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Conductivity distribution of the surface layer around Tatun Volcanic group, Taiwan

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Tatun volcanic group (TGV) is located at northern Taiwan. More than 20 volcanic domes and cones have been created within and around Tatun Graben, which is bounded by Chinshan Fault in the north and Kanchiao Fault in the south. Most volcanoes have been created before 0.3 M (Wang and Chen, 1990), and no historical record of eruption at TVG. However, eruptions in 18 ka BP (Chen and Lin, 2002) and 5.5 ka BP (Chen, unpublished data) have been identified. Yang et al. (1999) found magmatic contribution in fumarolic gas. Kagiya (2008) proposed that volcanism has a wide range of diversity represented by two typical end members controlled by the easiness of magma storage beneath volcano; 'Eruption dominant (ED) volcanism' in difficult condition and 'Geothermal activity dominant (GD) volcanism' in easier condition. According to this idea, TVG seems to be GD volcanoes. On this aspect, the authors carried out VLF-MT survey around TVG to clarify electrical conductivity distribution in the surface layer. The results are as follows.

1) Low conductivity (< 3mS/m) was found north of Chinshan Fault, while high conductivity (> 10 mS/m) was found within the Tatun graben.

2) Extreme high conductive (> 30mS/m) areas were found along the trend of major volcanoes within the graben; around Liu Huang Ku (Sulfur Valley), around the foot of Chih Sing Shan Volcano (Hsiao Yiu Ken, Ma Tsao, and Len Shuei Ken), and around Da Yiu Ken, from southwest to northeast.

3) Relatively low conductivity (< 10mS/m) was found south of the trend of major volcanoes within the graben.

These results suggest that magmatic gas is mainly supplied beneath Chih Sing Shan Volcano and expanded to Liu Huang Ku geothermal area on the southwest side and to Da Yiu Ken on the northeast side along the fissure system. The area size of high conductive (> 30mS/m) zone is estimated more than 4 square kilometers. This result indicates geothermal activity of TVG might be comparable with that of Beppu geothermal area in Japan.

Keywords: Taiwan, Tatun volcanic group, geothermal activity, volcanic activity, electrical resistivity structure