Gap GeoPhysics
Exploration Services

Lalor HeliSAM

Case Study

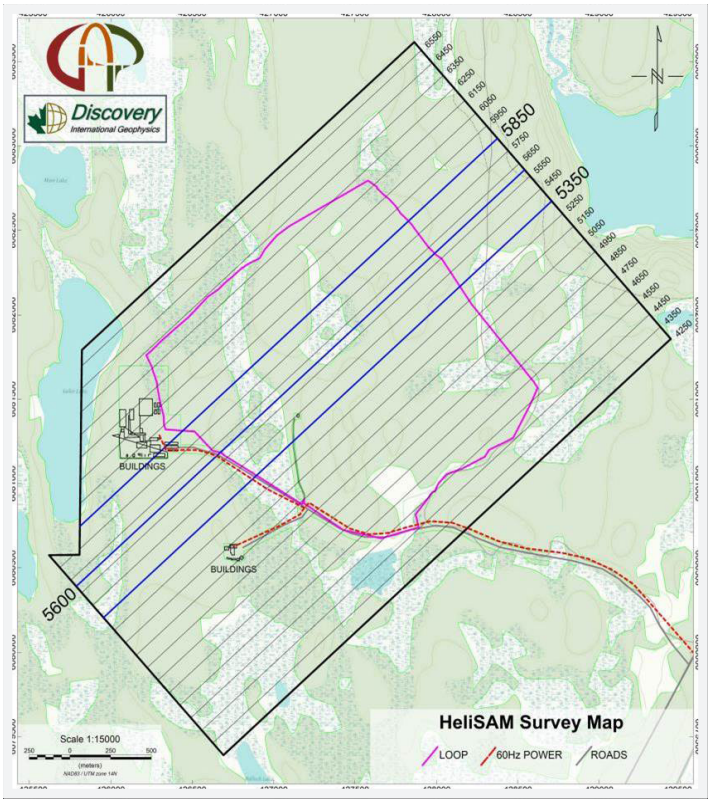
HeliSAM has demonstrated the ability to detect and characterise the Lalor VMS deposit using airborne acquisition and an inductive ground loop. It is a rapid, cost effective, deep search technology.

Gap Geophysics Australia (Gap) and Discovery International Geophysics collaborated to perform a trial survey over Hudbay's Lalor deposit near Snow Lake, Manitoba, Canada.

The deposit was discovered in 2007 using a Crone EM system with large, multi-turn loops and long stack times. The deposit lies 700m – 1000m below the surface. The deposit is made up of primarily gold, zinc and copper. As of Janurary 2014, the proven base metal resource was 1,332,000 tonnes with a probable resource exceeding 10,000,000 tonnes.

Hudbay have made the deposit available to geophysical contractors to survey in order to improve understanding of the deposit and to evaluate technologies for use in deep exploration.

The HeliSAM data acquisition system utilised comprised of a Gap GeoPhysics TM-7 SAM Receiver, Cesium magnetometer towed bird (B-Field), Hemisphere R320 GPS, laser altimeter and base station magnetometer. The transmitter system was a Phoenix TXU-30 that was generously provided by Hudbay.



The trial was completed over a five day period with the schedule shown below:

Day 1	*Mobilisation from Saskatchewan*
Day 2	*Inductions, inspect loop (it was inplace from a previous survey)*
Day 3	*Assembly of towed bird, out of aircraft testing of DA system, Installation of DA system into Helicopter*
Day 4	*Pilot training, test lines at 3.75Hz, 5 Hz and 7.5 Hz. Survey of 93 line km*
Day 5	*Pack up of equipment, demobilisation to Saskatchewan*

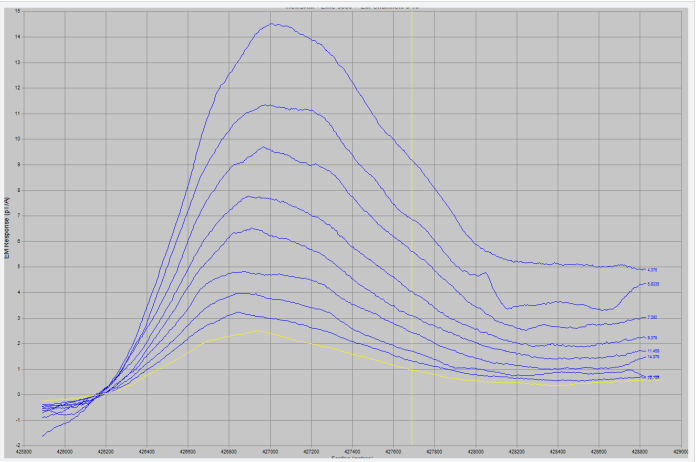
Details of the trial are outlined below:

Survey Area	*8.7 sq km (3.7km x 2.4 km)*
Resolution	*100m line spacing, 93 line km*
Sensor Height	*40m AGL*
Survey Rate	*50 knots average*
Helicopter	*Robinson R44 (locally sourced)*
Transmitter	*Phoenix TXU-30*
Transmit Frequency	*7.5 Hz*
Transmit Current	*20A*
Transmit Loop Size	*Single turn, 1.7km x 1.7 km*
Transmit Loop Dipole Moment	*57 MAm2*
Datasets	*Magnetics, Total Field EM, Calculated 3-component, Digital Elevation Model*
Data Processing	*MagPI (in-house), Geosoft Oasis Montaj, EMIT Maxwell*

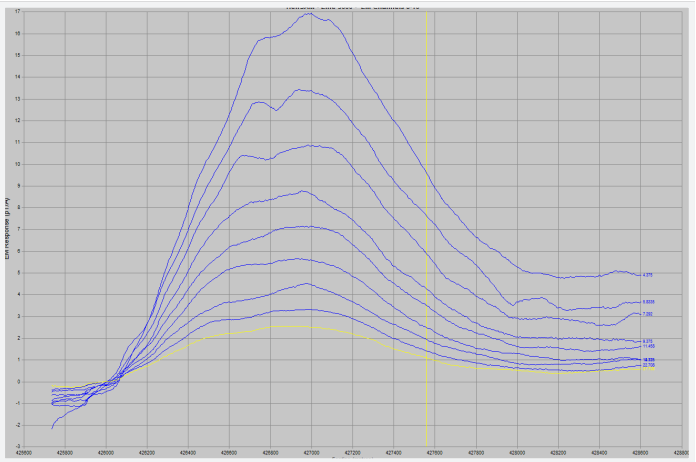
Results

Data has been processed and filtered. EM profiles and images are shown below:

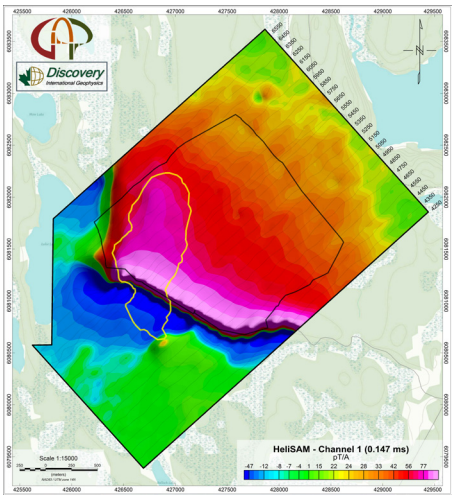
TFEM Linear Profile
Line 5350
Channels 8 – 16



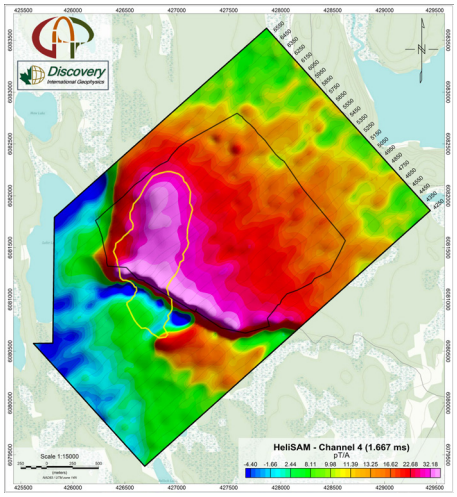
TFEM Linear Profile
Line 5600
Channels 8 – 16



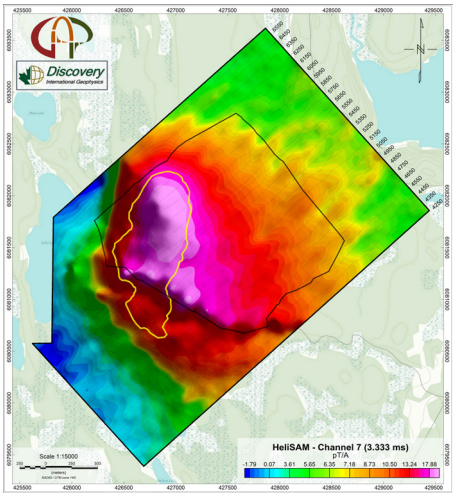
Below is a selection of TFEM Channels with the ore body outlined in yellow and the survey loop outlined in black. With the progression of channels there is a clear correlation between the observed anomaly and the known mineralisation. The magnetics data set is also included for reference.



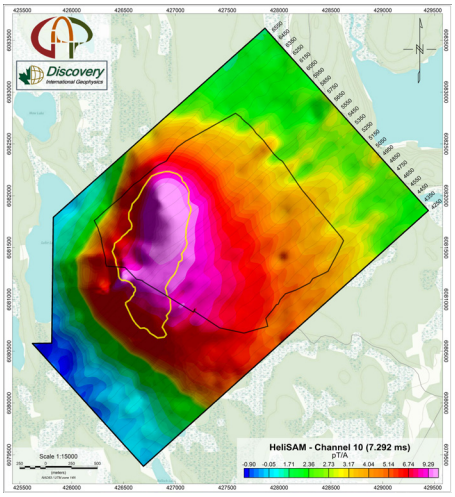
TFEM – Channel 1 (0.147 ms)



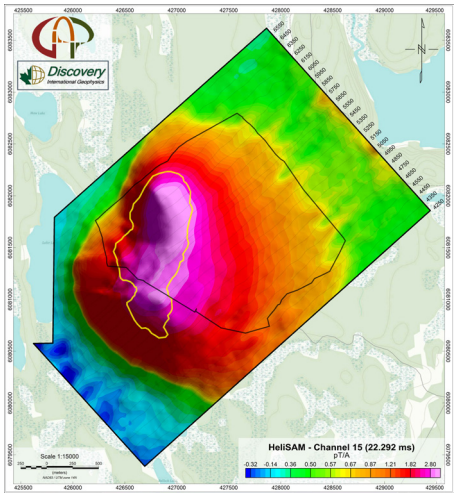
TFEM – Channel 4 (1.667 ms)



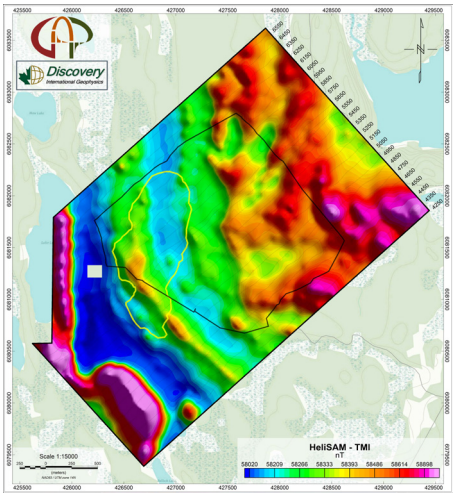
TFEM – Channel 7 (3.333 ms)



TFEM – Channel 10 (7.292 ms)



TFEM – Channel 15 (22.292 ms)



TMI

Conclusions

HeliSAM easily detected Lalor using an inductive loop source with a low base frequency and a total field airborne receiver.

HeliSAM combines the production rate of airborne surveys with detection capabilities similar to a ground based system.

HeliSAM is more cost effective than a ground survey of similar size and has a smaller environmental impact as survey lines do not need to be cut.

HeliSAM is an ideal tool for regional exploration as up to 18 sq km of surveying can be completed in a single day.

We believe this system is a huge step forward for deep, rapid, airborne exploration.

Acknowledgements:

HUDBAY

DISCOVERY Int'l Geophysics

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