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3D observation of shallow gas hydrates in eastern margin of the Sea of Japan by X-CT

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Gas hydrate has clathrate structure of a gas molecule in a water cage, and is found naturally in deep-sea and permafrost sediments. Natural gas hydrates were recovered in eastern margin of the Sea of Japan through scientific expeditions since 2005 (Matsumoto et al., 2011) and their characterization was investigated (Lu et al., 2011). On-board observation of the hydrate samples indicated that occurrence of the gas hydrates in silt sediments was classified into roughly three groups; flake-like, laminated, and massive types. Sometimes, many hydrate pieces appeared in one depth, which gave us questions how they occurred in sediment and whether they connected each other, or not. Therefore, we here study 3D observation of shallow gas hydrates in eastern margin of the Sea of Japan by X-CT. The samples recovered during MD179 expedition were used in this study. Histograms of gray scales in slice images of all the samples show that we can distinguish between sediment and gas hydrate/water. Flake-like, laminated, and massive gas hydrates are observed. In one sample, platy gas hydrates are broken and sediment seems to intrude into platy gas hydrates. This implies that dynamic activity occurs after gas hydrate formation.

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Keywords: gas hydrate, X-ray CT, 3D observation