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The geothermal structure inferred from Magnetotelluric data beneath southern part of Ilan Plain, north-eastern Taiwan

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Ilan plain is identified as a western extension of the Okinawa Trough in the northern Taiwan subduction system and has been considered as one of the most productive geothermal area in Taiwan. An east-west extension magma-like body caused by the westward of the Okinawa Trough has been revealed from seismic and geomagnetic studies. Some geothermal wells have been drilled around this area, but the temperature and water volume are lower than that expected, indicating the limitation of the distribution of the geothermal providing area. To find out the location of the geothermal providing area, we investigated the electrical resistivity structure beneath Ilan Plain using the magnetotelluric method. At data collecting steps, we carried out the survey of more than 100 sites, and employeed more than one sites for remote reference technique to promote data quality. After carefully visual inspection of the data of each sites, 84 sites were remnant with perfect data quality within study area. At data processing steps, we used moving average method to keep the smoothness of the data based on basic conceptual of MT method. MT data were analyzed and modeled using 3D inversion scheme. The fitness revealed by the pseudosection of the observed and model predicted data is good at relative shallow part, indicating this resistivity model is reasonable and can be accepted. The result shows that the geothermal providing area is a few hundreds of meters southward from those observation wells. The northward extension of the shallow conductor can be explained by the trace of hot water, and is matched to the temperature logging data. Comparing with the geothermal resistivity conceptual model, the shallow conductor($\sim$10 Ω-m) and relative deeper conductor($\sim$30-100 Ω-m) can be related to secondary mineralization altered by geothermal fluids which is typically investigated from geothermal area. The shallow conductor is related to the smectite-zeolite zone(70-220°C), and the relative deeper conductor is related to chlorite-illite zone(180-240°C). We suggest that this geothermal providing area may connected to deeper intrusive magma body.