Japan Geoscience Union Meeting 2014
(28 April - 02 May 2014 at Pacifico YOKOHAMA, Kanagawa, Japan)

AHW07-P04 Room:Poster Time:April 29 18:15-19:30

Groundwater levels and qualities in megacities of Korea

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This study was conducted to evaluate the groundwater levels and groundwater qualities in six metropolitan cities (Seoul, Busan, Daegu, Incheon, Daejeon and Ulsan) of Korea. For this purpose, we collected the groundwater level data of 2001-2011 from the Korean National Groundwater Monitoring Stations in the cities and semi-annual groundwater quality data analyzed by the Korean Ministry of Environment for the same period. Using these collected data, we analyzed the change in the water levels in and outskirt of the cities and in groundwater qualities in the cities. The groundwater levels in the outskirt were generally higher (0.84-15.66 m bgs), compared with those in the central part of the city (3.89-75.16 m bgs), and well responded with the seasonal rainfall (higher in the summer but lower in the winter). However, the groundwater levels in the central part of the city were largely affected by pavement, deep underground building such as subway, and artificial pumping, not by the seasonal effect. The six metropolitan cities showed ranges of 0-507 mg/L and 0-22,000 mg/L for NO_3-N and coliform, respectively. In addition, groundwater contamination with TCE (0.00-4.50 mg/L), PCE (0.00-0.48 mg/L) and 1.1.1 TCA (0.00-0.11 mg/L) was also found. The groundwater contamination with these contaminants was relatively severe especially in Seoul and Busan, which may be attributed to their high densities of populations and industrial facilities. 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).

Keywords: groundwater levels, qualities, metropolitan cities, contaminants, Korea