

Seismic reflection survey for mud volcanoes in Kumano basin

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Kumano basin is one of the forearc basins located landward of the Nankai trough. Seven mud volcanoes have been observed in and around the Kumano basin using side scan sonar imagery, core sampling and dive observations, however, the deep structure of these mud volcanoes have not been precisely investigated. To elucidate the deeper structure beneath the mud volcanoes in the Kumano basin, we conducted a mini 3D seismic survey at Daigo and Dairoku Kumano knolls in June 2004.

A 600m-long, 24 channel streamer cable and a GI gun with 150 in³ chamber were used in this survey. The GI gun was fired in the True GI mode to obtain a high frequency source signal. R/V Tansei-maru kept the speed at 3kt against the ground and fired the GI gun every 10s. The seismic data were stacked with water velocity onboard for the quality control purpose. The 5 days survey concluded into 34 basic seismic lines with 5km long, 100m interval to cover the Daigo and Dairoku Kumano knolls, and 16 additional 2.5km long seismic lines which cover the Daigo Kumano knoll at 50m interval together with the basic seismic lines.

Preliminary result shows that a BSR is well developed at 0.5 s in TWT beneath the seafloor around these mud volcanoes but the BSR is terminated beneath the center of Daigo Kumano knoll. On the other hand, the BSR exists beneath the Dairoku Kumano knoll. The previous piston coring and side scan sonar imagery suggested that Dairoku Kumano knoll has not been active for long time but Dairoku Kumano knoll has been active. The difference in the existence of the BSR is strongly related with the difference in the activity of these mud volcanoes. More detailed study including 3D seismic data processing will be conducted in the future.