

Structural imaging in Papandayan Volcano, Indonesia using Magnetotelluric and other geophysical methods

Nurhasan Nurhasan¹, Doddy Sutarno¹, Wahyu Srigutomo¹, Sparisoma Viridi¹, Yasuo Ogawa², Dini Fitriani³

¹Physics Department, Bandung Institute of Technology, Bandung, Indonesia, ²Volcanic Fluid Research Center, Tokyo Institute of Technology, Tokyo, Japan, ³Physics Department, Padjadjaran University, Bandung, Indonesia

E-mail: n_nurhasan@yahoo.com

Papandayan volcano is an active volcano situated in Garut, West Java, Indonesia. In 2002 eruption, it released pyroclastic volcanic material to the surface covering the 4 km² area on the summit to the north part of the volcano and formed new craters on the southern part of the summit. We have undertaken several geophysical measurements in period of 2008 2011 such as magnetotelluric, gravity, magnetic and DC resistivity in order to delineate subsurface structure of the volcano. Magnetotelluric measurements were designed using both a grid system with the 25 sites with interval station of approximately 250m covering the summit area and long profile crossing the summit area to image regional structure of the volcano. Frequency range from 320 Hz to 0.1 Hz were obtained by recording five components of electric and magnetic fields using phoenix MTU-5 system. Magnetic and gravity data were acquired in the summit area overlapping with the MT sites to determine basement structure of the volcano. The shallow resistivity structure was constrained by four lines DC resistivity surveys that were carried out in the center of the summit to confirm the thickness of pyroclastic distribution released from 2002 eruption. The MT results derived from 2D and 3D inversion show that the resistive zone of deep structure with the circle-like shape exists in the middle of the model in coincidence with the location of new craters. A comparison of low total magnetic field appear to be consistent with the circle-like shaped resistive zone presumably related to high temperature distributed in center of the region. From gravity data, we have found the basement of the pyroclastic structure.