

# BREAK-THROUGH TECHNOLOGY



## SkyTEM over Caber North Deposit

The on-going development of SkyTEM dual moment TEM systems has been driven by specific exploration objectives. First, to increase the power and depth of penetration. Second, to reduce the noise level and enhance detection of subtle contrasts at depth. The result of a 5 year development program, SkyTEM516 has demonstrated its accomplishment of these objectives over the Caber Deposit in Québec, Canada. The SkyTEM516, with a transmitter area of 536 m<sup>2</sup> and 16 turns, is capable of delivering a dipole moment of more than 1,000,000 NIA. In addition, a unique receiver design has been engineered to reduce the noise level by a factor of 20.

The Caber North deposit is particularly suitable for testing a helicopter-borne EM system's signal-to-noise as it is a challenging target and one that conventional ground EM systems have difficulty detecting. The deposit (1.3 Mt @ 4.0% Zn, 1.7% Cu) is buried under more than 300 meters of conductive overburden. SkyTEM516 and SkyTEM512 (launched in 2014) system is proven to successfully detect the Caber North deposit.

Detection of this target is difficult because its response ranges from 2 to 10 fV/Am<sup>4</sup> where 1 fV=10<sup>-15</sup> V. Hence, detection of Caber North and similar targets requires a dipole moment in the range of 1,000,000 NIA and, above all, an exceedingly low noise level.

The SkyTEM516 system has an un-normalized target responses range between 2-10 nV/m<sup>2</sup>. Therefore, in order to detect this target the noise level must be markedly lower than 0.5 nV/m<sup>2</sup>. Few airborne EM systems are capable of achieving this since systems with a high dipole moment typically have a corresponding high noise level due to limitations of the receiver system. As a result, many systems are incapable of detecting the Caber North Deposit due to an inferior signal-to-noise ratio.

All SkyTEM dual moment systems are capable of mapping the near surface concurrently with depth. A range of systems is available to provide solutions for varying exploration objectives.

Comparing 2015 data from SkyTEM 516 to 2014 data from SkyTEM512 acquired over the Caber North deposit

# Over 1,000,000 NIA



## Overview

In January 2015 SkyTEM re-flew the well-known Caber deposit 30 km west of Matagami in Québec, Canada. The deposit is buried under more than 300 m of conductive overburden. The test was flown with the SkyTEM516 system, which has the highest dipole moment of all SkyTEM systems.

The presented improvements demonstrate the substantial and ongoing R&D commitment at SkyTEM, which aims at constantly pushing the limits of Airborne Geophysics.

## Key Facts

- 536 m<sup>2</sup> transmitter area
- 16 turns transmitter coil
- >1,000,000 NIA peak dipole moment
- Superior late-time signal to noise ratio and depth of penetration
- System optimized for depth
- 60 kph

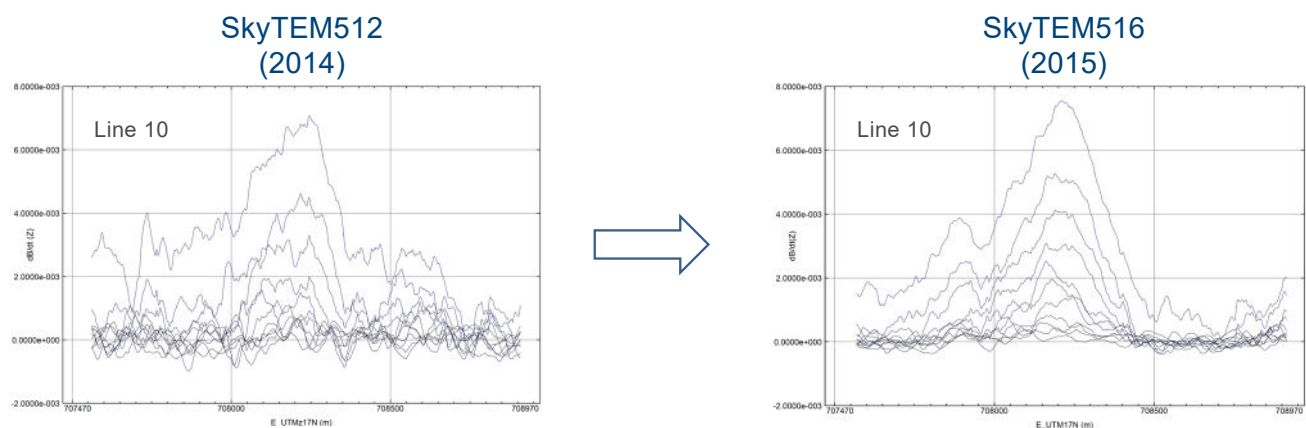


Figure 1: Comparison of SkyTEM512 survey in 2014 and SkyTEM516 survey in 2015 data over the Caber North deposit. The gates shown are late time  $dB/dt$  responses in units of  $pV/Am^4$  covering the time interval from 1.2 ms to 9.4 ms.

Demonstrating a consistently high signal to noise ratio over the challenging target



### Test results

- Well defined late time anomaly response on all flow lines
- Considerably improved signal to noise ratio compared to 2014
- EM and Magnetic anomaly locations are in perfect agreement with the known Caber North deposit

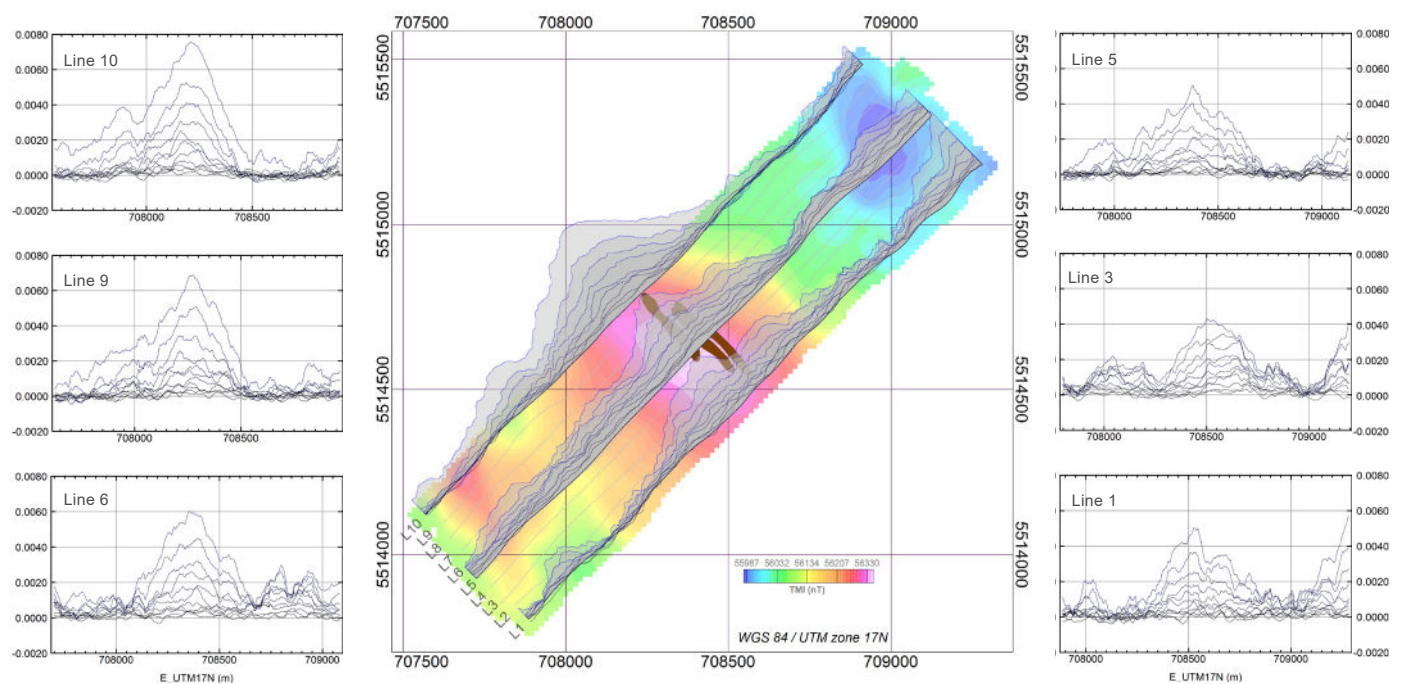
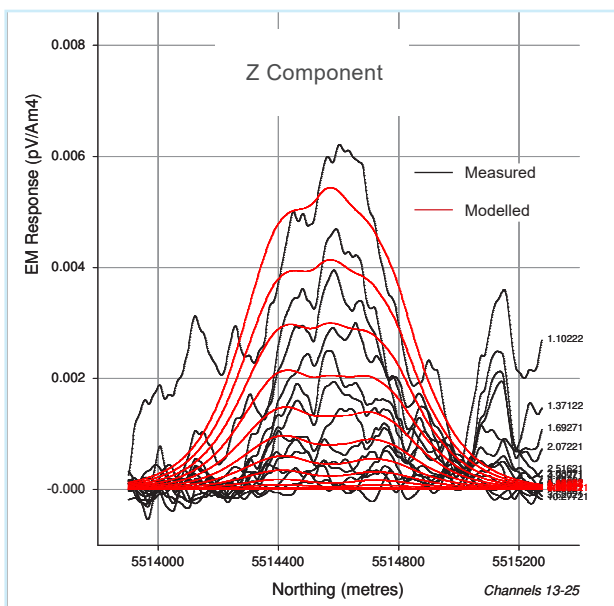


Figure 2: The central panel shows the location of the Caber North deposit (brown) on top of the Total Magnetic Intensity. Late time  $dB_z/dt$  responses are shown as grey shaded curves for three of the six lines presented in the surrounding panels.

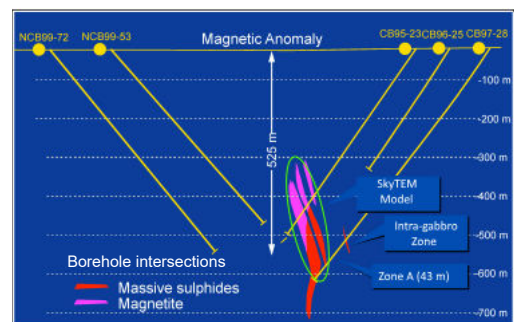
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Parameter	Unit	Caber North
Easting	Meter	708310
Northing	Meter	5514675
Depth below surface	Meter	-300
Dip	Degree	88
Dip direction	Degrees from north	225
Strike length	Meter	1000
Depth extent	Meter	300
Thickness	Meter	90
Conductivity	Siemens	0.5

## 3D modelling of SkyTEM data from Caber North



The Caber North deposit is a steeply dipping Volcanic Massive Sulphide Copper-Zinc lens. The SkyTEM516 system detects the deposit. 3D modelling resolved the parameters of the sulphide lens. In accordance with ground truths it is modelled to be situated at 300 m depth with a dip of 88 degrees and a conductivity of 0.5 Siemens.



Deposit cross sections are provided by Abitibi Geophysics