Environmental changes of the estuary based on sedimentary facies, TOC and TS contents and organic matter part 2

Akiko Omura[1], Azusa Yamazaki[2], Mamiko Yoshida[3], Miyuki Yamagishi[4], Koichi Hoyanagi[5], Atsushi Urabe[6]

[1] Shinshu Univ., [2] Geology, Sci., Shinshu Univ, [3] Geoenvironmental Sci., Sci. and Tech., Niigata Univ., [4] Geology Sci.,Shinshu Univ, [5] Geology, Shinshu Univ., [6] Resear. Inst. Hazards for Snowy Areas, Niigata Univ.

The Niigata Plain is a coastal plain along the Japan Sea and is situated in the central part of the main Japanese Island. Large discharge rivers, Shinanogawa and Aganogawa Rivers flow into microtidal and wave dominated Japan Sea. Holocene sediment in the Niigata Plain is more than 140 m in thickness. It is filling the estuary formed during the last glacial maximum. We drilled 50 m and took successive cores on the Niigata Plain for the study of facies and sequence analyses, total organic carbon(TOC) and total surfer(TS) analysis, and insoluble particulate organic matter composition. Drilling site SRSN is situated at the central part of the Niigata Plain.

We analyzed grain-size of sediments with a laser diffraction size analyzer (Coulter LS230), total organic carbon content (TOC) with a CHN analyzer Yanaco MT-5 and total sulfur content with a sulfur content analyzer Horiba EMIA-120. We also analyze organic matter composition. Each type of organic matter was then subdivided into particles based on characteristics seen under a reflected-light fluorescence microscope(Sawada and Akiyama, 1994).

Bay head delta sediments (below 48.85m) are composed of medium to fine sand intercalated thin layers of silt. Large scale foreset beds represent in thick sand layers. Bay head delta sediments are overlain by estuarine lagoon sediments (48.85 to 42 m), which are composed of strongly bioturbated sand and sandy silt with scattered shell fragments. Discrete burrows include Paleophycus, Skolithos, Teichichnus and Chondrites. Low contents of TOC and TS are recognized in this interval. Estuarine lagoon sediments from 42 m to 26.52m are composed of strongly bioturbated sandy silt. Discrete burrows include Chondrites, Teichichnus and Thalassinoides. Small size borrows Chondrites abundant. TS content increases from 0.2 to 1.6% upward in this interval. TOC content begin to increase in the upper part of this interval. Estuarine lagoon sediments are overlain by repetitions of fluvial, lagoon and salt marsh sediments (26.52 to 1.83m). Fluvial sediments are mainly composed of coarsening upward succession of silt to sand and upward fining sand layers intercalate peat layers. Bioturbation is not basically observed in fluvial sediments. Estuarine lagoon and salt marsh sediments are composed of strongly bioturbated upward fining succession of sand to sandy silt and bioturbated peat. Teredolites burrows are observed in peat layers. Estuarine lagoon sediment is rich in sulfur. An autochthonous fossil of brackish water molluscs(Corbicula Japonica Prime) was found at 13.70 m. TOC contents increase upward in this interval.

The maximum flooding surface(MFS) is set up at the most fine-grained part of clayey silt(42m). Transgressive systems tract(TST) is composed of the bay head delta and estuarine lagoon sediments and their TOC contents are 0.5 to 1%. High stand systems tract(HST) consists of lagoon, bay head delta and fluvial sediments. TOC contents increase upward in HST sediments. TS content of the HST lagoon sediment is higher than that of the TST lagoon sediment. HST lagoon was much stagnant than TST lagoon, because the estuary mouth was closed by the adjacent delta system. Bay head delta and TST lagoon sediments have high contents of land-derived organic matter, such as vitrinite, cutinite and NFA(non-fluorescent amorphous organic matter). Marine organic matter, such as alginite, is rarely found in bay head delta sediments. Alginite is frequently found in lagoon sediment. HST lagoon sediments have high contents of vitrinite and NFA. NFA decrease and vitrinite increase upward in the HST lagoon sediment. Fluvial and lake sediments have high contents of vitrinite, cutinite and NFA. NFA decrease and vitrinite increase with coarsening upward facies succession in fluvial and salt marsh sediments.