Distribution of Modern, Paleo and Formation water in Plains and Basins in Japan

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Ground water research group in Geological Survey of Japan, have been carried out groundwater sampling in basins or plains in Japan and published hydrogeological maps, Water Environmental Maps. Recently, we started to re-analyze them from the view of groundwater age by using ion concentration, stable isotopes and radioactive isotopes in water. Groundwater age can be classified into three types, Modern water (younger than 20,000 years), Glacial water (older than 20,000 years), Formation water (very old, c.a. 1 million years) and their transition zones (Hasegawa et al., 2017). Demonstrating the distribution of such groundwater is important not only to consider a lower boundary condition of groundwater flow system but also to show the basic information for hydrogeology in Japan.

In the presentation, we will introduce several conceptual maps in middle and northern Japan. As a result, the boundary of Modern and Glacial waters locates at a shallower than 200 m, in where soft Quaternary sedimentary rock area with gentle topography. This result emphasized that even soft Quaternary rock (generally with high permeability) can form the lower no-flow boundary of the groundwater flow system in respect to the Modern groundwater. The Formation water locates at depths of deeper than 500 m but seems to have wide transition zones.

On the other hands, the Modern water presents deeper than 200 m at volcanic areas. In these areas, the steep topography and high permeable geology seem to induce a high driving force of groundwater flow and produce the large scale of Modern groundwater flow system. At the coastal zone at the foot of Mt. Fuji, the Modern water is found at a depth of 250 m. The result above is the actual demonstration of the relationship between topography and the distribution of the Modern water.

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