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Characteristics of water quality and stable isotopes in Matsumoto basin and its seasonal variation

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Matsumoto basin is located to slightly northward from the center of the Nagano Prefecture and surrounded the mountains (Hida-mountains and Tsukuma mountains). The complex alluvial fan is formed by the Metoba and Susuki river in the east part of the Matsumoto basin. There is some aquifer in the Matsumoto basin and large quantity of groundwater is stored in the basin. The people who live in Matsumoto city have been used the groundwater water or spring water for long period, and now that the water supply facilities is completed many people use the groundwater or spring water for drinking water.
The water quality compositions of groundwater at Matsumoto basin show mainly the Ca-HCO3 type. The dissolved chemical concentrations increase with the depth of aquifer. The water quality composition is changed from the Ca-HCO_3type at shallow aquifer to the (Ca+Na)-HCO_3type at deep aquifer. The water quality composition is affected by the geological conditions. Thus the groundwater in shallow aquifer contains the NO_3^-, these groundwater is affected by artificial influenced. The water quality and stable isotope ratios of groundwater are almost constant during a year, so the groundwater is well mixed in the process from the recharge to the discharge.
The stable isotope values of oxygen and hydrogen in river and spring water are low at high altitude and high at low altitude. There is an "altitude effect" in this area. However, the stable isotopes in groundwater are almost constant, so it is likely that the recharged are of groundwater at Matsumoto basin is almost same. Thus the HCO_3^- concentration of groundwater increases with the depth of aquifer, HCO_3^- values can be used to estimate the relative residence time.
The result of stable isotopes of oxygen and hydrogen in precipitation which have been sampled at 592m and 1900m above the sea since June in 2009 show the altitude effect ($d^{18}O$ is -0.2 per mil/100 m and dD is -1.6per mil/100m, respectively). It is estimated that the recharged area of groundwater at Matsumoto basin is about 1900 m above the sea from the result of stable isotopes in precipitation. In the future, the investigation and sampling of precipitation, groundwater and spring water at Matsumoto basin will be continued.

Keywords: Matsumoto basin, water quality, stable isotope, groundwater flow