

Transport and speciation of trace metals in Tama – Omono River system in Akita Prefecture, Japan

Q.PHAM*, D. ISHIYAMA, Y. OGAWA, M. FUKUYAMA

Akita University, 1-1 Tegata-gakuen-machi, 010-8502 Akita, Japan (*correspondence: neyup_87@yahoo.com)

For understanding the element cycles under subaerial environment, chemical forms and the change of chemical forms of elements in river water are important. The aim of this study was to assess the relevance of all dissolved, colloidal and particulate forms for the transportation of trace metals in the river water of Tama-Omono River system in Akita Prefecture, Japan. This river system contains acidic thermal water due to the discharge of the Tamagawa Cl-SO₄ type thermal water to Tama River and Kawarage Cl-SO₄ type thermal water to Omono River at the upstream of both rivers. In addition, Tama River runs through the area mainly composed of Neogene volcanic rocks, while Omono River runs through the area mainly composed of Quaternary strata covering Neogene sedimentary rocks.

In Tama River, Al and Fe were dominantly found in the particulate form (>60%) while dissolved Cu and As were observed significantly during transportation (>40%, >60%, respectively). The amounts of Al, Fe, Cu and As that are transported by river water of Tama River decreased from upstream to downstream (118 to 18 ton/month, 8 to 6 ton/month, 49 to 26 kg/month and 37 to 23 kg/month, respectively). In Omono River, sizable proportion of Al (70%) and Fe (65%) were found within the particulate form that is similar to Tama River. The small proportion of Cu (26%) and As (47%) were observed in the dissolved form and the proportion of these elements in colloidal form increase toward downstream (19-35%), which is a different tendency with the distribution of these elements in Tama River. The amounts of Fe, Cu and As that are transported by river water of Omono River increase from upstream to downstream (15-148 ton/month, 22-225 kg/month and 112-308 kg/month, respectively) while the amount of Al is constant (27 ton/month). These amounts, however, are 18, 5, 13 and 2 times larger than those are transported by river water of Tama River to the Sea of Japan, respectively.

These differences accord with (1) the difference of geology along both rivers and (2) the numbers of presence of dam lakes along Omono (no dam lake) and Tama rivers (4 dam lakes). The dam lakes along Tama River keep most of the particulate loads and that could play an important role in reducing the environmental impact.