

Variation in groundwater-stream water interaction with season: focus on water level, temperature and chemistry

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JEON, Woo-hyun^{1*}; YUN, Sang woong¹; LEE, Jin-yong¹
JEON, Woo-hyun^{1*}; YUN, Sang woong¹; LEE, Jin-yong¹

¹Department of Geology, Kangwon National University, Republic of Korea

¹Department of Geology, Kangwon National University, Republic of Korea

This study was conducted to reveal seasonal variations of the groundwater and stream water interaction in Gangwon province of Korea using analyses of measured water levels, water temperature and water chemistry from August to November of 2013. For measuring the water levels in the hyporheic zone, four piezometers (IYGW-1~4) were installed at depths of 0.830~1.565 m below stream bed, perpendicular to stream flow direction and the stream level was also measured at IYSW-1. The water level and water temperature were measured every hour using an automatic logger (DIVER). In addition, nearby groundwater, hyporheic water and stream water were collected for ion and stable isotope analyses in the wet (September) and dry seasons (November) along with field measurements of pH, EC, DO and ORP. The water levels of the piezometers generally increased with rainfall, and they were lower than the stream water level in September, indicating a losing stream, but the former was higher than the latter in November, indicating a gaining stream. The reversal of the heads occurred at October 10. The stream water temperature (IYSW-1), directly affected by the surrounding air, was between 0.9~22.9 °C with a large fluctuation. However, the hyporheic water (IYGW-4; 1.565 m depth) showed a small range of 13.2~17.8 °C. The water temperature at IYGW-4 was lower than those of the other piezometers but the reversal of the water temperatures also occurred at October, like the water levels. The groundwater, hyporheic water and stream waters were all classified as Ca-HCO₃ type by Piper diagram, which is indicative of effect of ambient air. The EC of IYGW-4 was the highest (136.7 μS/cm), indicating relatively higher influence of the groundwater. This research was supported by Basic Science Research Program through the National Research Foundation of Korea (NRF) funded by the Ministry of Education (NRF-2011-0007232).

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