MAPPING WATER RESOURCES

The unique SkyTEM technology for mapping groundwater

SkyTEM is an innovative and technologically advanced helicopter-borne geophysical system specifically designed to map buried aquifers. This unique technology, capable of mapping the top 500 metres of the Earth in fine detail and in three dimensions, was conceived and developed in Denmark, a country with a reputation for environmental care and R&D.

SkyTEM has helped geological organizations and government water agencies on seven continents unearth a wealth of information about their aquifers and aided in their understanding of how geology and mankind kan affect, and be affected by, groundwater resources. Since its launch in 2003 SkyTEM has also been employed globally for resource exploration and for environmental and engineering investigations.

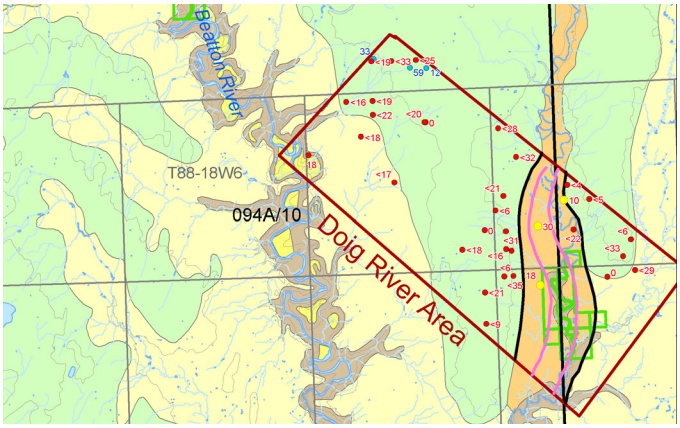
SkyTEM can detect, locate and map:

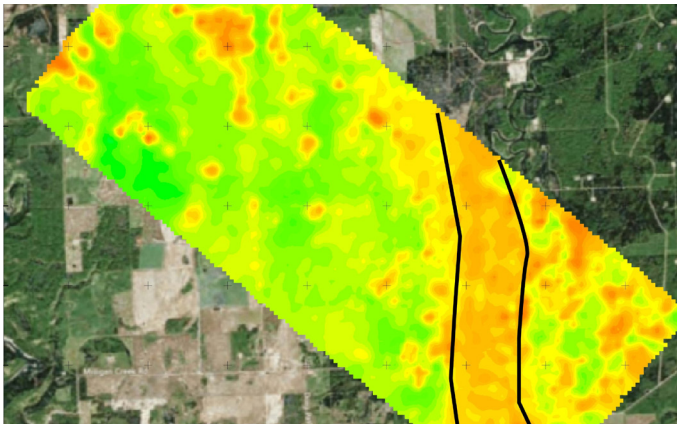
- Aquifers
- Mineral deposits
- Soil contamination
- Aggregates
- Fractures and faults
- Landfills
- Salt water encroachment
- Paleochannels
- Groundwater recharge
- Water depths (bathymetry)
- Oil and gas
- Site characterisation
- Landslide investigations
- Pre-construction planning

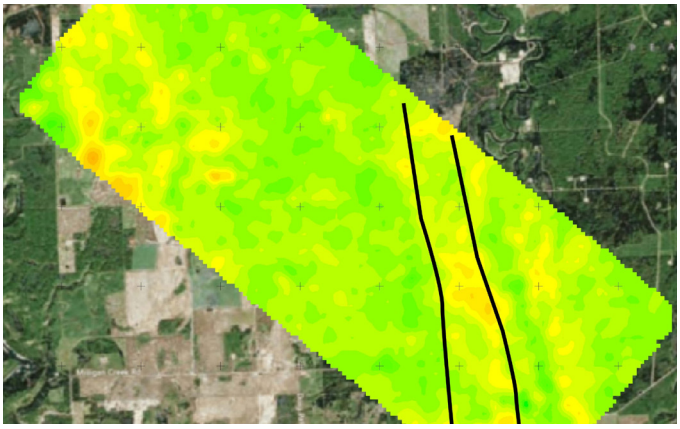
The SkyTEM Method

The image below shows an area of approximately 140 square kilometres (54 sq. miles) that was mapped recently for Geoscience BC's (GBC) Peace Project in British Columbia. The map at top shows over 20 boreholes drilled in the area to locate a buried river channel, shown in orange. The SkyTEM data at the bottom clearly reveals the channel. The SkyTEM data also indicates the top of the channel is encountered at 5 m (15 ft) below the surface and extends to a depth of approximately 50 m (150 ft). The drilling required several months and several hundred thousand dollars while the SkyTEM survey was completed in a few hours at a fraction of the cost.

The Peace Project comprised of 8,000 km2 (3100 mi2). The SkyTEM survey was a cost-effective and time-efficient solution as mapping of the entire area was completed in only 43 days.
See http://www.geosciencebc.com/s/PeaceProject.asp.







Drilling boreholes is not enough

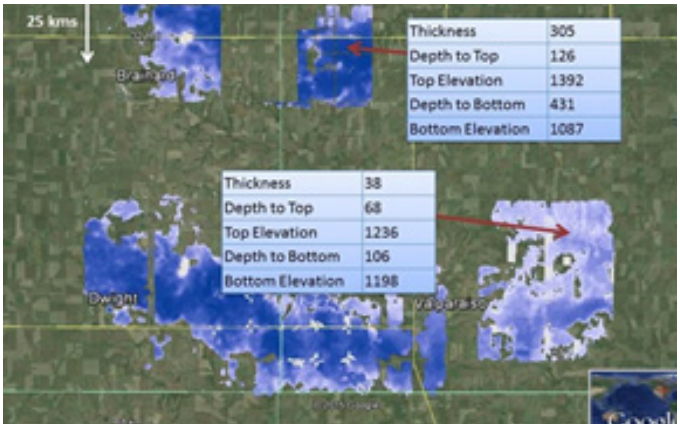
In most parts of the world groundwater mapping is based only on one data source – drilling information. A 6 inch borehole represents less than one millionth of one acre. This borehole will provide precise information about the geology immediately in the vicinity of the hole, but any assumptions made about the surrounding geology is a leap of faith or at best a guess. Drilling boreholes can be expensive particularly when insufficient information is available to determine where to drill and how deep to drill for water. If a large area is being studied budgets may only allow for limited drilling so selection of where to drill is crucial. Also, access to some areas can be difficult and expensive if the terrain is remote, rugged or heavily vegetated. Limited drilling is often the only option considered and low borehole density can result in uncertainties and low confidence levels in geological interpretations and hydrogeological models.

The SkyTEM airborne method of mapping quickly and economically delivers accurate subsurface data from which location of and depth to aquifers can be revealed. This summary is intended to help landowners in the project area access data showing the depth to aquifer material, the thickness of the aquifer and other basic information". The image on the right shows a screen capture from the State NRD's webpage (www.lpsnrd.org/Programs/gwaem.htm) and gives an example of the pop-up information that appears as the mouse moves over the area. This information can provide a wide range of additional solutions including where to best position monitoring wells for year-round assessment of water levels, and to estimate the volume of water available at locations within the study area.

Measuring volumes of available water

SkyTEM is used to map an important agricultural area of northwestern Nebraska. The area, measuring over 99 mi2, is designated as a Special Management Area by the Natural Resources District (NRD) in response to seasonal water level declines. After collecting subsurface data with SkyTEM the State of Nebraska webpage stated: "...as hoped, the electromagnetic survey provided extensive information about the area's geology, aquifer characteristics and water in storage. The NRD's use of the data is on-going.

This summary is intended to help landowners in the project area access data showing the depth to aquifer material, the thickness of the aquifer and other basic information". The image on the right shows a screen capture from the State NRD's webpage (www.lpsnrd.org/Programs/gwaem.htm) and gives an example of the pop-up information that appears as the mouse moves over the area. This information can provide a wide range of additional solutions including where to best position monitoring wells for year-round assessment of water levels, and to estimate the volume of water available at locations within the study area.



Accurate reliable data is required to achieve groundwater sustainability.

"SkyTEM312*FAST*

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

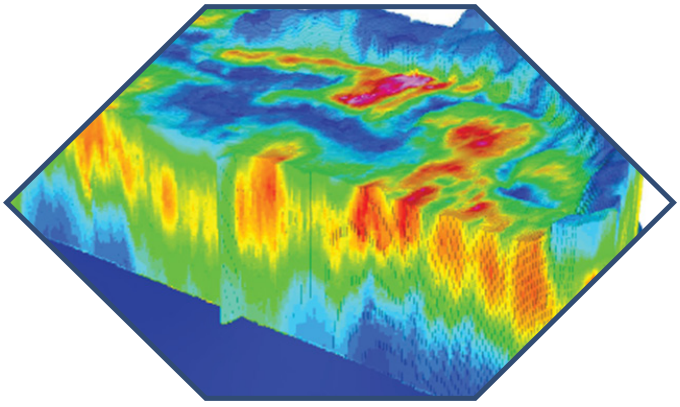
Find high yield sites to drill

SkyTEM data is used to optimize drilling for the Department of Agriculture and Food in Australia. Principal research scientist Richard George says drilling involves a hit-and-miss technique in which there is just a one-in-five chance of finding water and even less chance of finding water of suitable quality. He also says the SkyTEM survey has doubled the odds of striking it lucky. “We’re running better than a one-in-three success rate of finding sufficient water-bearing sands, though we’re still only half way through the program. By finding sites with high yield we can save on energy as we don’t have to pump from such a long way down.”

The ability to reveal the availability and movement of water is a huge asset for countries and regions with the need to manage resources and respond to natural disasters. The SkyTEM method, engineered specifically to identify and characterize aquifers, is widely accepted globally as the best technique for mapping water resources.

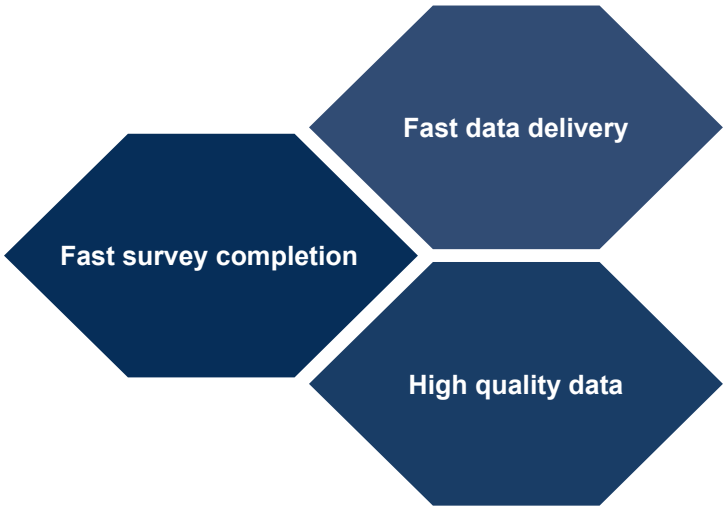
SkyTEM is capable of mapping subtle changes between sand, clay, silt, gravel, and tills that define the location and potential vulnerability of aquifers. In 2015 the Danish Ministry of Environment completed mapping the country’s aquifers with SkyTEM.

The technology delivers digital data that is used for creating detailed 3D geological representations of the subsurface down to 500 metres deep. These representations can be used for a variety of different applications and are a vital factor for designing reliable and practical hydrological models for sustainable water management.



SkyTEM can be compared to computed tomography (CT) scans performed on the human body as it is a non-invasive way to diagnose or flesh out geological features and conditions in three dimensions.

The superior mapping capabilities of SkyTEM Surveys are well documented in papers and case studies authored by our clients and the scientific community. Please visit our website at www.skytem.com to read some of these papers and for other information about the SkyTEM method.



Hydrogeology divisions of governments worldwide routinely employ SkyTEM technology to map their water resources. Clients include:

- The United States Geological Survey
- CSIRO (Australia)
- BRGM (Geological Survey of France)
- Geoscience BC (Canada)
- National Geophysical Research Institute of India
- Lower Platte South Natural Resource District, Nebraska
- Western Australia for the Department of Agriculture and Food
- The International Water Management Institute (IWMI)
- Stanford University
- Geoscience Australia
- Geological Survey of Sweden

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

WWW.SKYTEM.COM
INFO@SKYTEM.COM