Morphology and Relative Age Modeling of Explosive craters in the Tatun Volcano Group, Taiwan

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The Tatun Volcano Group (TVG) is located in the north of Taipei city for only 15 km away, and has been argued whether it is active or not for a long time. The Chihsingshan volcano is covered by many gas fumaroles and hot springs and is viewed as a relatively younger volcano of the TVG. Furthermore, using high-resolution digital elevation model (DEM) can easily identify two apparent fault zones (or rifting valleys) with many craters, which pass through the eastern and the western edifice of Chihsingshan volcano, respectively. Shapes of those craters are nearly circular or elliptic, probably stand for the young eruptive events.

This study utilizes 1 m x 1 m LiDAR (Light Detection And Ranging) DEM to investigate the small craters along the fault zones. The boundaries encompassing the crater were depicted by their steep slope, especially the intact ones. Eight and six craters have been determined from western and eastern side, and two and three of them are more intact, respectively. Numerous fractures exist in the linear extent are similar to the fault zones, but the morphology was destroyed by the downstream river system. The results of fractal dimensions analysis, a statistic method that tells the broken level of the shapes, may correlate with the age of those craters. Previous studies have proven this modeling method can fit the lava flow sequences of the TVG. Hence we try to find a suitable age modeling for the explosive craters in the same way, and then we can compare different ones for relative age and focus on the youngest one. In addition, field sampling at the craters such as Duck Pond and Dream Lake may be ideal archives of volcanic deposits from young volcanic events. With the combinations of LiDAR-DEM, fractal dimensions analysis and field sampling results, we could figure out the formation sequence of the craters.