Magnetotelluric studies in the Zhangzhou Basin geothermal zone, southeastern China

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The southeastern coast geothermal zone, one of the known geothermal zones in China, contains significant natural geothermal resources. It is clear that the occurrence of hot springs is related to granite and volcanic intrusions, which was controlled by a series of tectonic fractures. To understand the shallow and deeper electric structure of the Zhangzhou Basin geothermal zone, broadband (320-0.001 HZ) magnetotelluric (MT) measurements have been carried out. Four-component MT data were acquired in magnetic N-S and magnetic E-W with a site spacing of 1-2 km at each site. The recorded MT data were processed by robust time series and remote reference processing techniques. The joint inversions of TE and TM modes using the non-linear conjugate gradient algorithm have been performed after distortion decomposition. In the inversion models, a low resistivity cap of 200-800 m thickness was observed, which represented the blanketing sediments composed of Quaternary and volcanic rocks of the Late Jurassic period. The presence of high resistivity above a depth of 20 km indicates that granites are abundant in the upper and middle crust. MT measurements revealed some deep-seated highly conductive zones, which were inferred to be partially meltrd zones at a depth of 8-17 km, which is likely to be reason behind the formation of the high-temperature hot springs. The results also show that there is a shallower Moho, which indicates that the heat from the upper mantle may have had a big contribution to the surface heat flow. Fracture-controlled meteoric fluid circulation is the most likely explanation for the hot springs.