Estimation of the amount of soil erosion using suspended sediment load - an example in the Horonobe area, northern Hokkaido -

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We should estimate ten-thousand-year stability of geological environment to meet the geological disposal of high level radioactive waste. Especially groundwater flow plays an important role because it might cause migration of nuclides. Since long term transitions of geology and topography may influence hydrogeological conditions such as hydraulic gradient and hydraulic conductivities, estimations of vertical displacement rate and erosion rate are also important. This report discusses the method to estimate an amount of erosion in the future based on suspended sediment concentration in rivers as an example in Horonobe area, northern part of Hokkaido.

The study area is composed of three river basins; P-3(7.6km2), P-4(2.3km2), and P-5(20.8km2), where water level and turbidity are consecutively measured and river flux measurement and water sampling are periodically performed. In addition, we intensively sampled river water at P-3 and P-5 every one or two hours during the Typhoon No.14 of September 2005 so that we could understand the large variation of water level and turbidity in detail. The turbidity and the suspended sediment concentration of sampled river water were obtained by a laboratory analysis.

The relationship between turbidity and suspended sediment concentration showed extremely high correlation coefficient of 0.996. It means the consecutive monitoring of turbidity is available in order to estimate the continuous suspended sediment concentration.

Suspended sediment load can be estimated from its concentration multiplied by river flux. As a result, we estimated the total amount of the suspended sediment load of P-3(2.0t/km2), P-4(0.3t/km2) and P-5(4.5t/km2), respectively, during the Typhoon No.14.

The suspended sediment load may be governed by geology, topography, vegetation, weather and so on. Therefore, prediction of each factor leads the future estimation of the amount of the suspended sediment load, and it would help the long-term estimation of the erosion rate.