

## A pilot magnetotelluric survey for geothermal exploration in northern Thailand

AMATYAKUL, Puwis<sup>1\*</sup> ; RUNG-ARUNWAN, Tawat<sup>1</sup> ; OGAWA, Yasuo<sup>2</sup> ; SIRIPUNVARAPORN, Weerachai<sup>1</sup>

<sup>1</sup>Geophysics Research Group, Department of Physics, Faculty of Science, Mahidol University, <sup>2</sup>Volcanic Fluid Research Center, Tokyo Institute of Technology

One of Thailand's most prominent geothermal field is located in Maechan district, Chiangrai province, along the active Maechan fault which is East-West left-lateral strike-slip fault. Its surface temperature is 99.5 degree Celsius with the flow rate of 3 l/s. Magnetotelluric (MT) survey is proposed to help delineating geothermal fluid and controlling features of the hydrothermal system. In July 2013, 7 magnetotelluric stations were deployed covering the area of Maechan geothermal field. Horizontal magnetic and electric fields ( $H_x$ ,  $H_y$ ,  $E_x$  and  $E_y$ ) were collected with the remote reference site located 70 km away in Fang district, Chiangmai province. To obtain 3-D resistivity model, 18 periods of off-diagonal ( $Z_{xy}$  and  $Z_{yx}$ ) elements ranging from 0.003 to 300 second were applied with WSINV3DMT, a 3-D MT inversion widely used among many authors. The obtained resistivity model shows the shallow conductive zones which their locations coincide with the hot springs manifestation. These conductive zone locates from the surface to not more than 500 m and referred as the reservoir of hot geothermal fluid heated by the deeper resistive batholith granite basement. The resistivity contrast in the obtained model up to 2 km northward is corresponding to the lineament of Maechan fault. This also confirms the hypothesis from previous studies that the hot fluid is being stored in fractures of weathered granite which is the damage zone of Maechan fault and reaches the surface where the springs are located through shallow fractures and faults.

Keywords: magnetotellurics, geothermal field, three-dimensional inversion, electrical resistivity, Maechan fault