

## Study on groundwater flow system at Oshino Village in Yamanashi Prefecture –Report 1. Characteristics of water quality and stable isotopes of shallow and deep groundwater at Oshino Village.

\*Shiho Yabusaki<sup>1,3</sup>, Makoto Taniguchi<sup>1</sup>, Ichiro Tayasu<sup>1</sup>, Tomoya Akimichi<sup>1</sup>, Noboru Ohomori<sup>2</sup>, Ken Gotou<sup>2</sup>, Syuichi Furuya<sup>2</sup>, Souichirou Watanabe<sup>2</sup>

1. Research Institute for Humanity and Nature, 2. Oshino Village, 3. Fukushima University

Oshino Village is located in southern part of Yamanashi Prefecture, Japan. The elevation is 936 m a.s.l. and the area of village is about 8 km from east to west and about 4 km from north to south. The Oshino Hakkai springs that is registered as World Cultural Heritage Site are located in Oshino Village. It is suggested that the Oshino Hakkai springs are recharged at Mt. Fuji as a result of field observation. The objective in this study to clarify the detailed groundwater flow and residence time of springs and groundwater in Oshino Village.

The field observation in Oshino village were carried out at 18 to 19 in January, 2017. EC, pH, water temperature and depth of water table were measured and spring water and groundwater were sampled for 72 sites. Dissolved inorganic matters, trace elements and stable isotopes of oxygen and hydrogen were analyzed by using the analytical instruments (ICS-3000, Agilent 7500cx, L2130-i).

As a result of this observation, followings are revealed.

- 1) Dissolved inorganic matters and  $\delta^{18}\text{O}$  and  $\delta\text{D}$  of Oshino Hakkai springs (Okamaike, Choshiike, Nigoriike, wakuike, Kagamiike, Shobuike and sokonashiike) are mostly the same. However, the Deguchiike which is one of the Oshino Hakkai springs shows a little different water quality, it is considered that the groundwater flow of Deguchiike is different from that of other springs of Oshino Hakkai.
- 2) The water quality of groundwater mostly shows the  $\text{Ca-HCO}_3$  type, but there are some sites that contain the  $\text{Na}^+$  or  $\text{Mg}^{2+}$ . The amount of dissolved inorganic matter of groundwater are lower at central part than the other area of Oshino Village. It is expected that the different groundwater flow system is existed.
- 3) There are some sites of shallow groundwater that show a little high nitrate concentration. It is thought that the high concentration of nitrate is due to fertilization to farmland.
- 4) The deep groundwater that well depth is about 100 m and some sites of shallow groundwater show the high pH (above 8.2), and also show the high concentration of vanadium and phosphorus and relatively low values of  $\delta^{18}\text{O}$  and  $\delta\text{D}$ . There's a high possibility that these sites' groundwater is recharged at Mt. Fuji.
- 5) It is conceivable that  $\delta^{18}\text{O}$  and  $\delta\text{D}$  values are affected by the difference of recharge area. As a result of correlation chart which showed the EC versus  $\delta^{18}\text{O}$ , observation site was able to divide into three groups. The regression line of  $\delta^{18}\text{O}$  versus  $\delta\text{D}$  is  $\delta\text{D}=6.2\delta^{18}\text{O}-5.0$  ( $r^2=0.969$ ).
- 6) The artesian well which is located at northwestern part of Oshino village shows  $\text{Na-SO}_4$  type. In this site, the water temperature is relatively high and  $\delta^{18}\text{O}$  and  $\delta\text{D}$  is relatively low. These water qualities of the artesian well differ from other sites.
- 7) From the contour map of water table, the groundwater flow at Oshino Village was divided into two. The groundwater flows from southeast to northwest in eastern part and from south to north in central and western part of Oshino Village.

In future, we are going to carry out the field observation at Spring and Summer in 2017, and to estimate the groundwater flow system and residence time.

Keywords: Oshino Village, Oshino Hakkai, groundwater flow, water quality, stable isotope, trace element

