Acoustic detection of gas seeps on the NE Sakhalin continental slope, Sea of Okhotsk.

Y. K. Jin[1)], J. K. Hong[1)], A. Salomatin[2)], B. Baranov[3)],
A. Obzhirov[2)], and H. Shoji[4)]

[1)]Korea Polar Research Institute, Korea
[2)]Pacific Oceanological Institute FEB, RAS, Russia
[3)]P.P.Shirshov Institute of Oceanology, Russia
[4)]Kitami Institute of Technology, Japan

음향학적 방법을 이용한 오호츠크해 사할린 북동대륙사면에 분포하는 활동성 메탄분출구조 탐지

진영근[1)], 홍종국[1)], A. Salomatin[2)], B. Baranov[3)],
A. Obzhirov[2)], and H. Shoji[4)]

The northeastern Sakhalin continental slope (NESS) of the Sea of Okhotsk is characterized by an abundance of gas seeps and gas hydrates. Multidisciplinary surveys have been carried out to investigate gas seepage and gas hydrate accumulation during joint Korean-Russian- Japanese expeditions conducted from 2003 to 2011 (CHAOS and SSGH projects).

Ongoing gas seepage was indicated by various phenomena: strong hydroacoustic anomalies (gas flares), side-scan sonar structures with high backscatter intensity (seepage structures), bathymetric features (pockmarks and mounds), gas- and gas-hydrate-related seismic features (bottom-simulating reflectors, gas chimneys, high-amplitude reflectors, and acoustic blanking), high methane concentrations in sea water, and near-bottom gas hydrate occurrence.

Indicators of gas seepage are commonly clustered at active seeps. For example, a gas flare is spatially associated with a topographic mound with strong backscatter intensity, below which acoustic blanking and a gas chimney are present.

The spatial distribution of gas seeps in the study area is controlled by four structural elements: faults, the shelf break, submarine valleys and submarine slides. Northwest- and northeast-trending fault systems,

including the Lavrentyev Fault, are the most important control on seep distribution.

Gas chimneys showing enhanced reflection (ER) on high-resolution seismic profiles are interpreted as active pathways in which gas (mainly methane) is migrating upward to the seafloor. In addition to active gas flares, ER chimneys are a good indicator of active seepage.

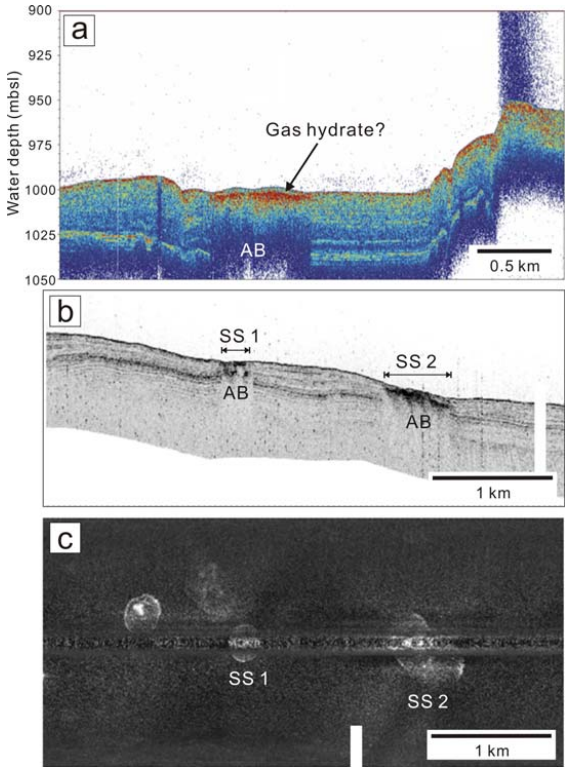

Fig. 1. Zones of acoustic blanking documented in (a) hydroacoustic profile and (b) sub-bottom profile. Acoustic blanking (AB) may result from sub-bottom gas-bearing sediment or near-bottom gas hydrate layers that inhibit signal penetration. Seeps SS1 and SS2 exhibit acoustic blanking on the sub-bottom profile (b) and high backscatter intensity in a side-scan sonar image (c).