FAST SURVEY COMPLETION
FAST DATA DELIVERY
HIGH-QUALITY DATA

SkyTEM312*FAST*
– Economic, high quality data collection

For budgetary reasons alone, large-scale airborne surveys have traditionally employed fixed-wing aircraft (FWTEM) platforms. This, however, has often been at the expense of near-surface resolution due to the separation between the transmitter and receiver of fixed wing systems and the requirement to fly at higher altitudes and faster speeds than helicopter-borne electromagnetic (HTEM) systems. As a result ground geophysical surveys are often required to follow-up the targets detected by fixed wing systems. Also HTEM geophysical surveys benefit from the ability to operate from remote locations and there is no requirement for a landing strip or airport as there is for FWTEM.

In order to address these shortfalls, SkyTEM has engineered a new type of HTEM system – SkyTEM312*FAST*. This system has a dipole moment of ~510,000 NIA and operates at speeds of 120-150 km/h with a transmitter and receiver terrain clearance of 50 metres. SkyTEM312*FAST* is a radical departure from existing HTEM systems in that it offers the cost-efficiency of FWTEM systems with virtually the same high-quality data as conventional SkyTEM systems. The performance of SkyTEM312*FAST* is built on an exceptionally rigid and aerodynamic carrier frame that maintains the low noise levels necessary to provide fine discrimination in the near surface data while retaining the ability to detect weak conductors at depth. This dual-moment capability makes the system ideal for both mineral exploration and groundwater mapping purposes.

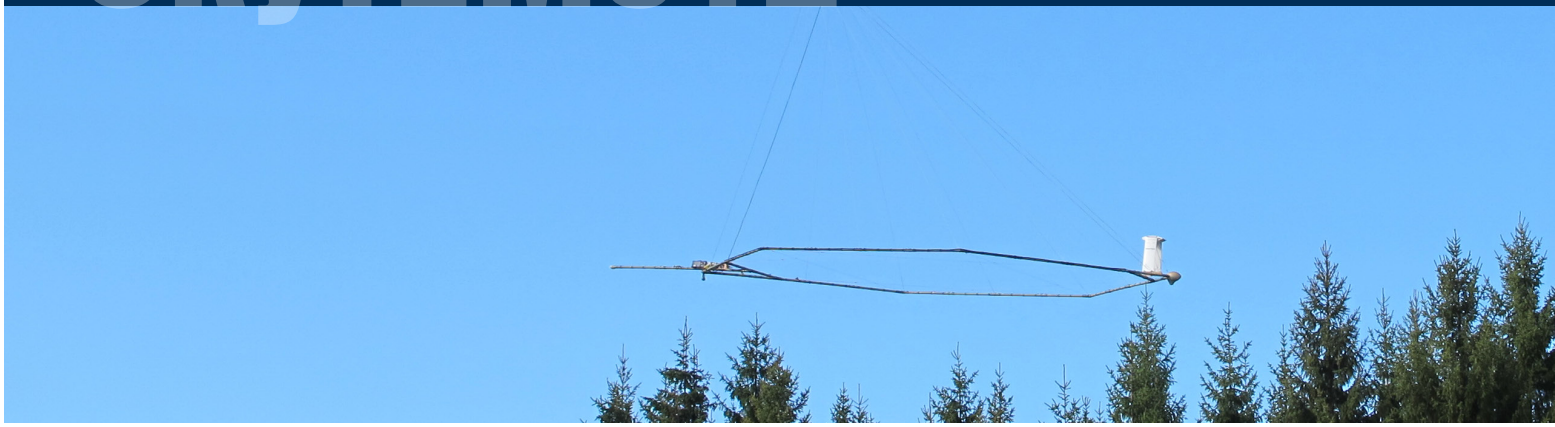
Patented receiver technology eliminates signal drift and, combined with a one-time calibration procedure, data levelling and post flight corrections are minimized or eliminated. This also eliminates the need to conduct high altitude calibration/verification flights at regular intervals during each sortie. In addition to saving valuable survey time this is of particular benefit when low ceiling or bad weather could restrict survey productivity. As a result preliminary data and simple inversion can be produced within 48 hours of acquisition throughout the survey. This early review of data allows project managers to make decisions on flying in-fill lines while the SkyTEM crew and system are still on site.

SKYTEM AIRBORNE SURVEYS WORLDWIDE

> I had the opportunity to perform QA/QC checks on SkyTEM's preliminary data and found it to be consistent and of high quality. SkyTEM maintained excellent communication with me throughout data acquisition and delivered the data electronically in a time fashion required in the contract
>
> *Dr. Mel Best (President Bemex)*

> SkyTEM312^{FAST} is an incredibly efficient system, and we are impressed by the great results we have achieved so far. Not only does the SkyTEM system map the near surface aquifers we were looking for, it now seems the system has a much greater depth of penetration than we expected for resolving much deeper geology. The ability to review high quality data several times a week was also of benefit to our program.
>
> *Carlos Salas (Vice-President Geoscience BC)*

SkyTEM312^{FAST}



SkyTEM312^{FAST} for groundwater

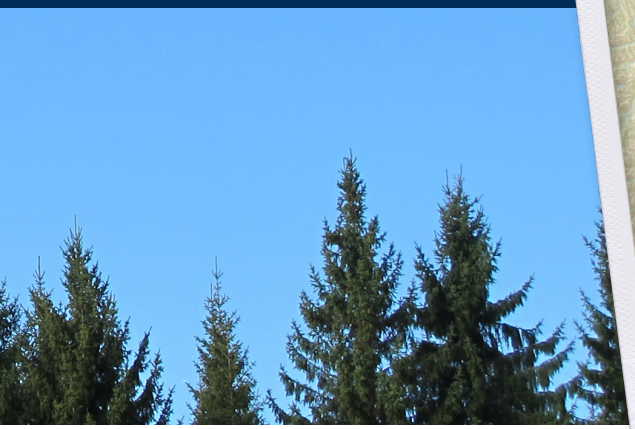
To protect groundwater resources, a strong technical knowledge of a region's aquifers is necessary. In 2015, Geoscience BC (GBC) launched the Peace Project to collect new information about groundwater within an 8,000 square kilometre area in northeast BC. This information serves as a key component of the Northeast Water Strategy Enhanced Water Monitoring System currently under development by the BC Provincial government in partnership with local governments, regulatory bodies, Treaty 8 First Nations, Geoscience BC and industry.

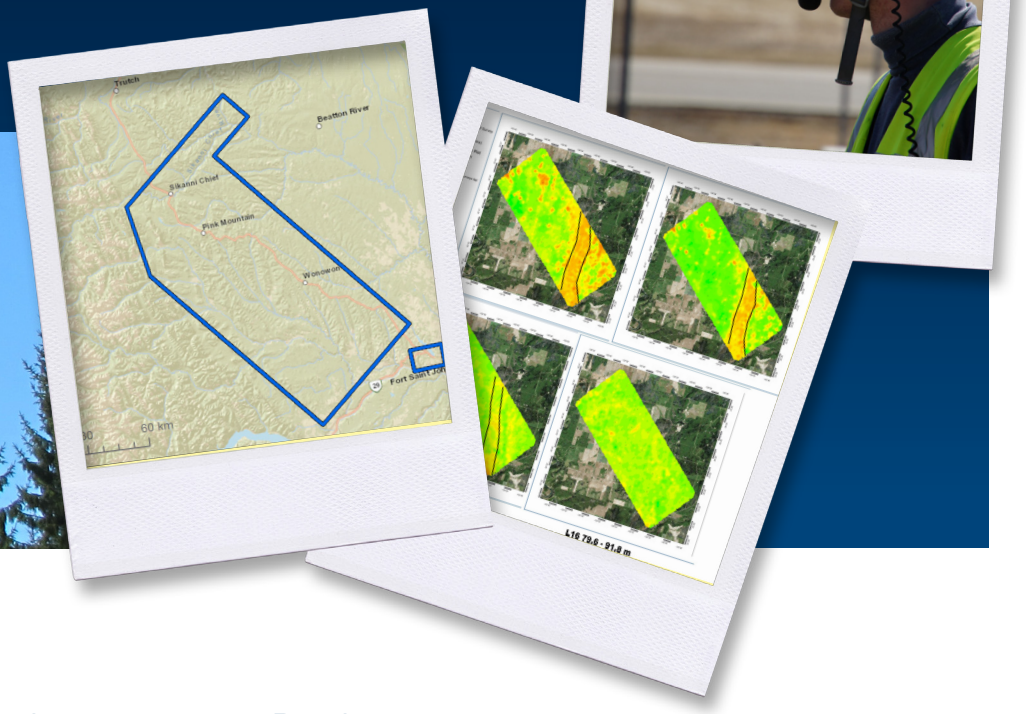
The main priority of the project, which took place in the late summer of 2015, was to map aquifers in the area to a depth of at least 300 m and collect the highest quality data as economically as possible. Given the large expanse of land to be covered (21,000 line-km at a flight line spacing of 600 m) it was decided that the HTEM geophysical technique would be employed. This however gave rise to another priority – to avoid or minimize disturbances of the First Nations people residing throughout the area, and to complete the airborne data acquisition before hunting and trapping season began in the fall. GBC contracted SkyTEM Canada to manage the collection of the data, communicate with the First Nations counsel hired by GBC, coordinate each day's flights so that people in the area were aware of daily activities in the area(s) being surveyed and complete all data acquisition in six weeks

Results

The acquisition and quick delivery of 21,000 line-km of high quality high resolution data was attained in 43 days. SkyTEM312^{FAST} is engineered to reach survey speeds approaching 150 km/h that in this case resulted in an average production speed of 118.5 km/h throughout the survey, including the time required for the helicopter turns. A delivered average daily production of 525 line-km was achieved. As with all SkyTEM systems, SkyTEM312^{FAST} is highly efficient and robust with little to no downtime, a critical precondition for rapid survey execution.To take advantage of the extended daylight hours available in July, three flights per day were flown. Additionally, the client was able to view preliminary data in short order, due to SkyTEM's quick in-field data turnover.

> The SkyTEM312^{FAST} survey did everything required to enhance our 3D geological model in an efficient and very cost effective manner.
>
> *John Hicks (General Manager Exploration, Panoramic Resources Limited)*



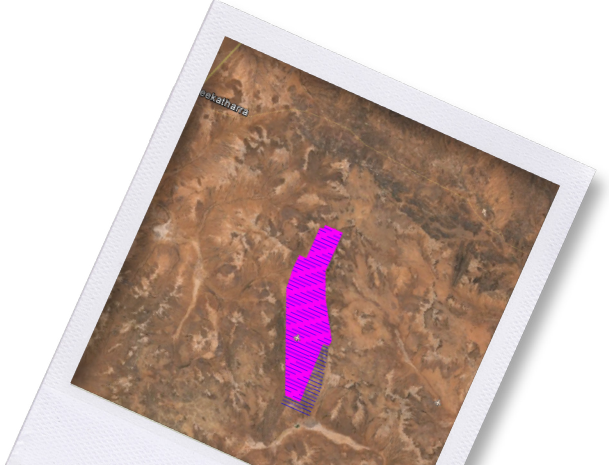


SkyTEM312^{FAST} for mineral exploration

In the Autumn of 2015, 5,000 line-km of HTEM was flown with the SkyTEM312^{FAST} system over Panoramic Gold's Gidgee project in Western Australia. The objective of the survey was to cover a large area in a cost-effective manner and to produce a high resolution 3D geological map of the deposit and surrounds through the integration of pre-existing drillhole and ground mapping data. The Gidgee area is a challenging mapping environment with moderately conductive overburden to highly saline salt pans present in the area. SkyTEM's high moment made it possible to resolve features as deep as 350-400 m in a cost-effective manner compared to FWTEM that would have been required to fly at relatively higher altitudes and possibly yielding shallow lower resolution data.

Results

The majority of the survey was ultimately flown with a 200 m line-spacing, with a zone of 1,600 m line-spacing in the SE. An average daily production of 500 line-km per day for the 10 flight days was achieved. Preliminary raw but located EM data was delivered within 48 hours, with flight statistics, flight path (northing and easting) and altitude delivered 48 hours thereafter.



SKYTEM AIRBORNE SURVEYS WORLDWIDE

FAST SURVEY COMPLETION
FAST DATA DELIVERY
HIGH-QUALITY DATA

	SkyTEM312*FAST*	
	LM	HM
No of transmitter turns	2	12
Transmitter area per turn	341 m^2	341 m^2
Transmitter current	~5 Amp	~120 Amp
Peak moment	~3,000 NIA	~500,000 NIA
Repetition frequency	275 Hz	25 Hz
On time	800 µs	5 ms
Off time	1018 µs	15 ms

The SkyTEM system is of benefit to explorationists in meeting their mapping objectives for the following reasons:

- **Resolution** – All SkyTEM systems employ dual-moment technology where a current waveform composed of low and high dipole-moments is used enabling discrimination between weak geological contrasts in the top layers concurrently with those at depth.
  - Low moment (LM) mode with low current, high base frequency and fast turn off provides early-time data and high spatial sampling for shallow imaging.
  - High moment (HM) mode with high current and low base frequency provides high quality late-time data for deep imaging.
- **Calibrated** – The SkyTEM system is one-time calibrated allowing for direct comparison with ground based or borehole EM datasets together with complete traceability back to the established TEM reference model. This also ensures that data from repeat or contiguous SkyTEM surveys can be seamlessly and confidently processed and combined.
- **Magnetic system** – The sensor is Geometrics Caesium Vapour type 822A, Total intensity magnetometer mounted on the rigid carrier frame. The rigid platform's position and orientation is continuously monitored and together with its separation from the aircraft means that Caesium-vapour magnetic data is not being corrected with lower frequency response fluxgate data in the compensation calculations. Corrections regarding frame geometry are actual and not approximated.
- **Rigid carrier frame** – All sensors, including the magnetometer, are mounted on the rigid carrier frame and flown at low altitude ensuring that all measurements are recorded in a fixed geometric setup and as close to the ground as is achievable from an airborne geophysical platform.
- **Robust** – The system is very robust and can fly in challenging weather and terrain conditions and without an onboard operator.

SkyTEM has completed numerous projects for clients world-wide in the engineering, environmental and resource exploration sectors. The company employs an experienced staff of geophysicists, geologists, remote sensing specialists and field survey operators and we support our clients and employees with a commitment to high standards in safety, quality and client service

SKYTEM AIRBORNE SURVEYS WORLDWIDE

SKYTEM SURVEYS APS
DYSSEN 2
8200 AARHUS N
DENMARK
TEL: +45 8620 2050

WWW.SKYTEM.COM
INFO@SKYTEM.COM

VER. 1.0 20160217 50