



Application of natural isotope tracers to geothermal research in the Maechan fault zone (N Thailand)

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Previous geothermal research in Thailand has mainly focused on high-potential geothermal systems such as the active Maechan fault zone, which is located in the northern part of the country. Fang and Maechan hot springs have been the primary targets for power generation and agricultural applications (Apollaro et al. 2015).

Here we present a comprehensive survey of chemical and isotopic compositions of thermal waters from six hot springs, well water, and cold surface water samples. This study aims to identify sources of the geothermal waters, hydrodynamic processes and the thermal capacity of the hot springs along the Maechan fault zone. Field parameters, major ions, stable isotopes of hydrogen, oxygen, and carbon, as well as radiocarbon and tritium were investigated.

The chemical composition of both thermal waters and cold surface waters is dominated by the Na-HCO₃ type. $\delta^2\text{H}_{SMOW}$ and $\delta^{18}\text{O}_{SMOW}$ data of thermal water and cold surface water plot along a local meteoric water line, suggesting local precipitation as the source of thermal water in the area. $\delta^{13}\text{C}_{PDB}$ values between -4 to -16 ‰ indicate that dissolved carbon in the thermal water samples is mainly from inorganic carbon sources but some mixture with organic carbon may occur. Radiocarbon analyses (10-20 pMC) suggest ages of more than 10,000 years for the formation of the thermal waters. Tritium concentrations range between 0-0.2 TU.

Bibliography

Apollaro, C., Vespasiano, G., De Rosa, R., Marini, L. Use of Mean Residence Time and Flowrate of Thermal Waters to Evaluate the Volume of Reservoir Water Contributing to the Natural Discharge and the Related Geothermal Reservoir Volume. Application to Northern Thailand Hot Springs." *Geothermics* 58: 62–74. 2015.