

MobileMT: Testing in Northern Ontario Comparison with ZTEM and AirMt



SUMMARY

Mobile MagnetoTellurics (MobileMT) is the latest innovation in airborne electromagnetics and the most advanced generation of airborne AFMAG technologies. The patent pending MobileMT technology utilizes the naturally occurring electromagnetic field in the frequency range of 25 – 20,000 Hz. In January 2018, Expert Geophysics Limited completed a test of the MobileMT system over an area near Cochrane, Ontario, Canada. The test area was previously flown by Geotech Ltd. with ZTEM and AirMt systems (Kaminski, Kuzmin, Legault, 2010). The comparison with the AirMt and ZTEM data demonstrates that MobileMT data collected at the low natural signal level conditions (in January) shows the same geoelectrical features in the same frequency range (30 – 360 Hz) as AirMt and ZTEM. The successful MobileMT test demonstrates that the MobileMT technology is the next stage in the evolution of airborne AFMAG technologies.

MOBILEMT TECHNOLOGY

The MobileMT technology utilizes an airborne system together with a ground station. An airborne bird, towed by a helicopter, measures variations of the magnetic field with three orthogonal induction coils, while a ground station measures variation in electric field with four sets of electrodes. The ratio of the magnetic field magnitude and the electric field magnitude in both in-phase and out-of-phase components provides analytic parameters in selected bands of frequencies in the range of 25 – 20,000 Hz. The advanced noise suppression technique on mechanic, electronic, and signal processing levels ensures high data quality even in cases of low natural EM fields. The auxiliary equipment includes Geometrics cesium magnetometer G-822A, GPS navigation system, radar altimeter, data acquisition system.

SURVEY DESCRIPTION

The test survey was conducted near Cochrane, Ontario, Canada in January 2018 (Fig.2). Expedition Helicopters The survey helicopter, a Bell 206 JetRanger, was operated by. The test line, previously flown by Geotech Ltd. with ZTEM and AirMt systems (Kaminski, Kuzmin, Legault, 42010), was flown

to acquire comparative MobileMT data. The bird terrain clearance was approximately 140 m. The electric base station was located approximately 2 km from the test line.



Figure 1: MobileMT bird towed by a helicopter (left), electric base station installation (top right), one of eight ground electrode installations (bottom right)

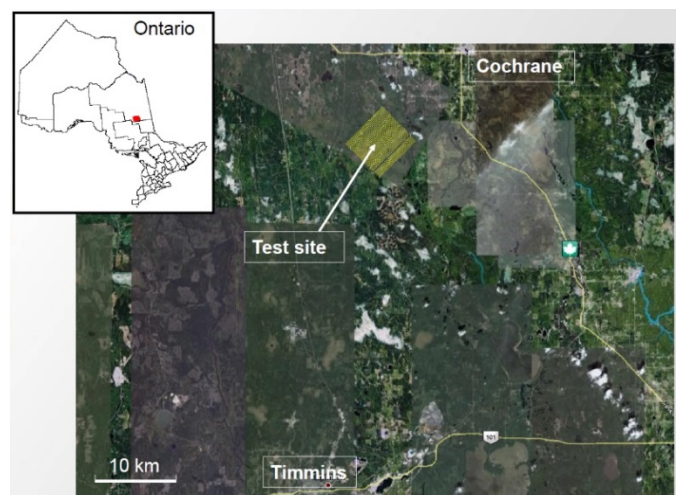


Figure 2: Survey area location (Kaminski, Kuzmin, Legault, 2010)

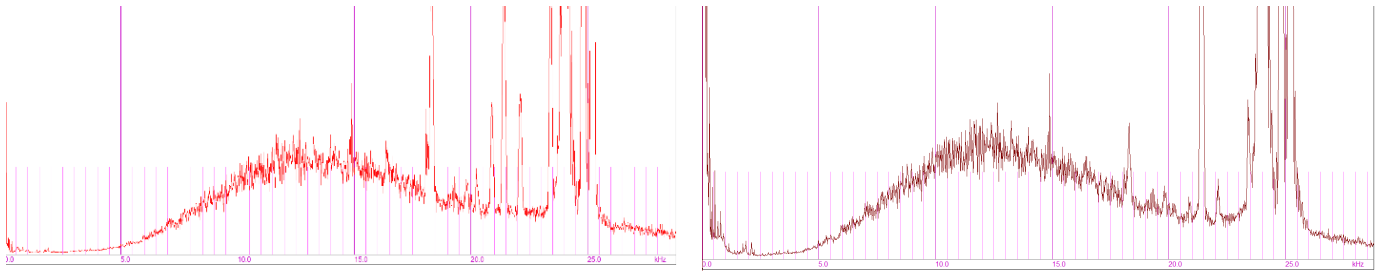


Figure 3: Airborne magnetic X-coil spectrum up to 20,000 Hz range (left) with the corresponding electric X-line 1 spectrum (right)

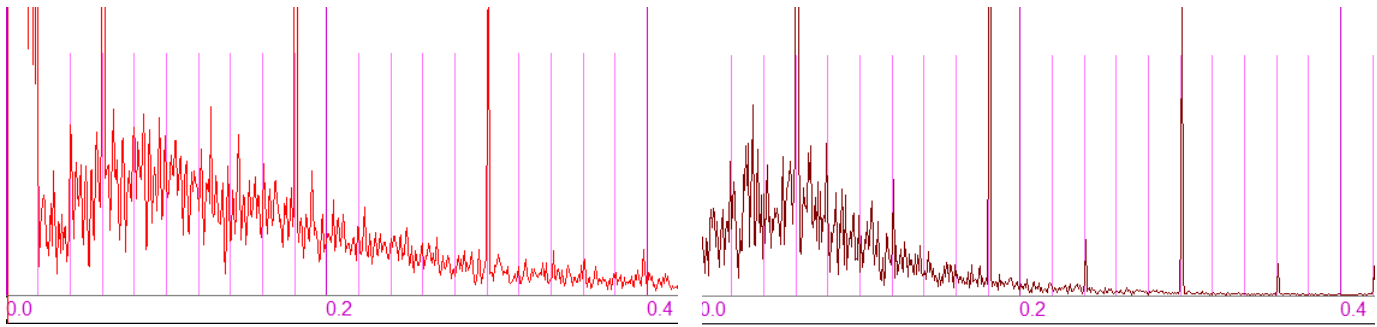


Figure 4: Airborne magnetic X-coil spectrum up to 400 Hz range (left) with the corresponding electric X-line 1 spectrum (right)

TEST SURVEY RESULTS

The signal spectrums recorded during the test flight is presented in Fig. 3 and 4. The comparison MobileMT data with the ZTEM and AirMt data is shown in Fig.5. The comparison with the AirMt and ZTEM data demonstrates that the MobileMT data collected at low signal level conditions (January, northern Ontario) shows the same features in the same frequency range (30 – 360 Hz) as AirMt and ZTEM. These results demonstrate that MobileMT technology is the next step in the evolution of airborne AFMAG technologies.

CONCLUSION

Mobile MagnetoTellurics (MobileMT) is the latest stage in the evolution of passive airborne electromagnetics. Any exploration program, from regional to prospect scale, will benefit from MobileMT's broad frequency range, low system noise, and combined electric/magnetic field measurement.

REFERENCES

Kaminski, V. F., P. Kuzmin, and J. M. Legault (2010), The AirMt passive airborne EM system, presented at 3rd CMOS-CGU Congress.

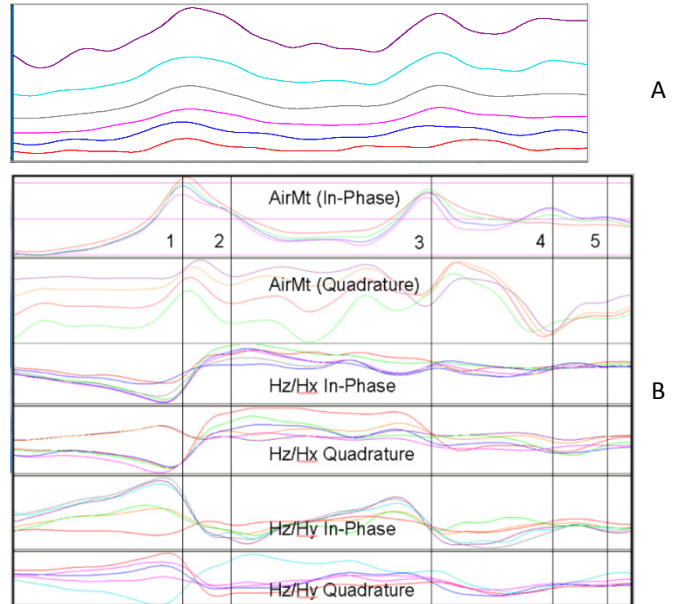


Figure 5: The MobileMT data profiles – part A, frequencies (from bottom to top): 28 Hz, 63 Hz, 95 Hz, 142 Hz, 213 Hz and 319 Hz; part B top - AirMt profiles, frequencies 45 Hz, 90 Hz, 180 Hz and 360 Hz, part B bottom – ZTEM profiles (part B data: Kaminski, Kuzmin, Legault, 2010)