HIGH-RESOLUTION TOPOGRAPHIC FEATURES OF SHALLOW GAS HYDRATE FIELD OF JOETSU BASIN, EASTERN MARGIN OF JAPAN SEA

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ABSTRACT
Mega pockmarks and mounds, both of which are 200m to 500m in diameter and 20m to 40 m deep or high, characterize the Umitaka Spur and Joetsu Knoll of the Joetsu Basin. The pockmarks and mounds develop in NNE to SSW direction parallel to the general trend of tectonic mobile belt along the eastern margin of Japan Sea, suggesting that the topography has been strongly controlled by regional tectonics. Seismic profiles have revealed well-developed chaotic to transparent zones (gas chimneys) in the area of pockmarks and mounds, from which a number of methane plumes stand up to 700m above sea floor. Ultra-high resolution bathymetric data and reflection images were acquired by Multi Beam Echo Sounder (MBES) and Side Scan Sonar (SSS) of the AUV “URASHIMA” during the YK10-08 cruise of R/V Yokosuka (JAMSTEC), July 2010. Based on mosaic images of MBES and SSS, we could identify several types of the hydrate mounds over gas chimney zones. Some are rough and high relief topography, featured by a few meter scale depressions, crevasses and minor ridges with strong reflection images, indicating development of hard ground (type A), but the others show smooth and low relief conical mound with weak reflections of background level (type B). Such strong reflectors are due to carbonate crusts and concretions and gas hydrate exposures as observed by ROV. Piston and gravity coring recovered massive and nodular gas hydrates and carbonate concretions from these hydrate mounds. High relief topography, such as depressions, crevasses and minor ridges of type A mound seem to suggest significant dissolution and collapse of surface gas hydrates. MBES and SSS onboard AUV provide powerful tools to reveal accumulation and evolution of shallow gas hydrate system.

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