

Characteristics of H and O stable isotopic composition in the Chikusa River

*Ken'ichi Ohkushi¹, Ichiro Tayasu², Shiho Yabusaki², Fujiyoshi Lei², Yudai Yamamoto⁵, Takanori Nakano², Ki-Cheol Shin², Tadashi Yokoyama³, Hiromune Mitsuhashi⁴, Masayuki Itoh¹

1. Kobe University, 2. The Research Institute for Humanity and Nature, 3. Ako School for Students with Special Needs, 4. University of Hyogo, 5. Nagoya University

Chikusa River is the class B river in southwestern Hyogo prefecture. Because of heavy rain, this river sometimes flows over and its basin is damaged, so Hyogo prefecture has carried out river reforming works to improve the capacity of flow until May, 2016. But the works changed the environment of this river, the impact on the quality of river water and the river ecosystem is concerned and we need the basic data of this river to measure this impact scientifically. In this study, we analyzed concentrations of dissolved ion and trace elements, stable isotopic ratio of water (δD , $\delta^{18}O$). In addition, we plotted the result of analysis on a basin map with a geographical information system so that the result could be seen easily and we aimed to offer the basic data which was easy to use. Furthermore, we estimated the formation factor of dissolved ion, trace elements and stable isotopic ratio of the river water through a comparison between the result of analysis and the land use, geological features and topography of the basin.

In Chikusa River, Chikusa River Conservation Committee has been holding “The simultaneous survey of water temperature all around Chikusa River” in every August since 2002. In this survey, the committee and many local residents measure water temperature at 94 sites, from headwaters to river-mouth and some tributaries. From 2015, Research Institute for Humanity and Nature, Kobe University and University of Hyogo has joined in this survey and started collecting water samples. In the survey of 2016 (held in August 7, 13:00~16:00), we received the water samples from local residents and we filtered them at once, with cellulose acetate filters whose diameters of holds are 0.2 μm . After filtering, we subdivided the samples into some polyethylene bottles and a glass vial and stored them at 20°C or -30°C. We analyzed stable isotopic composition of water.

Stable isotopic composition of water was lower in the upstream and higher from the middle reaches to the downstream. From the upstream toward the middle reaches, the ratio became lower as the altitude became higher because of the precipitation affected by the altitude effects. On the other hand, the ratio was higher from the middle reaches to the downstream in spite of the altitude. These areas' river became shallower and wider in the river reforming works, so the effects of sunlight on the river became big and the evaporation from the surface of river became more active.