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Hydrothermal fluid circulation and structural discontinuities on Mount Hasan, Turkey: preliminary results

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Mount Hasan is a double peaked quaternary stratovolcano located in central Anatolia, Turkey. Greater Mount Hasan (3253) and Lesser Mount Hasan (3069) culminates almost 2000 meters high above the surrounding basin. The volcano has been built in three phases namely paleo-, meso- and neo-Hasan formed by dome and lava flow emplacements, ignimbritic eruptions and intermittent collapses (Aydar, 1998). Pleistocene to Holocene volcanic activities of Neo-Hasan have been evidenced by previous radiometric analysis. Although the volcano is in a dormant state, analytical investigation of the activity is essential.

We have carried out an extensive Self-Potential (SP) survey to map the hydrothermal anomalies, reveal out the hydrothermal fluid circulation and structural controls acting on the volcano driving the fluid circulation. A significant domain covering the Greater Hasan has been measured using Self-Potential method. A total number of 26 profiles, when combined, which forms five long radial profiles descending from the summit and a long circumferential profile surrounding the base of the volcano have been measured. The total length of the measurement is 93,4 km. SP measurements that have been acquired at 25 and 50 meters point separation have also been accompanied with superficial temperature measurements and less denser CO_2 measurements.

The typical “W” shaped volcano-electric signal has been well observed with a maximum of 3762 mV potential difference. Hydrothermally active summit zone evidenced by fumaroles, hot-grounds and water vapour have been identified with positive SP signals. An elevation / SP gradient (Ce-gradient) map has been calculated to enhance the SP anomalies and to reveal-out the structural relationship of fluid circulation. The hydrothermal and the hydrogeological zone have been well differentiated. Overlapping circular Ce anomalies surrounding the hydrothermal zone have been interpreted to be related with the previous collapse structures. This project was supported by The Scientific and Technological Research Council of Turkey (TÜBİTAK P.No:116Y167).

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