Gas hydrate distribution inferred from seismic data of reflection profiling in Japan Sea

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Gas hydrate recently noticed as a new resource instead of oil. In Japan, It is mainly distributed along the Nankai Trough and around Hokkaido, and also in the Toyama Trough. One of the prospecting methods of gas hydrate is seismic of reflection profiling with the specific reference to the strong reflection surface called BSR(Bottom Simulating Reflector). Although the sample of gas hydrate is actually recovered by ODP(Ocean Drilling Program) Site796, BSR is not appearance in the seismic profile across the Okushiri Ridge. Similarly in the Toyama Trough, BSR was confirmed by utilizing the data of former Geological Survey of Japan, but not recognizable with the data of former Japan National Oil Corporation. The purpose of this paper is to elucidate the occurrence of gas hydrates in relation to the geologic structure and the history of structural development mainly by reanalyzing of seismic data of reflection profiling in the Toyama Trough and the Okushiri Ridge. Additionally, we consider how gas hydrate appears in the seismic profiles in the individual areas in terms of frequency response.

Seismic data of reflection profiling of the Toyama Trough are from former Geological Survey of Japan(GSJ) and former Japan National Oil Corporation(JNOC); the Okushiri Ridge from Ocean Research Institute(ORI), the University of Tokyo.

The results are the following:

1) The mode frequency spectrum of the seismic data that demonstrated BSR is around 60Hz(period: 0.0169 s).

2) Even in the JNOC data where BSR was not clear, a peak was existed around 60Hz although the power spectrum was weak. Consequently, the rough position of BSR could be presumed on the seismic profile.

3) The frequency response of opal-A/CT boundary is not seen highly visible a strong power spectrum likes gas hydrate BSR.

4) In the ORI data the power spectrum is minimum frequency in 60Hz from the data across the vicinity of ODP Site796 in the Okushiri Ridge. It is confirmed that not only gas hydrate but also opal-A/CT boundary exists from ODP Site796 and the seismic profile in the Okushiri Ridge. However, it is not clear what controls such an appearance gas hydrate BSR in any causal relations of opal-A/CT boundary.