

## Geochemical maps of river waters in Toyama Prefecture: major and trace element distributions and Sr isotope signatures

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Toyama is located central Japan, and abundant in water resources. To understand river and groundwater quality, water circulation patterns recharged from high-altitude areas, and anthropogenic nitrogen fertilization, major ion chemistry, oxygen and hydrogen isotopes, and nitrogen isotopes of nitrate in river and groundwater have been studied so far. However, trace elements and Sr isotope ( $^{87}\text{Sr}/^{86}\text{Sr}$  ratio) data, that can be used as hydrological tracers, have not yet been studied although such hydrological tracers will provide insight into our comprehensive understanding of (1) water circulation patterns recharged from high-altitude areas and (2) anthropogenic and geological influence on water quality. In this study, we aim to comprehend geographical distributions of major and trace elements and Sr isotopes in river waters through geochemical maps and statistical analysis. River water samples were collected at 76 sites in September-November 2013. The major elements, trace elements, oxygen isotopes of water ( $\delta^{18}\text{O}$ ) and  $^{87}\text{Sr}/^{86}\text{Sr}$  were measured by ion chromatograph, sector-field ICP-MS, IR-MS, and TIMS, respectively.

The  $^{87}\text{Sr}/^{86}\text{Sr}$  ratios of river waters varied from 0.70594 to 0.70989. The highest value was obtained in the upper stream of Shogawa, and the lowest value was found in a Tateyama stream. The relatively lower  $^{87}\text{Sr}/^{86}\text{Sr}$  ratios were found in the eastern part of the studied area, Kurobegawa and Jyogannjigawa, where there are input of hot spring waters to rivers. In the western part of the studied area, we found strong correlations between  $\text{Na}^+$  and  $\text{Cl}^-$  and between  $\text{Cl}^-$  and  $\delta^{18}\text{O}$ , suggesting the influence of the sea salt on river water quality. However, such influence of the sea salt on river water quality cannot be identified from  $^{87}\text{Sr}/^{86}\text{Sr}$  ratio. We will present geochemical maps on 7 major elements, 15 trace elements, DIC,  $\delta^{18}\text{O}$ , and Sr isotopes in a poster session, and discuss water circulation patterns recharged from high-altitude areas and anthropogenic and geologic influence on water quality based on these data set.

Keywords: geochemical map, Sr isotope, trace metal, Toyama, oxygen isotope, river water