

## Gas hydrate BSRs on the West Okushiri Ridge, Japan Basin

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West Okushiri Ridge is a newly proposed ridge located 50 km west of Okushiri island, branching from the Okushiri Ridge at around 80 km north of the island, reaching down to the west of the Matsumae Plateau. The West Okushiri Ridge is bounded by active reverse fault (Okamura, 2002) on the western flank, facing 3600 to 3800 m deep Japan Basin, encroaching the West Okushiri Basin, 3680 m deep, to the east. The elevation ranges from 150 m to 400 m. Thus, the West Okushiri Ridge is considered to represent the westernmost frontal structure of the eastern margin of Japan Sea. A series of sea-going expeditions (T/V Umitaka-maru UT08, R/V Natsushima NT08-09 and R/V Kaiyo KY09-05) have identified discontinuous but strong BSRs at the depth of 230 ms to 250 ms TWT on the West Okushiri Ridge while the heat flow has been measured to be about 100 mK/m over the area. Sediment cores recovered by PC deployments exhibit sharp decline in the concentration of sulfate of the interstitial waters, suggesting extraordinary high methane flux, and brecciated structures in shallow horizons. SCS profiles have revealed well-developed high angle fault system and gas chimney like structures in the West Okushiri Basin. Observations and analytical results seem to draw the scenario that a tectonic inversion caused the thrust faulting and tight folding within the thick sedimentary sequence of Japan Basin and initiated the West Okushiri Ridge with well-developed fracture system on its crest and deep thrust faults on the western flank. Deep-seated gases migrated to shallow horizons through fault conduits and accumulated in shallow fractured units on the ridge. This scenario is similar to that of the evolution of the Joetsu gas hydrate field, suggesting that the formation of gas hydrate deposits in the eastern margin of Japan Sea were governed by the tectonic inversion, crustal shortening, and thrusting and folding in organic matter rich sedimentary sequence. Deep coring and sampling should directly delineate the occurrence and distribution of the Okushiri gas hydrates.

Keywords: West Okushiri Ridge, gas hydrate, BSR, eastern margin of Japan Sea