D-52 Interpretation of a 2-D self potential anomaly at the Mahapelessa thermal spring-southern Sri Lanka

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Mahapelessa thermal spring is located close to the Highland-Vijayan boundary in the Hambantota district. The regional gneisic rocks have strike trending N10W/to N40W and dips of 25° to 55° westward.

The self potential (SP) anomalies due to geothermal conditions are generally broad compared to mineral deposits. Many mechanisms generate natural potentials and contribute to the anomaly. Streaming potentials are known to occur by the heat triggered movement of water or by a differential pressure across a rock formation. SP in geothermal conditions are mostly attributed to streaming potentials.

SP measurements were made with copper-copper sulphate non polarizing electrodes and a high impedance digital multimeter. The base electrode was fixed 20m north of the spring and the other was moved in NE and then in SW directions in steps of 30m. Time varying telluric potentials that get enhanced at large electrode separations were eliminated by taking only the steady readings. Moist ground conditions at the time of the survey gave good ground connect with the electrodes.

Raw SP data are shown in *Figure 1*. The curve was smoothed by a 5 point running average to remove the short wavelength potential variations due to near surface effects.

The observed SP is a broad (_2km) negative anomaly with a minimum of _30mV close to the spring. Considering the potential due to a single current source in

a uniform half space gives a source depth of ~280m with the anomaly half width of ~1000m.

Trial and error matching of potential due to double dipole current source (*Figure 2*) model gives a close match with the observed SP curve. The direction of these dipoles dipping 32° west are considered to be active paths of water flow.

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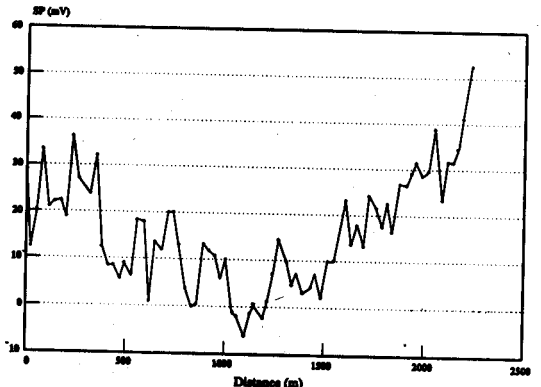

Fig.1 Self potential variation across the Mahapelessa hotspring in the NE-SW direction

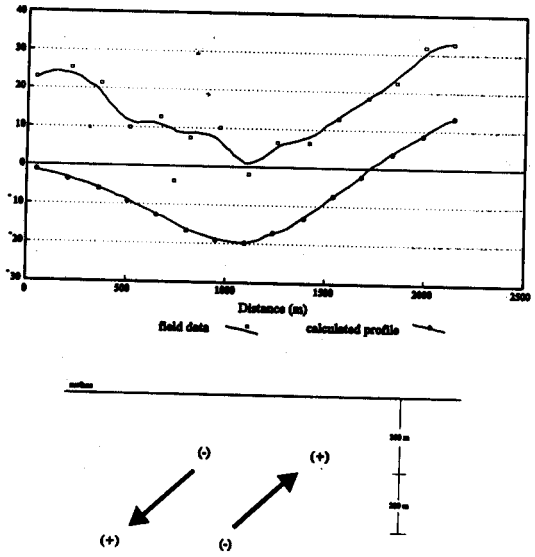

Fig.2 Smoothed self potential variation & the calculated profile for a double dipole