

Study on groundwater flow system at Oshino Village in Yamanashi Prefecture –Report 3. Characteristics of groundwater flow at Oshino Village by using observations of 2017.

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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 filed observation in Oshino village were carried out at 18 to 19 in January and 8 to 10 in August, 2017. EC, pH, water temperature and depth of water table were measured and spring water and groundwater were sampled for 75 sites of January and 96 sites of August. In this study, “shallow groundwater” is defined as several meters to some dozen meters depth, and “deep groundwater” is defined as about 100 m depth.

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). And for estimating of the residence time, CFCs, SF₆ and ³H of some spring water and deep groundwater samples were analyzed. As a result of this observation, followings are revealed.

- 1) The water quality of spring water (including Oshino Hakkai springs) and shallow groundwater show mainly Ca-HCO₃ type. On the other hand, water quality of deep groundwater shows (Na+Ca)-HCO₃ type and Na-HCO₃ type. The nitrate (NO₃⁻) concentration of some sites for shallow groundwater is high especially in August, so it is considered that the water quality of shallow groundwater is influenced by the fertilizer. The water quality of deep groundwater is almost constant.
- 2) The vanadium concentration of some deep groundwater is over 100 μg/L. The vanadium concentration of the water which is recharged at Mt. Fuji is relatively high, so we can use this result for estimating the recharge area.
- 3) Stable isotopes ($\delta^{18}\text{O}$ or δD) of monthly precipitation which have been taken at 11 sites and elevation have strong negative correlation. The altitude effect is -0.19‰/100 m of $\delta^{18}\text{O}$ and -1.6‰/100 m of δD .
- 4) The artesian well which is located at northwestern part of Oshino village shows Na-SO₄ type. In this site, the water temperature is relatively high and $\delta^{18}\text{O}$ and δD is relatively low. These water qualities of the artesian well differ from other sites.
- 5) From the contour map of water table, the shallow and deep groundwater flow at Oshino village was divided into two. The groundwater flows from south to north in western part and from east to west in central and eastern part of Oshino Village.
- 6) As a result of CFCs, SF₆ and ³H analysis, it is estimated that the residence time of spring water (including Oshino Hakkai springs) is about 20 years and that of deep groundwater is about 30-40 years.

We will continue the field observation of Oshino village at 2018, and estimate the groundwater flow system and residence time.

Keywords: Oshino Village, groundwater, water quality, stable isotopes, groundwater flow

Observation site

