Geophysical Research Abstracts
Vol. 19, EGU2017-4252, 2017
EGU General Assembly 2017

The spatial geochemical characteristics of groundwater and surface in the Tuul River basin, Ulaanbatar, Mongolia

Odsuren Batdelger (1), Maki Tsujimura (1), Byambasuren Zorigt (2), and Enkhjargal Togtokh (2)

(1) Graduate School of Life and Environmental Sciences,University of Tsukuba, Tsukuba, Japan (mktsuji@geoenv.tsukuba.ac.jp), (2) Institute of Geography and Geo-ecology, Mongolian Academy of Sciences, Mongolia (gowi3@yahoo.com)

The capital city, Ulaanbaatar, is located along the Tuul River and its water supply totally dependent on the groundwater, which comes from the aquifer of the Tuul River. Due to the rapid growth of the population and the increasing human pressures in this basin, water quality has been deteriorating and has become a crucial issue for sustainable environmental and socio-economic development.

Hydro-chemical and stable isotope tracing approaches were applied into the groundwater and surface water in order to study geochemical characteristics and groundwater and surface water interaction. The Tuul River water was mostly characterized by the Ca-HCO_3 type, spatially variable and it changed into Ca-Na-HCO_3 type in the downstream of the city after wastewater (WW) meets the river. Also, electrical conductivity (EC) values of Tuul River are increasing gradually with distance and it increased more than 2 times after WW meets the stream, therefore anthropogenic activities influence to the downstream of the river. The dominant hydro-chemical facies of groundwater were the Ca-HCO_3 type, which represents 83% of the total analyzed samples, while Ca- HCO_3-Cl-NO_3, Na-HCO_3, Ca-HCO_3-SO_4 each represent 4%, and Ca-mixed and Ca-Mg-HCO_3 each represent 2% of the total samples. This suggests that groundwater chemistry is controlled by rock-water interaction and anthropogenic pollution. The floodplain groundwater chemical characteristics were similar to Tuul River water and showing lowest EC values. Groundwater far from floodplain showed higher EC (mean value of 498 μs/cm) values than river waters and floodplain groundwater. Also, different kinds of hydro-chemical facies were observed. The stable isotopic compositions revealed less evaporation effect on the groundwater and surface water, as well as an altitude effect in the river water. The similarity of stable isotopes and chemical characteristics of floodplain groundwater and river water suggests that alluvial groundwater is recharged by Tuul River water in the study area. The cluster analysis (CA) clearly indicated a connection between floodplain groundwater and river water, and also the effect of anthropogenic activities (such as canal and WW) in the system. The analysis results show that CA is a useful approach for future spatial sampling strategy in an optimal manner and offers a reliable classification of sampling stations in the region, especially along Tuul River. Therefore, the number of sampling stations in the monitoring network could be optimized without losing any significant information and saving cost.