

## Influence of climate change on river and submarine groundwater discharge for three decades and the change of nutrient fluxes from the land to the coastal area

\*Saki KATAZAKAI<sup>1</sup>, Jing ZHANG<sup>2</sup>, Kota NOJIMA<sup>3</sup>

1. Graduate School of Science and Engineer, University of Toyama, 2. Graduate School of Science and Engineering for Science, University of Toyama, 3. University of Toyama

In Toyama prefecture, 10 billion tons of river and submarine groundwater discharge annually flows in to Toyama Bay containing nutrients (Hatta et al., 2005). Urasawa et al. (2016) shows that 20-40% of nitrate originated on land contributes to the coastal ecosystems. So it is important to evaluate the state of nutrient transport of from the land to the coastal area. However, global warming has caused an increase in rainfall and a decrease in snowfall in Hokuriku area and it is possible that the states of water and material fluxes has changed over the past years. The aim of this study is to clarify the change of nutrient fluxes via river and submarine groundwater discharge into the coastal area, analyzing hydrogen and oxygen stable isotopes as well as chemical composition.

Results of my analysis, should be, data in my study show that the stable isotopes decreased due to increasing rainfall and decreasing snowfall for three decades. Nitrate and phosphate fluxes are shown to have dramatically decreased as forest and paddy field decreased and the water treatment facilities increased over the years.

These results suggest that nutrient fluxes from the land to coastal zone in this region may continue to decrease due to ongoing climate change and the impact of human activities.

Keywords: climate change, nutrients, river, submarine groundwater discharge