Forward Modeling and Field Effectiveness of Induced Polarization Anomalies Due to Natural Source

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Induced polarization method by artificial source is common in prospecting for sulphide mineralization. This technique normally involves sensitive sensor, measuring device, and excitation generator, which may be cumbersome, complex and expensive. To study the potential application of induced polarization effects caused by telluric currents to mineral exploration, we have studied two dimension structure from the numerical forward modeling based on finite element method and have measured telluric activity with different frequencies in the mineralized and non-mineralized areas.

In order to compare polarization effect with non-polarization effect, we construct the model consisted of two layers medium hosting polarized body using finite element method. The resistivity is 30 Ohm for first layer and 100 Ohm for second layer and polarizability • is 0.3 for polarized body and 0.0 for non-polarization body in the model. The computation results show that the two apparent resistivity curves are different in the amplitude. The differences are between 1% and 30% when periodicity ranges from 0.1s to 100s. The anomalies of frequency divergence of apparent resistivity at different periodicities over polarization body are distinct.

To study the field effect of induced polarization response caused by telluric currents, we have measured telluric activities with different periodicities at multimetal deposit area in Gansu Province, Northwest China and at non-polarized area in Yunnan Province, Southwest China using magneto-telluric equipment. The measurements show that there are clear anomalies of requence divergence curves of apparent resistivity over multimetal deposit but not at non-polarized region.