

Shallow volcano-hydrothermal inflation revealed by seismic behaviors and velocity structures in the Tatun Volcano Group, Northern Taiwan

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The Tatun Volcano Group (TVG) is bounded in the south by the Taipei City, where over 2.5 million residents live in this biggest government and business metropolis of Taiwan. Recently, various results from seismic observations, geochemical analysis, and geodetic survey suggested that the active behaviors associated with volcano is still ongoing. We used the seismic data from a local seismic network, which is composed of 40 seismic station for an area of ~10 km by 10 km. This network is maintain by the Taiwan Volcano Observatory at Tatun. Based on the seismic data from this network, we investigated the volcanic behaviors of the TVG and found an inflating reservoir with a depth of approximately 2 km. This result was supported by the stress behaviors of approximately 1,000 local focal mechanisms from 2012 and 2017 as well as the detailed images of velocity structures inverted by the approximately 3,000 local earthquakes via the algorithm of seismic tomography. This inflating reservoir is beneath the Dayoukeng area, where various volcano-hydrothermal appearances already be indicated by geothermal observation, geochemical characteristics, and geological surveys. Above this inflating reservoir in the shallow crust, active linear seismic zone is present from the reservoir to near surface. This clustered seismicity represents the possible location of fracture zone or conduit, where the possible location for the phreatic eruption is in the future. According to our results, we indicated the location and the status of the inflating pressure source, which induced the clustered seismicity and may be the next phreatic eruption in the TVG area.

Keywords: volcano-hydrothermal inflation, Tatun Volcano Group, Taiwan Volcano Observatory at Tatun