

STUDY OF SHALLOW AND DEEP RESISTIVITY STRUCTURES OF THE NELUMWEWA HOT SPRING, SRI LANKA

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Nelumwewa hot spring is located in the north-eastern part of Sri Lanka, in the Vijayan Complex approximately 10 km from the boundary between Highland and Vijayan Complexes. In the present study, near and deep resistivity structures were studied in the Nelumwewa hot spring area using Time domain electromagnetic (TDEM) method and Magneto-telluric (MT) method, respectively. Modelling the subsurface of the hot spring field is vital to understand the source of heat, hot water reservoir and the hot water moving paths in a geothermal field. Occam inversion method was used to generate the resistivity models for a 9 km stretch, encompassing the thermal spring area. The depths of the MT and TDEM methods go down to 16 km and 120 m for respectively. In the MT profile, approximately 3 km thick and 3 km long low resistive zone ($\sim 1 - 70 \Omega\text{m}$) was observable in the area towards the south-western (SW) direction from the hot spring. In the TDEM profile also, a similar low resistive zone ($\sim 1 - 50 \Omega\text{m}$) was observed towards SW direction from the hot spring area. These low resistive zones in both near and deep resistivity profiles might be representing the hot water reservoirs and hot water percolating paths connected by a deep-seated fracture system. Hence, the low resistive zones indicated in both MT & TDEM resistivity profiles are interpreted as hot water reservoir and hot water percolating paths that feeds the Nelumwewa hot spring, which were possibly originated in the shallow and deep fractures formed in the shear zone indicated by the structural mapping of the area.

Keywords: Time domain electromagnetic, Magneto-telluric, Hot-spring