Geophysical Research Abstracts
Vol. 15, EGU2013-4998, 2013
EGU General Assembly 2013

Monitoring the Methane Hydrate Dissociation by the Offshore Methane Hydrate Production Tests using Multi-component Seismic

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We developed a new OBC (Ocean Bottom Cable), named as 'DSS' (Deep-sea Seismic System). The sensor has 3-component accelerometer and a hydrophone applicable for four-component (4C) seismic survey. Using the DSS, the methane hydrate dissociation zone will be tried to be monitored at the water depth of around 1000m during JOGMEC offshore methane hydrate production test in early 2013.

Before the DSS, we had developed the RSCS (Real-time Seismic Cable System) with 3-component gimbaled geophones, and carried out a reflection seismic survey in the Nankai Trough in 2006. Referring this successful survey, we improved the RSCS to the DSS. The receiver size is reduced to 2/3 and the receiver case has a protective metallic exterior and the cable is protected with steel-screened armouring, allowing burial usage using ROV for sub-seabed deployment at the water depth up to 2000m. It will realize a unique survey style that leaves the system on the seabed between pre-test baseline survey and post-test repeated surveys, which might be up to 6 months. The fixed location of the receiver is very important for time-lapse monitoring survey. The DSS has totally 36 sensors and the sensor spacing is 26.5m. The total length is about 1km.

We carried out the pre-test baseline survey between off Atsumi and Shima-peninsula in August, 2012.We located the DSS close to the production test well. The nearest sensor is 63m apart from the well. A newly developed real-time 3-D laying simulation system consisting of ADCP (Acoustic Doppler Current Profiler), transponders attached to the DSS, and real-time 3-D plotting system for transponder locations have been adopted. After we laid the cable, we buried the DSS using ROV (Remotely Operated Vehicle).

The baseline survey included 2D/3D seismic surveys with shooting vessel and cable laying/observation ship. The resultant 2D section and 3D volume shows the good quality to delineate the methane hydrate concentrated zone. After the baseline survey, we have left the DSS on seafloor until the first monitoring survey scheduled in April 2013, because the fixed location of the sensors is essential for time-lapse monitoring survey.