Control factors on major element composition of suspended solids from the Ishikari River, Hokkaido, Japan

Tomohisa Irino[1]; Seiya Nagao[2]

[1] EES, Hokkaido Univ.; [2] Inst. Nature and Environ. Technol., Kanazawa Univ.

Fine grained solids from land to ocean are mostly supplied through rivers and atmosphere. The contribution of suspension load from river is significant around the continental margin, which significantly affects terrestrial and marine organic carbon deposition in marine sediments. Suspended load of Japanese river is highly variable depending on the tectonic and climatic condition where the river is located. The high relief of drainage basin and frequent flooding by high discharge events promoted by heavy rain associated with frontal activity and typhoon as well as by seasonal snow melting especially in the northern area makes it difficult to understand the mechanisms that control the total suspension transport and their composition. In order to realize quantitative estimate of the total transport of suspended material and understand the controlling factor on it, it is necessary to conduct continuous observation with wide areal coverage for the targeted river.

The Ishikari River is the largest river in Hokkaido, which is 268 km in length and 14,330 km^2 in drainage area. Seasonal variety of discharge is large and characterized by two high seasons such as snow-melting and autumn rain. Because suspended load is generally exponentially correlated with water discharge, it is necessary to directly measure the suspended material transported by the River to estimate the total solid transport appropriately. Therefore, we have conducted frequent sampling from 2004 to 2006 at 9 sites along the Ishikari River covering snow-melting season and raining events. Sampled water was filtered or centrifuged and the suspended solids are collected. We conducted EDS-XRF to determine the major element (Na, Mg, Al, Si, K, Ca, Ti, Mn, Fe) composition for filtered sample and grain size analysis by laser diffraction-scattering method for centrifuged sample.

Al content (mg/L) in the river water can be regarded as suspension load (or turbidity). The suspension load is positively correlated with water discharge but trends during snow-melting and raining event are different. Na/Al and Mg/Al are higher, and Ti/Al and Fe/Al are lower in the lower reaches than the upper reaches, while Si/Al, K/Al, and Mn/Al are not significantly different. Grain size shows wide variety depending on the type of discharge event but tends to be smaller in the lower reaches. Major element composition of the suspension load in the Ishikari River would be controlled by pattern of discharge as well as relative contribution from different tributaries consisting of their characteristic soil types.