Geophysical Research Abstracts
Vol. 17, EGU2015-4241, 2015
EGU General Assembly 2015

Subsurface temperature trend in response to exploitation of thermal water in Jiashi Hot Spring, northeastern Taiwan

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Temperature monitoring provides important information for sustainable management of a geothermal field. Previous studies show that decline of aquifer pressure is an obviously indicator of overexploitation for a thermal aquifer. However, many thermal water producing aquifers don't show pressure declining but with subtle temperature change. How to detect the temperature trend is an important topic for sustainable management of a geothermal field. In this study, we use borehole temperatures measured over a half year interval from 2011 to 2014 and Mann-Kendall method to determine the trends of subsurface temperature in Jiashi Hot Spring, northeastern Taiwan. Our results show that trends of subsurface temperature are related to the hydrogeology and flow field of groundwater. Flow directions of groundwater/thermal water are impacted by exploitation of thermal water of production wells, according to the depths and distribution. Repeatedly measured borehole temperature profiles provide important information to depict the trends of subsurface temperature change.