

Mineral Exploration Trends and Developments 2017



Ken Witherly
ken@condorconsult.com

The 2017 edition of ETD (Mineral Exploration Trends and Developments) again tracks new developments in exploration technology from around the world. ETD has been published since 1965, and has been under the stewardship of only two editors; Dr Peter Hood and Dr Pat Killeen. Dr Hood started ETD (initially just called Trends and Developments) and continued as Editor until 1992 when Dr Killeen took over. In addition to their duties as ETD Editors, both Hood and Killeen have had long and distinguished careers with the Geological Survey of Canada.

The Northern Miner Press, which took on publishing ETD in 2004, provides it as a special supplement to the early March edition of the *Northern Miner*. In the past decade KEGS (Canadian Exploration Geophysical Society) became the primary patron for ETD, but gradually more commercial support was found for the publication. Most recently DMEC (Decennial Minerals Exploration Conferences) has taken over the role of major patron for ETD, and with it the responsibility for the funds raised to cover the costs associated with publication. The current supporters of ETD are listed on the inside cover of the publication and their support is gratefully acknowledged. Any group working in exploration technology can submit material for potential inclusion in the next edition of ETD. Those interested in submitting material can contact Pat via email (his contact is provided at the end of this article).

In summary, the latest edition of ETD reports that the business climate in 2016 was an improvement over 2015 and companies appeared to be putting more funds into improving their technology.



Dr Peter Hood founding Editor of ETD.

Killeen noted the following as important advances:

- TDEM: more companies modified helicopter-borne TDEM systems to fly surveys faster.
- Airborne Gravity Gradiometer (AGG): a new generation AGG system was successfully test flown and another company has a new AGG system in development.
- Airborne IP: more companies are processing AEM data for IP information and even including it in joint inversions.
- Drones: more companies are providing magnetic survey capabilities using drones and some are offering radiometrics. EM still appears to be in development.
- 3D IP-array style systems are becoming more common place.
- Modeling of all types of data is advancing.
- Borehole: there are significant advances in acquisition and processing of EM, IP, magnetic gravimetric sensors.



Dr Pat Killeen, current Editor of ETD.

The introduction to ETD cites continuing slow level of activity in the industry, but notes that innovation continued regardless. In the Airborne Section there is a clear move to the heli-time domain EM systems that have become the industry standard for airborne EM surveys. Table 1 shows EM systems included in last year's ETD and indicates which systems have reported major changes/improvements to the technology over the past year. Two new systems are also shown. The reported efforts on improvements relate to technical and operational efficiencies – getting more data cheaper.

The drone story continues to advance and, encouragingly, more case studies are being provided so as to allow the industry to assess this technology. One that EGS has provided is 'Drone Topographic Mapping of Great Sand Dunes National Park.' The issue of FastTIMES containing this case study can be accessed at the url provided [eegs.org/FastTIMES/Latest Issue](http://eegs.org/FastTIMES/LatestIssue). The next Society of Exploration

Table 1. EM systems included in the 2016 and 2017 ETD

System	Company	Head office
VTEM ^A	Geotech Ltd	Canada
HelITEM ^A	CGG MultiPhysics	Canada
SkyTEM ^A	SkyTEM	Denmark
Xcite	New Resolution Geophysics	South Africa
GPRTEM2	Geophysics GPR	Canada
Poco	Terraquest	Canada
P-THEM	Pico Envirotec	Canada
AirTEM	Triumph Surveys	Canada
New for 2017	New for 2017	New for 2017
ITEM	Precision GeoSurveys	Canada
EQUATOR (combined TD/FD)	GeoTechnologies	Russia

^AETD 2017 indicates major changes in past year.

Table 2. Gravity systems included ETD 2017

System	Company	Head office
HD-AGG ^A	GEDEX	Canada
Falcon family ^A	CGG MultiPhysics	Canada
Lockheed Martin FTG ^A	Austinbridgeporth	UK
Lockheed Martin FTG ^A	Bell Geospace, Inc.	USA
AIRGrav	Sander Geophysics	Canada
TAGS-6	GyroLAG	South Africa
CMG GT-2A	MagSpec Airborne Surveys	Australia
CMG GT-2A	New Resolution Geophysics	South Africa
CMG GT-2A	Prospectors A.S. Ltda.	Brazil
CMG GT-2A	Terraquest	Canada
CMG GT-1A/GT-2A	Thompson Aviation	Australia
CMG GT-2A	Geotech/UTS Geophysics	Canada/Australia
CMG GT-1A/GT-2A	CGG MultiPhysics	Canada

^AGravity gradient systems.

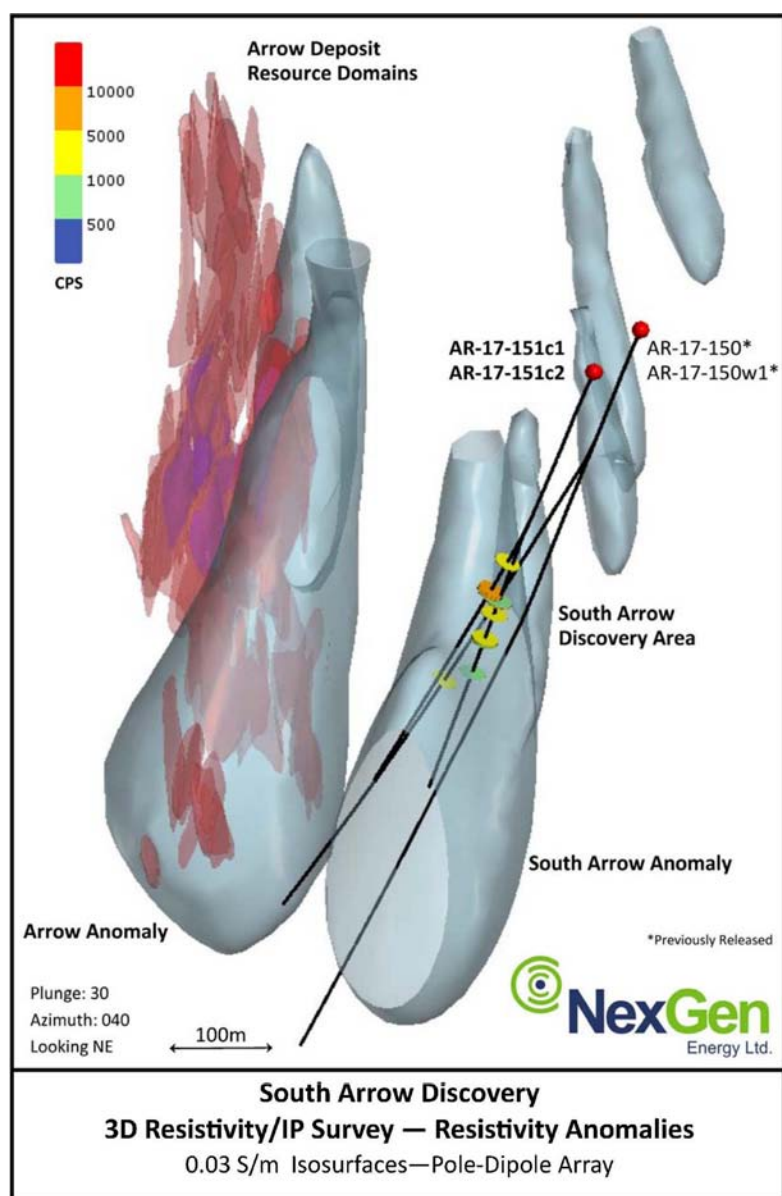


Figure 1. Results of a 3D IP/resistivity survey carried out by Dias Geophysical for the NexGen Energy Ltd on their Arrow property.

Geophysicists conference (Houston, October 2017) is slated to have a workshop on drones.

There are now a significant number of contractors offering airborne gravity (Table 2), with the Lockheed Martin systems the most popular AGG technology and the Canadian Microgravity (CMG) GT-2A the most popular scalar technology offered. For a recent update on airborne gravity technology, the video recording of the Airborne Gravity workshop held at the 2016 ASEG conference is now available on the GA website: <http://www.ga.gov.au/scientific-topics/disciplines/geophysics/gravity>.

On the ground technology front (includes petrophysics and borehole), most groups seem to be taking a similar tack to the airborne contractors, where the emphasis has been on improving existing products rather than taking large leaps into major new technology. One system that caught my attention was a new magnetic instrument called the Qmeter Magnetization Meter being offered by Terraplus. The purpose of the system is 'to measure and differentiate remnant magnetization from induced magnetization'. What is interesting is that the idea behind the technology appears in article published in *Exploration Geophysics* in 2014 (Schmidt and Lackie, 2014). It is not that often we can see an idea advanced from a journal to a commercial product in such a short time. Wouldn't it be great to see this happen more often!

We hope all the 3D IP-resistivity systems noted in the last report are out in the field getting well used. A nice example of one system in action came out last week from the Athabasca Basin (Canada), one of the major areas of exploration focus for high grade uranium. Figure 1 shows the results of a 3D IP/resistivity survey carried out by Dias Geophysical for the NexGen Energy Ltd on their Arrow property. NexGen states in their press release (http://www.nexgenenergy.ca/news/index.php?content_id=303) that the drilling of the new Arrow South zone with significant uranium mineralization encountered was in part due to the results of the 3D survey.

In closing I quote some lines from the first ETD (1965): 'A vibrating-string gravimeter suitable for use in a drill-hole has been developed by Shell Oil Company (Goodell and Fay, 1964). It is claimed that it is capable of measuring

differences between stations of one milligal and that it has proved to be a useful instrument for determining average densities over a one thousand foot section'. When reading these lines it struck me that our quests for better technology and useful data are seldom solved quickly but require enormous time and effort to achieve useful results.

The full ETD report and tables can be accessed on the KEGS website: <http://www.kegsonline.org/?dir=6&sub=23&typo=news&doc=1062&action=show&title=Trends%20in%20Geophysics%202016>.

The full record of ETDs since 1965 can be found on Condor Consulting, Inc. website (www.condorconsult.com) under Downloads\ETD Archive.

If you have a story you would like included in the next ETD, please contact Pat Killeen at pkilleen@explornet.ca to get on the mailing list.

Reference

Schmidt, P. W., and Lackie, M. A., 2014, Practical considerations: making measurements of susceptibility, remanence and Q in the field: *Exploration Geophysics*, 45(4), 305–313. doi:10.1071/EG14019

www.publish.csiro.au/journals

Exploration Geophysics

The Journal of the Australian Society of Exploration Geophysicists

Publishing excellent research, technical papers, case histories, advances in data interpretation and theoretical developments in applied geophysics.



Preview

The Magazine of the Australian Society of Exploration Geophysicists

News and reviews on the exploration industry, advances in geophysical techniques and communication among ASEG members.



Stay Informed

Keep up to date with industry news by subscribing to our email alerts or registering for RSS feeds. www.publish.csiro.au/earlyalert



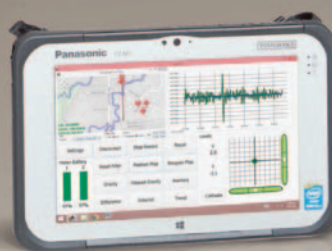
WWW.SCINTREXLTD.COM

SCINTREX
A DIVISION OF LRS
Setting the Standards

INTRODUCING THE CG-6 AUTOGRAV™ SURVEY GRAVITY METER



SMALLER AND LIGHTER
ROBUST FIELD UNIT
ENHANCED, INTUITIVE INTERFACE
FASTER SURVEYS
REMOTE TABLET OPERATION



With Lynx LG
tablet interface
software



Available in Australia from Geosensor

Ph: 0407 608 231

www.geosensor.com.au