

Foraminiferal assemblage and carbon isotopic composition for the last 30,000 years off Joetsu, eastern margin of Japan Sea

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A number of pockmarks, mounds, gigantic methane plumes, BSRs and massive gas hydrates have been observed on the Umitaka Spur and Joetsu Knoll off Joetsu, eastern margin of Japan Sea.

We analyzed planktonic and benthic foraminiferal assemblages of three piston cores of 5 to 9 m long and established twelve foraminiferal units for the last 30,000 years over the study area. These foraminiferal units could be applied to other nine piston cores on the Joetsu knoll and Umitaka spur.

Foraminiferal units correlate well with litho-stratigraphy. Unit 4, which is characterized by *Bolivina pacifica*, correspond to thin laminated dark layer, TL-1. Units 6,7 and 8 are correlated to thicker dark and laminated layer, TL-2, which is characterized by minimum number of benthic foraminifera and maximum number of planktonic foraminifera. Characteristic foraminifera of TL-2 is *Stainforthia rotundata*, which is thought to be common in methane dominated environment. The lower part of TL-2 is dominated by *S. rotundata*.

Tephra chronology and C-14 dating of planktonic foraminifera have revealed that the sedimentation rate on the Umitaka spur and Joetsu knoll are remarkably variable reflecting the topography. Sedimentation rates on flat sea floor is generally around 15 to 20 cm/ky, whereas those are 2 to 4 times faster within pockmarks. This seems to suggest that the pockmarks were much deeper and rapidly buried for the last 30,000 years.

Carbon isotopic composition of benthic foraminifera of Unit 6 shows remarkable negative shift from -1.5permil to -3.0permil for approximately 24,000 to 20,000 BP. This infers that methane seeps and perhaps dissociation of gas hydrate in this area were enhanced during the Last Glacial Maximum, reflecting sea level fall and pressure release.