

Study on water circulation in the Lake Ichinomegata, Oga Peninsula, using oxygen and hydrogen stable isotopes

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The Lake Ichinomegata that is in the northwest of the Oga Peninsula, Akita prefecture is one of the Megata maars which were formed by volcanic activities approximately 60,000 to 80,000 years ago. Lake water of the Ichinomegata has been used for irrigation and has been recharged artificially by river water for several hundred years. Today, lake water is also used for tap water. Some limnological studies on the Megata lakes were carried out (e.g. Yoshimura, 1936; Sato et al., 1986). However, water circulation of these lakes and interaction between the lake water and groundwater are still unknown. In this study, we do fieldwork once two months to reveal water circulation of lake water and interaction between lake water and groundwater in the Lake Ichinomegata. In this presentation, we will show the result of preconsideration of water circulation based on oxygen and hydrogen stable isotopes of the lake water which were collected in May 2008, and spring water, stream water and river water around the lake which were collected from April to Jun 2008.

Delta-D and delta-18O of inland water such as spring water, stream water and river water around the lake mainly ranged from -47.2 to -53.8 permil and -8.0 to -9.2 permil, respectively. Also, d-value mostly ranged from 15 to 20. Considering the isotopic ratios of rain water that had been collected in the Akita city located in about 35 km southeast from the study area (Matsubaya, 1998), these values mostly close to the rain water in March and October. Therefore, these samples are considered to be mainly recharged in these periods. On the other hand, isotopic ratios of the lake water in all depths were higher than the inland water. Considering the history of the Lake Ichinomegata, the lake water is considered to be recharged by rainwater which precipitated in the catchment area of the lake and the river water that has been led to the lake. According to the result of temperature profile in the lake, the lake water formed vertical thermal stratification in this period. Thus, only the surface water of the lake can be affected by evaporation. However, result of this study shows that the lake water in all depths are affected by evaporation. Therefore, the overturn (water circulation in all depths) of the lake water is considered to be occurred. Considering seasonal change of thermal structure in the lake, the overturns will be occurred from winter to early spring season.