

Spatiotemporal variation of focal mechanisms of Tatun volcano group, northern Taiwan

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Over 2000 focal mechanisms of volcanic-tectonic events (VTs) were solved between 2014 and 2016 in the Tatun Volcano Group (TVG), northern Taiwan. These focal mechanisms were obtained on the basis of the data from a dense seismic network maintained by the Taiwan Volcano Observatory-Tatun. This network is composed of 40 seismic stations and distributed uniformly within an area of 15 km by 15 km. Each seismic station is equipped with a 24 bits broadband seismometer with a 24-bit digitizer. For this reason, abundant micro-VTs occurred in the TVG could be recorded. For each micro-event, the arrival time and the first polarity of each station were recognized by manual picking. Then the VTs could be located and solved by the best-fitting focal mechanism depends on the P-wave first-motion polarity. Depending on these focal mechanisms, the spatiotemporal variation of stress state could be discussed. We found a coincident variation of occurrence between the normal faulting events in the depth between 0 and 2 km and the reverse and strike-slip faulting events in the depth between 2 and 4 km. In this research, this spatiotemporal variation of the focal mechanisms was attributed to a pumping reservoir buried in the TVG deeper than 2 km in depth. During the inflation of this reservoir, the vertical compression stress would induce a series of VTs with the normal faulting mechanisms above the reservoir ranged about 0-2 km in depth. Concurrently, the horizontal compression stress would be increased at the lateral circumambient rim of the reservoir located deeper than 2 km so that some reverse and/or strike-slip mechanisms are triggered. During the deflation of reservoir, the faulting characteristics would be changed reversely.

Keywords: Tatun Volcano Group, Focal mechanism, Volcanic-tectonic events, Reservoir