Environmental changes of the estuary based on facies, TOC and TS contents and organic matter 1: northern part of the Niigata Plain

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[Introduction]

Maximum thickness of the Holocene sediment in the Niigata Plain is more than 140m. It is filling the estuary formed during the transgression called Jomon Kaishin. The estuary lagoon environment is influenced by delicate sea-level fluctuations. We drilled 50 m and took successive cores at the Kajikawa area northern part of the Niigata Plain for the study of the environmental changes during last 10,000 years from the analyses of sedimentary facies, total organic carbon, total sulfur, and the compositional study of insoluble particulate organic matter.

[Facies, TOC content and TS content]

The samples for the analyses were taken at every 50cm. TOC and TS contents range from 0.3 to 7.4% and 0.1 to 3.9% respectively.

Pleistocene fluvial sediments are found below 39.38m. We divided Holocene sediments into nine sedimentary facies and interpreted the sedimentary environment. The interval from 39.38 to 35.98m is composed of very poorly sorted pebbles and interpreted to transgressive lag sediments. The interval from 39.3 to 35.98m is composed of poorly sorted and weakly bioturbated sand with gravels and interpreted to bay head delta sediments. The interval from 35.98 to 27.28m is composed of alternation of strongly bioturbated sand and mud and interpreted to tidal flat sediments. High TS content and low TOC content indicate the salt water and oxic conditions. The interval from 27.28 to 15.5m is composed of alternating layers of strongly bioturbated silt and laminated silt and interpreted to lagoon sediments. Low C/N ratio and high TS content indicate the environment that planktonic organic matter is supplied and sulfate is preserved in the anoxic condition. The interval from 15.5 to 11.0m is composed of weakly bioturbated massive silt and interpreted to lake sediments. Low TS content and high C/S ratio indicate fresh water. But high TS content at about 12m depth indicates temporal inflow of saltwater. The interval above 11.0m depth is flood plain sediments composed of massive sandy silt, natural levee sediments composed of alternation of sand and mud or reverse graded sand and channel sediments composed of graded sand. High TOC and low TS contents indicate the fresh water condition with peaty environment.

[System tracts and sedimentary organic matter composition]

Sedimentary organic matter consists of mainly vitrinite, cutinite and NFA (non-fluorescent amorphous organic matter), and rarely sporinite, alginate and FA (fluorescent amorphous organic matter).

The maximum flooding surface (MFS) is set up at about 21m depth from the lowest C/N ratio and the highest FA content. Transgressive systems tract (TST) is composed of transgressive lag, bay head delta, tidal flat, lagoon sediments. High stand systems tract (HST) is composed of lagoon, lake, fluvial sediments.

Sedimentary organic matter consists of mainly NFA and vitrinite in tidal flat sediments. And alginite of marine-derived organic matter is found and indicates the strong influence of seawater. This result corresponds to the interpretation of TS content. Vitrinite content decreases upward, NFA content increases upward in TST lagoon sediments. Vitrinite content increases upward, NFA content decreases upward in HST lagoon sediments. TS content increases upward in TST lagoon sediments, and is the highest at about 20m depth in HST lagoon sediments. They indicate that organic matter was preserved as NFA in the anoxic condition. High vitrinite and cutinite contents indicate the increase of the terrestrial organic matter derived from the river.