Borehole Logging Measurements and Applications

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Borehole geophysical logging is one of the oldest and most reliable methods of understanding the physical properties of the rock. As the technology has improved, the goal of understanding the relative change in physical properties has evolved to acquiring higher resolution quantitative physical property data with new techniques and instrumentation.

Improvements to logging instrumentation has led to real-time reporting of data and increased acquisition speeds. Recently, probes have been developed that can measure chargeability and gravity, previously these were only measured through surface and airborne surveys. Additionally, different probes can now be combined to create a stack of probes that can measure multiple parameters in a single survey (figure 1). With newer technologies, it is important to supplement with routine calibration procedures.

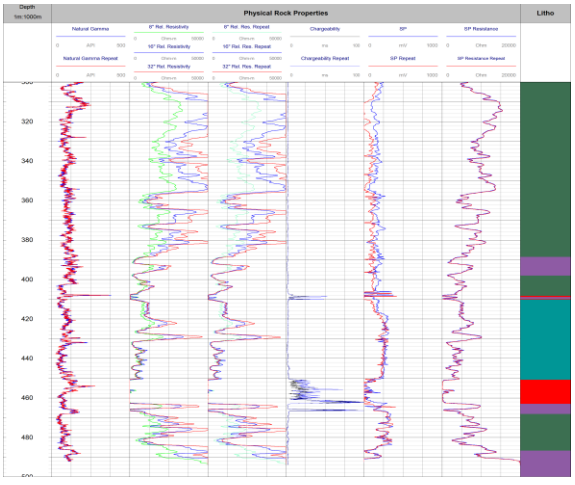

Figure 1 DGI Multi Parameter Single Survey Data

New techniques have allowed downhole logging to be performed in environments that were once extremely challenging or not possible. Methodologies, such as DGI anchor and pully system (figure 2), have been developed to allow logs to be acquired in sub-horizontal and even up inclined holes, most often used in underground environments. Difficult hole conditions can be logged in coordination with the drilling campaign. For example; logging through casing or drill rods, to survey weathered or broken rocks. Or circulation of a saline solution to log in permafrost environments.

Figure 2 DGI Anchor and Pully System

Interpreting a deposit requires many different disciplines and datasets. Through geologic modelling, statistical analysis, inversions and machine learning; in-situ logged physical rock properties can provide the link between geophysics, geochemistry, and geology.