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## Ultra high resolution bathymetric map of gas hydrate mounds of shallow gas hydrate areas in Joetsu Basin, Eastern margin

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Mega pockmarks and mounds, both of which are 300m to 500m in diameter and 30m to 40 m deep or high, characterize the Umitaka Spur and Joetsu Knoll of the Joetsu Basin. A number of pockmarks and mounds develop in NNE to SSW direction parallel to the general trend of 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 active 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. Bathymetric image data of MBES by AUV URASHIMA is about eight to ten times high resolution compare with mother ship board MBES Systems. As a result, Ultra-high resolution bathymetric data provide us give a chance to discuss tens of centimeters scale images. Based on mosaic images of MBES and SSS, we could identify several types of the hydrate mounds over gas chimney zones. Some are represented as a smooth and low bulge without strong reflections of background level, but the others show rough and uneven topography, featured by a few meter scale depressions, crevasses and minor ridges with strong reflector images, indicating the development of hard ground. Such strong reflectors are due to carbonate crusts and concretions and gas hydrate exposures as observed by ROV. Micro-topographic features are likely to represent a growth stage of hydrate mounds, and perhaps the accumulation of shallow gas hydrates. MBES and SSS onboard AUV are powerful tools to identify gas hydrate accumulation and evolution of shallow gas hydrate system.

Keywords: gashydrate, JapanSea, Topography, URASHIMA