Geophysical Research Abstracts
Vol. 17, EGU2015-2450, 2015
EGU General Assembly 2015

The Hydrogeochemistry of Qingshui Geothermal Field, Northeastern Taiwan.

Chen Yu-Wen (1), Lin Cheng-Kuo (2), Lin Wayne (2), Chang Yu-Te (2), and Hsieh Pei-Shan (2)

(1) Earth and Environmental Sciences, National Chung Cheng University, Chia-yi County 62102, Taiwan (jijin0508@gmail.com), (2) Green Energy and Environment Laboratories, Industrial Technology Research Institute (ITRI), Hsinchu 31040, Taiwan

The Qingshui geothermal field is located at the upstream valley of Lanyang Creek, northeastern Taiwan. It is renowned as a geothermal field. The previous studies demonstrated a higher geothermal gradient, 100^{o}C/km warmer than a normal geotherm. However, Qingshui geothermal field has not been well developed due to the higher mining costs. In the recent years, the Taiwan government has been focusing on developing alternative and renewable energy and initiated a 10 year project, Nation Energy Program. This study is part of this project

In general, it is very difficult to collect deep downhole samples without considerable change of hydro- and gas-chemistry of water under high temperature and pressure. A new sampling tool, GTF Sampler, was designed by the research team, Green Energy and Environment Laboratories, Industrial Technology Research Institute. This tool can simultaneously collect high quality geothermal water and gas sample and moreover, the sampling depth can reach up to 800 meters. Accordingly, a more accurate measurements can be conducted in the laboratory.

In this study, 10 geothermal samples were collected and measured. The results demonstrate that geothermal water samples are characterized with Na(K)-HCO_3 water type and located at the mature water area in Giggenbach Na-K-Mg diagram. Several geothermometers, including silica and cation geothermometry, were used to estimate potential temperature in the geothermal reservoir systems. In general, the geothermoters of Na-K and Na-K-Ca obtain reservoir temperatures between 120-190^{o}C and 130-210^{o}C, respectively, but the silica geothermometer indicates a lower reservoir temperature between 90 and 170^{o}C. There is no big difference among them. It is worth to note that all calculated temperatures are lower than those of in-situ downhole measurements; therefore, more detailed and advanced researches would be needed for the inconsistency. To examine the argument about igneous heat source in the previous studies, rare earth elements (REEs) were also measured in this study. The results normalized by North America Shale REEs (NASC) show a flat pattern and a distinct europium positive anomaly. It possibly indicates a chemical interaction between meteoric water and sedimentary rock, which excludes the possibility of an igneous source.