as 2 km north and south. The striped structure observed in the HR3D generally develops almost in parallel except for some mounds and the interior of the pockmarks. Some biostratigraphic boundary determined by the change in diatom assemblage seems not to intersect markedly with the striped structure.

Implications

The types of gas hydrate indicates that those in the "concentrated horizons" were formed probably not contemporaneous with the deposition of the host muddy sediments, and it postdated some time after the deposition below the seafloor. However, details such as the depth of formation of "concentrated horizons", timing and cause(s) of gas supply, and the reason why gas hydrate *must* be concentrated in certain horizons are unknown.

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