



The association between volcanic fluid variations and seismic events in the Tatun Volcano Group, northern Taiwan

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Taiwan is located at the western edge of the circum-Pacific volcanic belt. Hydrothermal activity is still common in the Tatun Volcano Group, and it is one of the major geothermal areas in Taiwan. Before developing the geothermal resources, monitoring volcanic activities and further evaluating volcanic hazards are essential measures. Geochemistry plays an important role in investigating geothermal reservoirs. In the past decade, researchers in Taiwan have accomplished several studies in this area. Our group collected volcanic gas and water samples to analyze their chemical compositions and isotopic ratios.

Integrating our observations with seismic and gravity data, we can associate fluid variations with two mechanisms. Firstly, the variations of fluid concentration, seismic events and gravity fluctuations occurred in a time series. $\text{SO}_2/\text{H}_2\text{S}$ ratios from Da-you-keng varied from 0 to 3 since 2005 to 2007. Meanwhile, HCl concentrations also increased dramatically. Then large gravity variations and volcanic earthquake swarms took place subsequently. Same process happened again in 2010. We infer that magma chamber disturbance and/or deep fluid transportation might be the major cause. The other case, unlike the former one having multiple proxy variations, we only observed HCl concentration increasing rapidly after big earthquakes. The variations are reckoned as the consequence of hydrothermal reservoir disturbed by earthquakes, and the responding time is short and rapid.