



Geothermal Play-Fairway Analysis of the Tatun Volcano Group, Taiwan

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Geothermal energy is a sustainable and low-emission energy resource. It has the advantage of low-cost and with-standing nature hazards. Taiwan is located on the western Ring of Fire and characteristic of widespread hot spring and high surface heat flows, especially on the north of Taiwan. Many previous studies reveal that the Tatun Volcano Group (TVG) has great potential to develop the geothermal energy.

However, investment in geothermal development has inherent risk and how to reduce the exploration risk is the most important. The exploration risk can be lowered by using the play-fairway analysis (PFA) that integrates existing data representing the composite risk segments in the region in order to define the exploration strategy. As a result, this study has adapted this logic for geothermal exploration in TVG.

There are two necessary factors in geothermal energy, heat and permeability. They are the composite risk segments for geothermal play-fairway analysis. This study analyzes existing geologic, geophysical and geochemical data to construct the heat and permeability potential models. Heat potential model is based on temperature gradient, temperature of hot spring, proximity to hot spring, hydrothermal alteration zones, helium isotope ratios, and mag-netics. Permeability potential model is based on fault zone, minor fault, and micro-earthquake activities. Then, these two potential models are weighted by using the Analytical Hierarchy Process (AHP) and combined to rank geothermal favorability. Uncertainty model is occurred by the quality of data and spatial accuracy of data. The goal is to combine the potential model with the uncertainty model as a risk map to find the best drilling site for geothermal exploration in TVG. Integrated results indicate where geothermal potential is the highest and provide the best information for those who want to develop the geothermal exploration in TVG.