Geochemistry Study of the Late Quaternary Gas-Hydrate-Bearing Sediments of Japan Sea and Pacific Ocean

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Interbedded dark gray thinly laminated units and dark brown to gray bioturbated units are common throughout the Quaternary sediments of Japan Sea, and have been often explained in terms of glacio-eustatic sea-level change. Recently, active methane venting and gas hydrates were recognized, which are widely distributed just below the sea floor of the Umitaka spur in the Joestu basin off Joestu, eastern margin of Japan Sea.

Research-cruises occurred last years in this area and also in the western margin of the Pacific Ocean. Samples were collected from the Joetsu basin and the inner slope of Japan Trench off Sanriku Peninsula in 2006 and 2007, and were analyzed for TOC content by CNS determinator, mineral composition by XRD, and delta ^{13}C of TOC by mass spectrometry. The intention is to identify environmental changes occurred for the last 30.000 years, because the behavior of total organic carbon and mineral composition follows the characteristics of the environment that surrounds the study area and at the depositional time. At the Last Glacial Maximum (LGM) time, about 20 Ka B.P., the sea-level dropped around 90 meters than the actual sea-level. The rivers were more close to the edge of the platform and, because of this, closer to slope and basin sites. That rivers mouth location put more organic matter and fine sediments on suspension and this material precipitated to the basin-seafloor. On the other hand, at Holocene time, the rise of sea-level puts the rivers mouth far from the slope by the retreat of the coastal line. For this reason, theoretically, it is expected that less organic matter will appears at Holocene time than at Pleistocene time. Nevertheless, in the study area, TOC has been revealed to increase upward. So, at Holocene time, the production of organic carbon was bigger than at Pleistocene time both in Japan Sea and Pacific Ocean. A possible reason for this is that the organic matter production was from marine phytoplankton, not delivered from land, as suggested by the delta ^{13}C which increased upward. On the other hand, piston cores located over Umitaka Spur and Joetsu Knoll shows different TOC value patterns. Gas Hydrate occurrence can explain the difference because origin of methane is partly thermogenic and partly biogenic, and the organic carbon could be used on gas hydrate formation.