A study of the SP geophysical technique in a well-characterized field area

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The self potential (SP) method measures natural electrical potentials that exist in the ground which are due to charge separations generated by electrochemical processes. These potentials may arise in a number of ways; most or all involve water, and most are poorly understood. Electrochemical boundary potentials exist between two different materials in contact. Streaming potentials involve the physical separation of charges by flowing groundwater and bioelectrical potentials are associated with changes in vegetation. An important application for self potential is for mineral exploration, since massive ore bodies generate strong negative SP anomalies.

This project is an in-depth study of the self potential method on the MUN campus in a field NE of the Institute of Ocean Technology (IOT). This area is a good candidate for this investigation because it has been previously surveyed multiple times using a variety of geophysical techniques. Because of this work, the ground structure and the locations of anomalous bodies have already been determined. Through comparison of the self potential data with the data collected from other methods such as the EM 31 ground conductivity meter, and the ground penetrating radar the nature and source of the SP signal can be better understood.

The investigation is carried out using the departments SP system, which consists of (1) the induced polarization-self potential unit, a high impedance multimeter, (2) a pair of electrodes that consist of porous pots that have a cork top with a conducting copper cylinder in a saturated solution of $CuSO_4$ and (3) insulated wires. The study involved repeated measurements of key

profiles on different days, sometimes weeks apart to monitor which features are steady, which are transient, and which may always be present but may change in shape.