EGU2020-2786
https://doi.org/10.5194/egusphere-egu2020-2786
EGU General Assembly 2020

Hydrogeochemical anomalies associated with the 2017 MW 5.5 Pohang earthquake in South Korea

Jaeyeon Kim[1] and Kang-Kun Lee[1,2]
[1]School of Earth and Environmental Sciences, Seoul National University, Seoul 08826, Republic of Korea
[2]Corresponding author (kklee@snu.ac.kr)

The 2017 M_W 5.5 Pohang earthquakes, which were known as triggered by enhanced geothermal system (EGS) stimulations, had significant effects on the groundwater system. This study aimed to identify the hydrogeochemical anomalies and to understand the response mechanisms of groundwater system to the earthquake. For this, the environmental isotopes (^{222}Rn, Sr, ^{2}H, and ^{18}O), major ions, and time-series data (groundwater level, temperature, and electrical conductivity) were analyzed. Principal component analysis (PCA) was also employed. The results from time-series data showed the anomalies in the groundwater wells located near the epicenter. The hydrochemical parameters including stable isotopes data of ^{2}H and ^{18}O showed the different change patterns among groundwater wells before/after the earthquakes, which were related to the distance from epicenter, faults, and seawater. The environmental isotopes, radon and strontium, suggested the possible mechanisms underlying the effects of earthquakes by spatial distributions, such as seawater intrusion, water-rock interactions, shallow and deep aquifer mixing, deep fluid upwelling, and bedrock fracture opening. With this, the main cluster of PCA results was also distributed along these isotope concentration gradients.

Our findings proved the usefulness of environmental isotopes and hydrogeochemical parameters to understand the earthquake-related changes in groundwater system. These studied parameters and the adopted methods would be positively applied for other earthquake zones.