

KOPRI RESEARCH ACTIVITIES ON GAS HYDRATES IN THE COLD SEAS: ANTARCTIC, OKHOTSK AND ARCTIC SEA

Young Keun Jin, Jong Kuk Hong, Sang Heon Nam, Kyung-Ho Chung, Sung-Ho Kang, and Yeadong Kim.

Korea Polar Research Institute

ABSTRACT

Because gas hydrates are formed in low temperature and high pressure environments, cold seas including Polar and Okhotsk Seas are very favorable areas for gas hydrate formation on earth.

KOPRI collected single-/multi-channel seismic reflection data on the South Shetland continental margin, Antarctic Peninsula since 1993 using RV *Onnuri* and *Yuzhmorgeologiya*. Seismic data show that Bottom Simulating Reflectors (BSRs) are widely distributed on the South Shetland margin. We estimated the total volume of gas hydrate in the area. Assuming that gas hydrates exist only where BSRs are observed, the total volume of gas hydrates along the seismic profiles in the area is about $4.8 \times 10^{10} \text{ m}^3$ ($7.7 \times 10^{12} \text{ m}^3$ volume of methane at standard temperature and pressure).

Multidisciplinary surveys have been conducted to investigate gas seepage and gas hydrate accumulation on the Sakhalin continental slope (SS), Sea of Okhotsk, during joint Korea-Russia-Japan expeditions conducted from 2003 to 2011 (CHAOS and SSGH projects). Active gas seeps in a gas hydrate province on the SS were evident from features in the water column, on the seafloor, and in the subsurface: well-defined hydroacoustic anomalies (gas flares), side-scan sonar structures with high backscatter intensity (seepage structures), bathymetric structures (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 seawater, and gas hydrates in sediment near the seafloor. These expressions were generally spatially related; a gas flare would be associated with a seepage structure (mound), below which a gas chimney was present.

As the ice-breaker RV *Araon* in 2009 was launched, KOPRI will expand gas hydrate research activities in the polar sea. KOPRI has developed a Korea-Canada-US international research project to focus on geological, geophysical and oceanographic investigations of the Beaufort Sea shelf to study the stability of decomposing permafrost and gas hydrate and the mechanisms for gas migration and release at the sea floor. Our research will allow assessment of the importance of Arctic shelves as past and present sources of methane for the atmosphere and will quantify a range of geohazard/environmental processes associated with gas migration and release that have not been documented to date. In addition, KOPRI will conduct surveys to investigate gas hydrate and its related phenomena in Chukchi Sea (Arctic) and Ross Sea (Antarctica).