TOTAL FIELD EM FOR HIGHLY CONDUCTIVE TARGETS

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Total field magnetometer sensors, such as those of the optically-pumped cesium vapour variety, are not conventionally used in electrical geophysics. Exceptions to this are Sub-Audio Magnetics (SAM) surveys, carried out with such a sensor typically moving and measuring magnetic fields continuously at sample rates of 1 - 4 kHz. At the very low base frequencies (often below 1 Hz) used in EM surveys for highly conductive targets in very conductive terrain, cesium vapour magnetometers have an instrument noise level which is superior to almost all sensor types. This is an important issue for the detection and discrimination of highly conductive targets and can accelerate data acquisition.

At the higher frequencies (say 100 Hz and greater) collected during the survey, coil sensors are generally better performers. However, signal-to-noise ratios for a total field survey at these frequencies can be supplemented by modifying the transmitter current waveform to increase signal.

Total field sensors do not need protection from motion during a reading. In some cases data can be collected with the sensor traversing, potentially resulting in a final data set with high spatial resolution. Interpretation of total field EM data is no more difficult than working with vector EM data. In most cases the advantages of superior data quality and logistical simplicity of the total field survey outweigh the loss of magnetic field vector information.

Examples of total field EM data acquisition and processing will be presented, with particular reference to the detection and modeling of highly conductive targets