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Characterization of Groundwater-Surface Water Interaction Using Thermal Tracer

YONGJE KIM[1], TAEHEE KIM[1], CHUL-MIN JEON[1], KUE-YOUNG KIM[1]

[1] *Korea Institute of Geoscience and Mineral Resources*

This study is to characterize the interaction between groundwater and stream water systems using the thermal tracer method. For this the temperature data of stream water and streambed were used for understanding the processes of the stream-aquifer exchange at a pilot test site. The test site located in the middle part of Korea is a small watershed with approximately 4 km2, and its geology is mainly composed of Jurassic granitic gneiss intruded by acidic dykes. The watershed has a well developed soil formation and its elevation is less than 120 m showing a gentle gradient topography. The three sets of multi level monitoring wells, 20 m, 30 m, and 40 m depth were constructed at the upstream (Site A), middle stream (Site B), and downstream (Site C) areas, as well as the mini-piezometers and thermometers were installed into the streambeds of Site A and Site C. Based on the data observed from the precipitation, groundwater level, temperatures, and other hydrogeologic parameters, the preliminary results showed that the temperature gradient between upstream and downstream was hardly used to be an indicator of their fluid flow directions due to the high temperature fluctuations of the streambeds. From the analysis of temporal variation data for the temperatures, however, the type of perennial stream at the site A and C was determined as the losing stream and gaining stream, respectively. The use of temperature data is possibly used in inverse problems, and the information on the heat should help to calibrate the coupled model of groundwater and surface water interaction.