

Exploration results of shallow gas hydrate by 2014 Logging While Drilling in Off-Joetsu and Mogami Trough, Japan Sea

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Research cruise GR14 of Greatship Ragini with Geoquip Marine GMTR 120 for LWD (Logging While Drilling) survey was conducted by Meiji University, in Off-Joetsu and Mogami Trough areas on the eastern margin of Japan Sea, during June 20th to July 17th, in 2014. The objective of the cruise is to explore the "gas chimney structure", which have been inferred from the acoustic blanking on the high resolution seismic profiles and from which methane gas hydrate have been sampled in the shallow subbottom (mainly down to about 10m by the gravity coring), from the seafloor to the base of gas hydrate stability zone (BGHSZ), whose depths are 50 to 120 m bsf in the survey area.

LWD tools to hire for the survey consists of Schlumberger geoVISION (resistivity imaging and gamma ray), TeleScope (telemetry) , sonicVISION (acoustic), and proVISION (CMR: Combinable Magnetic Resonance). The LWD survey was planned to explore down to 150 m bsf to penetrate BGHSZ. 10 sites were drilled in gas chimney structures and one site was drilled as the reference nearby a gas chimney structure. While 9 wells were drilled down to 150 m bsf as planned, drilling at two wells were stopped because of the stiffness of the formation and gas emission from the seafloor at 80 m and 100 m below seafloor, respectively.

LWD data quality was very fine, excepting very shallow depth intervals from the seafloor to 10 - 20 m bsf in most of wells. Methane gas hydrate concentrated intervals were identified from the high resistivity, high acoustic velocity, low natural gamma ray intensity and low CMR porosity. LWD data of most of the drilled gas chimney structures show the intense anomaly to suggest high concentration of methane gas anomaly in the shallow intervals from the seafloor to several tens of meters and deeper intervals over the BGHSZ. These two intervals are continuous in some sites. Only the deeper interval was observed in the reference site. Most of anomalous intervals are shown by the series of spikes on acoustic logs and broader resistivity peaks.

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