Geophysical Research Abstracts
Vol. 15, EGU2013-2545, 2013
EGU General Assembly 2013

A study of origin and recharge of groundwater at a well field near Chien-Shih area, Shinchu, Taiwan by using multiple geochemical and isotopic methods

Pei-Ying Lin and Louis Loung-Yie Tsai

National Central University, Institute of Applied Geology, Taoyuan County, Taiwan, Province Of China (986404001@cc.ncu.edu.tw, 886-3-4263127)

According to the data of United Nations Environment Programme (UNEP), if we continue to keep the present water consumption patterns upto 2025, two-thirds of the whole world people will be caught in water crisis. Due to global climate change, the climate pattern will be extreme, especially long drought season and heavy rainfall. Groundwater is expected to be the only reliable water resources in Taiwan. In order to utilize groundwater resource effectively, combined isotope studies and field investigations can provide valuable information about recharged water and groundwater flow path in relation to geological setting, as well as interactions among precipitation, surface water and groundwater. In the well field near Chien-Shih area, Shinchu, NW Taiwan, measured water table and accumulated monthly precipitation appear to be highly related, thus the major recharge source in study area is expected from precipitation. However, the difference of water table was only 1 to 1.5 meters during wet and dry seasons. Therefore, recharge sources of groundwater in study area is not only from precipitation, but also from another stable origin either from nearby mountainous area or river. Comparing with precipitation events and the temporal transformations of water types, we can obtain the evolution path and geological condition of recharge source. Furthermore, sampling locations of Well-S, Well-W1, Well-W2 and River respond to the type (III) Ca/Mg -SO_4^{2-} in different time durations, consequently there were conspicuous geochemical mechanisms such as dissolution-precipitatio, dilution, cation exchange, silicate weathering and mineralization occurred at that time. Finally, meteoric water stored in the mountain region had provide recharge and lead to the hydrochemical variations during dry season. The mean of $\delta^{18}O$ dropped to -5.2 ‰ in precipitation; -8.7 ‰ in river; -7.9 ‰ in gully-1; -7.0 ‰ in gully-2 and -7.8 ‰ in groundwater respectively. Compared among the variations of isotopic data, the isotope composition became lighter by additional recharge from river on Well-C and Well-W1 and heavier on Well-E, Well-W and Well-W2 during rainy season , as well as the variations became lighter on Well-W1 and heavier on others wells during dry season respectively. It is noteworthly that the isotope composition of Well-W1 is similar to river, a well-connectivity between river and Well-W1 is expected possibly through the crack systems. According to the characteristics of isotopes compositions varied with time and space, the conceptual flow model in specific study area will be established to understand which water contributes most in the recharge mechanism.