

4-Component seismic survey in the second offshore production test of methane hydrate

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JOGMEC carries out 4-component seismic surveys before and after an offshore production test and grasps a change in physical properties by dissociation of methane hydrate (MH) three-dimensionally and evaluates MH dissociation behavior from those data comparisons.

The 4-component seismic survey data was acquired three times in August, 2012 before the production test, in April and August, 2013 after the test in the first offshore production test. The result could show the change in physical properties by the data comparison between before and after the test. On the other hand, improvements of quality of acquired data such as a design of receiver and source points, accuracy of source points and cause of a change in physical properties by data comparison between before and after the test were mentioned as a problem. So, the problems experienced in the first production test were improved for a data acquisition of the second offshore production test. A preliminary simulation was carried out. As a result, it was confirmed that the improvement of the resolution of MH around the production well was possible by the following matters;

- One OBC (Ocean Bottom Cable) would be manufactured additionally and two OBCs would be used.
- Two OBCs would be set in east and west so as to insert the production well. Those direction would be made north and south.
- Source points would be arranged in the range of 4 km north and south and 3 km east and west centering on the production well.
- In order to improve the accuracy of the source points, GPS antenna would be installed at the center of the float hanging an air-gun.

So, one OBC was produced additionally in FY2016 and the 4-component seismic survey data before the test was acquired by the specifications according to the results of the simulation around the production well of the second offshore production test in August, 2016.

From the comparison of the profiles between the acquired data and the data of Daini Atsumi Knol in the geophysical survey project in 'Tokaioki to Kumanonada' took in 2002, it could be confirmed that the resolution in the MH reservoir, below BSR (Bottom Simulating Reflector), and between the sea bed and the top of the MH reservoir was improved. Therefore, more accurate reservoir structure grasp and the evaluation of MH dissociation behavior by comparing to the data after the test will be expected.

This study shows an example of interpretation of the profile before the test.

This study is performing as part of resources assessment of MHs offshore surrounding Japan that JOGMEC is conducting as a member of a research group for resources assessment of Research Consortium for Methane Hydrate Resources in Japan (MH21).

Keywords: 4-Component seismic survey, OBC, Methane Hydrate