On the Interpretation of High Resolution Induced Polarization Data observed on a Graphite Anomaly in the Bavarian Forest/Germany

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In the framework of the DESMEX2 (Deep Electromagnetic Sounding for Mineral Exploration) project, a newly semi-airborne system was tested over a large-scale graphite deposit in the Bavarian Forest/Germany. Since strong IP effects of the target can overlay the measured EM-signal, Terratec Geophysical Services applied its own developed High Resolution Induced Polarization (HIRIP) survey system on two profiles to determine the IP influence. The HIRIP survey system consists of simultaneous measurements of Direct Current Resistivity and IP data, where the current and voltage electrode are separated to send a high-powered current into the subsurface. For measuring IP data in time domain, the voltage decay is measured within 20 time gates and the received decay curves are fitted with a Debye model to determine the initial chargeability in mV/V. Latter is used for the determination of the IP model. We have measured two long HIRIP/DC profiles perpendicular to the strike direction of the graphite outcrop. Pol-Dipole configuration was used. The evaluation of HIRIP data is based on the Gauß-Newton inversion method implemented using the two-step inversion technique. The forward response of HIRIP data is calculated on a 3D prism mesh and its inversion works on a 2D triangular mesh. Due to the survey conditions, the remote poles are in close distance to their profiles and are considered in the calculation of the geometry factor and in the inversion. Data measured for very large offsets cannot be fitted and therefore they are not considered. The calculated 2D DC and HIRIP models shows strong conductive and highly polarized anomalies at the expected location of the graphite anomaly.