Changes of groundwater flow estimated from repeated measurements of borehole temperature in Yonezawa

Yasuo Sakura[1]

[1] Earth Sci. Chiba Univ

It is necessary to understand groundwater flow system to use groundwater effectively for resources. Recently, it have been recognized that land development and change of use of groundwater have influence on subsurface temperature distribution. The purpose of this study is to investigate and discuss on groundwater flow system in Yonezawa Basin from distribution of subsurface temperature and stable isotopic ratio, and change of temperature-depth profiles in observation wells by comparing the data of this study with the past data (Sakura, 1990).

Groundwater temperatures were measured in 9 observation wells in study area at ten times for about one year. Groundwater samples were gathered for measuring stable isotopic ratio.

By distribution of subsurface temperature and stable isotopic ratio, it is suggested that there are regional groundwater flow which flows from south to northwest and local groundwater flow which flows through the shallow zone along alluvial fan landform in Yonezawa Basin.

From comparing the present with the past of temperature-depth profiles, it was found that subsurface temperature decreased at almost area. The change of recharge system have influence on decrease of subsurface temperature at the area with high infiltration capacity where recharge areas or rice field areas locate, and the decrease of topographic driving force for groundwater flow by pumping have influence on decreasing shift of temperature-depth profile at discharge areas. In the urban area near Mogami River where the decline of groundwater hydraulic head occurred by heavy pumping in the winter for melting snow, it was also found that artificial recharge was induced from the river water.