

More sophisticated surveying and analysis techniques in exploration help companies cope in more remote regions and in difficult economic conditions

Exploration excellence



According to a December 2010 report by Metals Economics Group (MEG), most mining companies, both junior and established, responded to rising prices and more stable market conditions by increasing their exploration budgets in 2010, resulting in a 44% rise in the estimated worldwide exploration total for 2010. In MEG's 21st edition of Corporate Exploration Strategies (CES), the estimated total 2010 budget for nonferrous metals exploration reached \$12.1 billion, reinstating almost two-thirds of the industry's \$6 billion in cuts to exploration spending in 2009.

After rising for six straight years to an all-time high of \$14.4 billion in 2008, nonferrous exploration budgets dropped 42% in 2009 as the global economic crisis and declining prices for almost all commodities took their toll on the industry. Metals prices, of course the primary driver of exploration spending, have improved markedly since bottoming in early 2009, and have traded well above their long-term trends throughout 2010. In response, major, intermediate, and junior companies have all increased their aggregate exploration allocations in 2010. In particular, the significant improvement in the availability of equity

financings for the juniors over the past 12-18 months has allowed this group to account for the largest share of the overall increase in exploration spending this year.

When looking at individual regions, there is also cause for a positive outlook. In China, a recent November 2010 statement from Chinese state news agency Xinhua reported that the country plans to spend almost \$4.5 billion over the next five years to explore for minerals in 21 of its provinces to reduce reliance on imported mineral products.

Chen Renyi, director of the China Geological Survey's Department of Mineral Resources Assessment said that over the next five years, domestic excavation should help reduce imports of copper ore, iron ore, and sylvite to less than 75%, 50%, and 60%, respectively, of the total amounts consumed in China.

The Survey stated in October 2010 that more than 900 locations had been found during the past 12 years that contain mineral deposits. Of those, 5,000 Mt of iron ore have been found in the provinces of Liaoning, Hebei, Henan, Shandong and Shanxi. However, several of these deposits are of low-grade ore, requiring China to still import large quantities of higher-grade iron ore. Up to 38.5 Mt of

Ingetrol's Explorer Jr 36D2 in field operations

copper ore reserves were discovered in Tibet, Xinjiang and Yunnan last year.

Increasingly, there has been co-operation between Chinese metals and mining groups, with the global mining players. Rio Tinto and Chinalco recently signed a non-binding Memorandum of Understanding (MoU) to establish a landmark exploration joint venture in China. The JV will explore mainland China for world-class mineral deposits and is expected to come into operation in the first half of 2011. It is intended that between three and five large area exploration projects will be selected for the initial focus, with the potential for additional regions to be added at a later date. Chinalco will hold a 51% interest and Rio Tinto the remaining 49%.

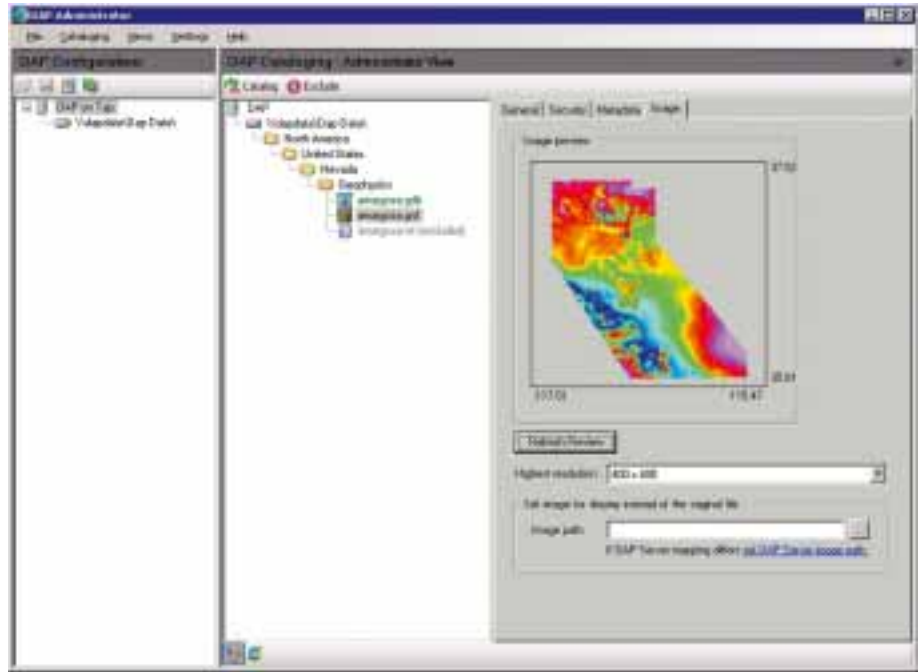
In other important growing markets, it is not only juniors but also the largest mining groups having to add to their reserves through exploration. Norilsk Nickel, the world's largest producer of nickel and palladium, has said it plans to spend \$45 million on mineral exploration projects in 2011 to counter dwindling levels of metal in the ore it mines.

Contractors see improvement

The major drilling contractors are also seeing an upturn in market conditions, reflecting the bigger picture. In its second quarter of the 2011 fiscal year ending October 3, 2010, Major Drilling posted quarterly revenues of \$127.8 million, up nearly 70% from the \$75.5 million recorded for the same quarter last year.

Francis McGuire, President and CEO of **Major Drilling**, commented on the near term: "Recent announcements of significant increases in exploration budgets from senior mining companies, combined with a recent increase in financing for junior mining companies, indicate that activity levels in calendar 2011 should be robust. To meet the labour availability challenge coming from this pick-up in activity, we have stepped up our training efforts around the world, and have re-instated many of the initiatives that were successful in the last industry upturn."

Canada's **Energold Drilling** notched up a new company record of 102,500 m drilled in the quarter ending September 30, 2010, up 136% from the 43,500 m recorded a year before. Over 242,900 m were drilled in the nine months to that date, demonstrating continued strong demand for exploration drilling in 2010.



The company referred to a shift in the type of drilling experienced by Energold, as a larger number of the rigs recently mobilised are for exploration programs in the 'frontier drilling' segment which demands higher pricing and margins. Frontier drilling includes drilling in remote areas where access is difficult or impossible for traditional drilling rigs due to

The Geosoft DAP Administration application catalogues and spatially indexes exploration project datasets

lack of infrastructure or social and environmental issues. With a significant increase in demand, a recent shift towards more 'frontier drilling' and more junior mining

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companies becoming active in implementing their exploration programs, the company expects that increases in the average rate per metre will follow suit.

Mexico continues as the most active region for Energold, with Brazil and Colombia showing considerable demand as well; however, a significant portion of the drilling continues to be brownfield exploration.

At the end of September 2010, the company had 100 drilling rigs with three more under construction in response to continued demand for highly mobile drilling rigs and increased exploration expenditures in frontier drilling. The fleet includes 76 EGD Highly Mobile Surface Rigs, seven EGD Underground Rigs as well as a number of conventional rigs.

Earth modelling

New developments for 2011 in earth modelling tools from **Geosoft** include a new 3D inversion modelling technology to be released later this year. The modelling capabilities will be available as an online service that is accessible within Geosoft's Oasis montaj earth mapping platform. The delivery of inversion capabilities as an online service will give interpreters access to advanced 3D inversion modelling capabilities without consuming desktop processing power.

Over the past decade inversion techniques, which convert geophysical data into 3D earth models, have proved their worth in exploring for major ore deposits around the world. They've helped mineral explorers to sharpen their prospecting and direct their drilling decisions, enabling them to reduce uncertainty, exploration risk and the cost of discovery.

While the results have been impressive, it is estimated that less than 10% of mineral exploration projects use inversions despite the availability of advanced inversion services and systems. At present inversion remains largely in the hands of expert modellers.

With its next generation earth modelling solutions, Geosoft is targeting speed, usability and accessibility to remedy this. Ian MacLeod, chief technologist with Geosoft commented: "Making 3D inversion fast and accessible to more explorers will change the cost/benefit scenario significantly. And this will lead to more exploration success through targeting decisions that benefit from an improved three dimensional understanding of the subsurface."

As data volumes continue to grow, Geosoft has also introduced a packaged solution for Geophysical Exploration Information Management. The geophysical Exploration Information Management Solution (EIMS)

bundles Geosoft professional services, that leverage the company's experience with geophysical workflows, and its DAP Server technology, which is designed to organise and distribute large geophysical and exploration datasets into one packaged solution..

The Geosoft solution enables organisations to catalogue their geophysical data within a DAP server environment that enables data validation, quality assurance and metadata entry for data management, and handles tasks like re-projection of data for efficient project use. Once the DAP data repository is validated and organized, the Geosoft EIMS solution provides efficient and global access to data

through spatial search technologies.

Barrick partnered with Geosoft to implement the EIMS solution, based on the company's experience with geophysical workflows, and its DAP Server technology which is designed to store and serve up large geophysical and exploration datasets.

Geophysical data from Barrick's exploration office in Elko, Nevada was catalogued within a centralised DAP Server environment which included built-in validation and automated metadata tools. Data quality assurance was an important focus in the initial phase of deployment. Although the data was well managed, the built-in validation system

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identified pockets of data that were inaccessible or lacked associated metadata. Once all the data were validated and organised within a central repository, Barrick gained an enriched dataset, better data integrity through the built-in validation structure, and a system for providing efficient, global access to the database.

Terra Remote Sensing continues to remain on the forefront of technological innovation through close relationships with scientific research groups and internal research and development. Terra brings next generation LiDAR, hyperspectral, thermal, and digital imaging, multi-beam bathymetric and shallow seismic sensors together for multi-faceted/multi-purpose datasets. These data sets can be integrated together to form a powerful multi-dimensional snapshot in time. With customisable sensor combinations, detailed geospatial information ranging from geomorphological characteristics to vegetation species can be extracted and used in wide-ranging applications throughout multiple project phases.

Portable PC applications

An April/May 2010 paper published in *GSA Today* entitled: *The digital revolution in geologic mapping*, highlights the increasing use of modern handheld pocket PCs in the mineral exploration sector. Examples quoted include the **Trimble** GeoExplorer series (such as the GeoXT, GeoXH and GeoXM products), which have fast processors with seamless GPS integration and can handle driving rain and minor plunges from outcrops. These units have 4 in screens, making them small, light and portable. They use the Microsoft Windows Mobile operating system, which is fast but doesn't have the capacity to run complex graphics programs like ArcGIS or Adobe Illustrator. Data is collected in the field using ArcPAD and must be uploaded to a PC workstation for final map preparation.

An alternative is to use ruggedised tablet PCs, such as the Xplore iX104 series from **Xplore Technologies**, which have larger 10 in screens and use standard MS Windows operating systems. These computers can run complex graphics programs, but an external GPS receiver and ArcPAD software are needed to integrate GPS location data in the field. Also, their larger size and increased weight make them functionally less portable.

Use of GF Instruments' Gamma Surveyor II with collimator in an open pit mine



Handheld and tablet PCs are designed to withstand the worst of field conditions

In 2008, Xplore released its sixth generation Tablet product: the iX104C4. This product family leverages leading-edge technologies, Xplore's strategic relationships with Microsoft and other technology leaders, as well as over 13 years of experience developing rugged pen/touch tablet computers.

Carlson Software has also released a product in this area, the all new Carlson Supervisor. It is a small, rugged tablet PC with many extras designed for real performance in the field by the mining and other industries. Produced by HHCS Handheld USA for Carlson, the Carlson Supervisor features full Windows 7 functionality with a daylight readable, 7 in touchscreen. Tough enough to work in the most challenging environments, the Carlson Supervisor has 2 GB of DDR2 RAM plus a 64

GB solid state drive (SSD). There are a wide range of options for communicating with other devices such as Bluetooth for short-range wireless connection to GNSS receivers for example, or 802.11 WLAN.

To collect visual information in the field, the Carlson Supervisor features a built-in two-megapixel camera with LED light. The Carlson Supervisor will be bundled with the Carlson Grade Supervisor, which is designed for site/grade/surface management and volume calculations for landfills, mining and construction.

Surveying instruments

Czech Republic-based **GF Instruments** has developed new versions of both its ground electromagnetic technology, as well as a new gamma-ray spectrometer. After a first series of 2010 deliveries of its multi-depth conductivity meter, the CMD Explorer, GF Instruments has developed and commercialised the new CMD Mini Explorer.

Both instruments offer simultaneous measurements of conductivity and in-phase in 2.2, 4.2, 6.7 m (Explorer) and 0.5, 1.0, 1.8 m (Mini Explorer) depth ranges. These lightweight and easily operated instruments are suited to mineral exploration, where they offer in-situ EM inversion with indication of two layered model parameters. Due to long-term calibration and temperature stability, up to 10 Hz sampling rate and GPS compatibility the CMD – Explorer and Mini Explorer can be used both for walking and moving applications performing fast layered conductivity mapping of large areas.

The company has also introduced the new Gamma Surveyor II – a super compact 1,024-





The DAS500 data acquisition system from RMS Instruments

channel gamma-ray spectrometer for K, U, Th assays and dose rate measurement in field exploration, borehole logging, moving and laboratory applications. This light weight (1.4 kg), rugged, water submersible instrument equipped with BGO detector (1.2 in³ or 6.3 in³) uses a unique method of spectral processing (without a radioactive test source) allowing ultra fast detection and evaluation of anomalies in search and assay modes. Gamma Surveyor II provides easy and comfortable operation for measurement with an internal or external probe, extra large data memory, GPS compatibility, long and reliable battery supply, and Bluetooth communication with probe, GPS or earphones.

RMS Instruments has developed new systems and important enhancements for instruments in the (D)AARC500 family. This range of Adaptive Aeromagnetic Real-Time Compensators provides real-time compensation of local magnetic interference for inboard magnetometer systems in fixed wing aircraft and helicopters, to the point where the full resolution of modern high sensitivity magnetometers can be utilised.

The AARC510 has now been introduced. This is the latest member of the family of advanced, adaptive real-time compensation systems. It is essentially a compact, low-cost version of the AARC500, ideally suited for strap-down installations in small fixed-wing aircraft and helicopters. The firmware in the AARC510 is especially tailored to allow unmanned operation.

A new remote connectivity tool allows users full control and operation of (D)AARC500 systems from a remote Windows-based computer, across an IP network. The user interface of the system is seamlessly replicated in the Windows-based machine. The mouse and keyboard attached to the computer have the same effect as if they were directly connected to the unit. This technology facilitates flexible architectures for complex systems that incorporate the (D)AARC500. A single computer/laptop can be used to control and operate the (D)AARC500 and other instruments. Any other Windows applications can also be running simultaneously.

All instruments in the (D)AARC500 family now support four front-end-sampled analog inputs, which are in addition to the standard analog inputs (16 differential, or 32 single-ended channels) supported through the Analog Input Module. These inputs are sampled at the same rate (up to 1,280 Hz), and processed in the same manner, as all other magnetics signals are. For basic magnetics-only surveys, an AARC500/510 equipped with this option, and an embedded GPS receiver, offers a compact, cost-effective and comprehensive solution.

In other developments, Geosoft has now incorporated support for direct importing of DAARC500 data files in their recent release of Oasis montaj (7.2). This offers a convenient alternative to the Data Exporting Software supplied with RMS Instruments' systems.

In the first quarter of 2011 RMS Instruments will also introduce its new Data Acquisition System, the DAS500. It will offer internal magnetometer counters for up to eight sensors, flexible and comprehensive data acquisition and recording capabilities, and an embedded GPS receiver (Novatel's OEMV-series). The system supports 16 differential or 32 single-ended analog inputs, data I/O through eight isolated serial (RS232) ports, and 100/1,000 MB/s Ethernet. Data may be recorded in internal (solid-state) Flash memory, an internal hard disk, or any device with a standard USB interface.

Diamond Aircraft and **RIEGL Laser Measurement Systems** launched a new turnkey survey aircraft in October 2010 – it has a high performance RIEGL airborne laser scanner, the LMS-Q680i, fully integrated into the "Universal Nose" of the Diamond DA42 Multi Purpose Platform (MPP) aircraft.

The Diamond DA42 MPP is designed to effectively capture 3D data of large areas for various applications such as precise digital terrain modeling. RIEGL airborne laser scanners are already well proven in open pit mining



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Innov-X Delta testing rock outcrop incorporating the Explorer GIS/GPS feature that allows instantaneous geochemical mapping in the field

applications, for example for continuous surveying of the large lignite open pit mines in Germany.

Handheld XRF devices

Also discussed in this month's automated mineralogy article, portable XRF continues to be an important tool for exploration geologists. Two of the market leaders are the family of Thermo Scientific Niton handheld XRF analysers and the X5000, Omega and Delta products from **Olympus Innov-X**.

In July 2010, Innov-X Systems was acquired by Olympus NDT, part of the industrial business of Olympus, best known for their industrial microscopes, consumer cameras and medical imaging technologies. However, Olympus NDT is also a world leader in the manufacture of innovative non-destructive testing instruments used in industrial and research applications for aerospace, power generation, petrochemical, civil infrastructure, automotive and consumer products. The acquisition was based on the complementary attributes of portable XRF to the Olympus NDT product portfolio, particularly in the field of metallurgical/alloy inspection technologies. Innov-X has retained its entire management team and is now known as Olympus Innov-X.

Innov-X's customer base continues to grow. John Cooke, the exploration manager at Equinox Zambia comments: "Equinox has been routinely using several Innov-X X5000s for low level Cu-in-soil analysis in its exploration programs to provide immediate vectoring to the key anomaly areas. At these key areas, outcrop samples were pulped to a sub 2 mm size fraction and were also read using the X 5000, so enabling ranking of the targets. The same pulps could then be freighted off-site and analysed by wet chemical methods at a

commercial laboratory. The results returned from the laboratory varied by only plus or minus 5% (for Cu) of the Innov-X X5000 result. Not only has the methodology saved our various projects hundreds of thousands of dollars in soil analytical costs, there is also the added benefit of immediate turn round of results to direct on-going exploration".

David Pawliuk, Vice President, Exploration at Silver Quest Resources comments: "We acquired an Innov-X Omega XRF unit early in

the 2010 field season. The unit went to Yukon, where it was used to test soils in the Dawson Range for the pathfinder elements (As, Sb) associated with gold mineralisation. By using the Omega our crew could immediately identify and follow-up on mineralised trends exposed in our backhoe trenches. The trenching was more efficient and focused than it otherwise would have been, saving precious time and thousands of dollars. The Omega may have paid for itself already."

Thermo Fisher Scientific will be demonstrating the latest members of its family of Niton handheld XRF analysers at Mining Indaba in February 2011. This includes the new Thermo Scientific Niton XL2 GOLDD Series and the enhanced Thermo Scientific Niton XL3t GOLDD+ Series. Thermo Scientific geometrically optimised large area drift detector (GOLDD) technology delivers faster measurement times and lower detection limits. "More than 2,500 of our Thermo Scientific Niton XRF analysers are already deployed in the global mining industry. With the launch of the Niton® XL2 GOLDD and enhanced Niton XL3t GOLDD+, mining companies of any size can

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access a range of products that is engineered from the ground up to withstand harsh mining environments, reduce laboratory costs and improve efficiency," said Bob Wopperer, director of marketing and business development for Thermo Scientific Niton Analysers.

The company cites the Niton XL2 GOLDD as the ideal instrument for grade control, concentrator operations and near-mine exploration, with the Niton XL3t GOLDD+ best suited for advanced exploration and the energy and industrial minerals markets.

Niton XL2 GOLDD analysers have a 45 kV, 100 μ A x-ray tube and are lightweight but ruggedly built to withstand severe environments. Ergonomically designed and featuring daylight readable icons, the model incorporates customisable menus for ease of use, multi-language options and a standard analytical range of more than 30 elements from magnesium to uranium. It is particularly suitable for mine mapping, development and grade control where accurate elemental composition data is required across a large number of samples.

The other main models, the Niton XL3t GOLDD+ analysers, have a 50 kV, 200 μ A x-ray tube delivering fast, accurate analysis for intensive metals exploration, including helping

to identify anomalies near the earth's average crustal abundance. It also has the new Thermo Scientific TestAll Geo feature, which automatically determines the correct analytical test mode for rapid analysis of major, minor and trace elements in geological samples. In addition, the pseudo-elements feature allows users to calculate oxide weight percentage and ounce per ton Au equivalents as well as to enter cut-off grade.

Sample testing and laboratories

The location of mineral exploration labs in new mining regions is crucial to getting timely results from fieldwork, and some of the majors have recently opened new facilities.

Stewart Group has announced a new fully operational sample preparation laboratory in Mauritania. The laboratory has been installed at the Al Agareb deposit, located at 80 km northeast of the Zouerate mining province.

The laboratory has been installed to provide sample preparation services to clients in the region and contains crucial equipment such as two standard crushers, a riffle splitter, two pulverisers, drying oven, sieve shaker and a comprehensive dust extraction system. The lab is fully equipped for processing samples from iron ore, uranium, gold and base metal

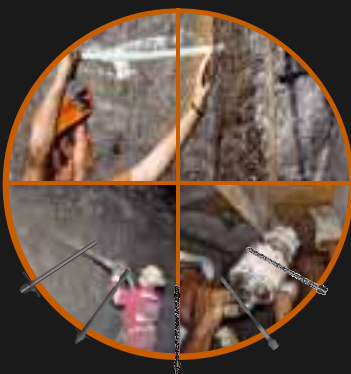
projects and up to 140-150 samples can be produced in a daily basis. However, sample throughput can be increased by up to three times its capacity when necessary.

The group has also expanded its operations in Mongolia, with a state-of-the-art expansion at its laboratory in the heart of the country. A new fire assay laboratory has been added to the Stewart Mongolia LLC facility in Ulaanbaatar, which can now provide a significantly broader range of services to the key mining regions in the country. The expansion is the second major development at the Mongolia facility in 12 months, after it became the first internationally owned laboratory in the country to achieve ISO/IEC 17025:2009 accreditation.

In addition to analysis of gold, silver and platinum group metals, the Mongolian site can conduct multi-elemental analysis, coal and solid fuel analysis, trace element analysis by ICPAES, and sample preparation of solid fuel and geochemical materials.

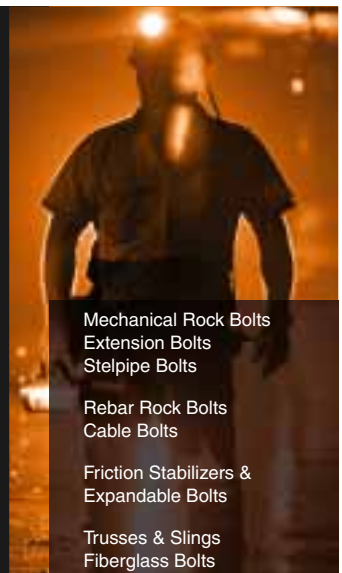
SGS has opened a new minerals testing laboratory in Jakarta, Indonesia. Strategically located near the Jakarta International Airport to ensure fast sample transport, the custom designed laboratory is now the hub of SGS' geochemistry and minerals trade services in Indonesia.

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The Sonic Drill SDC-350 inside a 20 ft ocean container

The Jakarta laboratory concentrates SGS' Indonesian minerals expertise and instrumentation into a centrally located facility, giving clients access to rapid, high volume analysis of exploration samples, ores and concentrates using SGS' globally standardised methods and quality systems.

SGS' current minerals laboratory in Balikpapan is being transitioned to a high volume sample preparation facility and joins the existing sample preparation facility in Manado in feeding pulps to the Jakarta lab.

Exploration drilling

Sonic Drill, a leading player in sonic drilling technology, has engineered and released a sonic drill rig that can fit within a shipping container. "We constantly heard from clients that they wanted a physically smaller machine with the same power that could be used in small spaces," said Tom Savage, president of Sonic Drill Systems, the company that also manufactures the larger elite Sonic Drill Corp rigs.

The SDC-350 has the same technology and exacting engineering standards but applied to a crawler rig on tracks that can easily fit within a 20 ft shipping container. This latest model also reduces the cost of shipping by two-thirds.

The new model quickly drills through a variety of formations to more than 80 m, using

water for flushing. It can handle drill tooling up to 203 mm in diameter and tilt up to 60°. Powered by a CAT six-cylinder diesel engine, the SDC-350 produces 129 kW at 2,200 rpm. With its smaller size, the SDC-350 can be towed behind on a variety of platforms.

The company is also planning the upcoming release of the SDC-390 - an even more powerful version of the SDC-350. Although the SDC-390 will be heavier, it will also offer the most powerful sonic drill head available, according to Sonic Drill..



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number of improvements. These include a more efficient design with a single module that comprises both telemetry and gyro modules in the same barrel; easier operation with the programming of the battery possible without the need of it to integrated in the tool; faster data acquisition (16 GB processor) and longer seven hour operating time; a reduced repair turnaround time from 15 days to seven days as well as other reliability and durability improvements.

Boart Longyear will be announcing the new 7XP and 9XP bits at PDAC 2011 – designed and tested by its

integrated product development and drilling services teams, with proprietary metallurgical processes having been used to allow the bits to outlast and out-perform the most advanced coring bits to date, says the company. Boart will also be announcing a new premium line of percussive rods and bits, as well as new surface bench rods, all manufactured with improved designs and advanced metallurgical treatments for increased reliability and performance.



Also being announced is a revolutionary new underground head assembly featuring new safety technology that is currently being tested in Chile, as well as a new powerful reverse circulation (RC) drill for the geo-construction market

Core orientation and downhole tools

Canada's **Fordia** has developed a new core orientation system: the Corient®. Corient is a mechanical device that integrates seamlessly into drilling operations and provides easy marking of core samples to record their original orientation in the ground. This data allows geologists to plan campaigns more effectively and optimise drilling costs. Corient requires no supplies, batteries or calibration and employs no fragile electronic components.

While core orientation has not yet been

adopted as a standard measure at all mineral exploration sites, it is growing in popularity. The data it yields allows geologists to determine the precise orientation of a core prior to removal, for greatly improved analysis of faults and geological structure. This facilitates the definition of drilling campaigns and increases the likelihood of finding mineral deposits. The Corient system is now available for rental in Quebec and Ontario and it will shortly be launched throughout Canada.

Given the necessary presence of a drilled borehole when using general logging equipment, operators often find it useful to exploit this advantage, and use a borehole geophone to acquire more precise, targeted data on local stratigraphy and rock velocity. **Geovista** has therefore now added a borehole geophone to its range of logging tools.

The probe includes a motorised caliper arm, a hydrophone, and three SM24 geophones arranged in an X-Y-Z pattern. The caliper arm is used to clamp the probe in a range of borehole diameters, to ensure adequate coupling with the seismic signal. The hydrophone contains a piezoelectric transducer, and has omni-directional reception. At the surface, there is a compact control and interface unit, which outputs the collected signals to a seismograph.



Another Geovista addition is a new Natural Gamma (GGR) sonde, aimed at the uranium mining sector. This sonde allows the operator greater control over its

The new borehole geophone from Geovista

operational parameters with a view to improving uranium ore grade estimation. It is fitted with 50 x 28 mm NaI crystal and detects GR energies from 65 KeV to 2.6 MeV.

The GGR sonde can be operated in a Setup, or Run mode. In Setup mode, its operational parameters (Detection Threshold, High Voltage supply, and K factor) can be remotely optimised by a competent person, according to the specific environmental conditions. In the Run mode, the sonde remembers the last parameters' settings when in Setup mode. A variation of the GGR sonde, includes a facility to include a selective metal (cadmium, lead, and copper) shielding to the detector.

Chile's **Ingetrol** continues to improve its product line and is poised to have a strong mix of portable and deep hole drill rigs for 2011. The Explorer Jr 36D is now offered with an optional secondary 26 kW turbo diesel motor module for additional power and portability. This rig can reach depths of up to 240 m in BTW core, 200 m in B W/L, 160 m in NTW and 130 m in N W/L.

The Explorer Jr 75E/90D, which was shown at PDAC 2010, now offers a version with H Chuck and synchronisation, in addition to the N Chuck and Top Drive heads which are still offered. Ingetrol has improved the feed cylinder on this model, now offering two cylinders on each side of the feed frame, instead of one feed cylinder underneath. This new cylinder positioning dramatically increases the lifting power of the drill rig to over 8 t.

The internationally recognised Explorer Plus MD4 continues to offer a combination of portability and power. Ingetrol also offers the Explorer Plus MD4 with the option of a top drive head, N Chuck or H chuck with synchronisation.

Finally Ingetrol's Explorer 1500 is a best seller for its versatility not only in depths but in portability as well. The Explorer 1500 is offered as an underground or surface rig with options to mount the rig on a skid, truck or crawlers. The skid version can also be heli-portable with maximum lifts of 550 kg. The Explorer 1500 features a P Chuck and can reach depths of up to 1,000 m in N W/L, 600 m in H W/L and 200 m in P W/L cores.

Ingetrol is also starting off 2011 as the representative of **Stockholm Precision Tools (SPT)** in Chile and Peru, offering their North seeking GyroTracer. SPT itself has announced that the GyroTracer now incorporates a

Geostatistical software

Geovariances, the leading provider of advanced geostatistical solutions, has released the latest version of its flagship software solution, Isatis 2011. New features for the mining industry include the latest developments from M2RC, a research consortium on multivariate non-linear geostatistical techniques sponsored by the mining industry between 2006 and 2009. These new applications focus on the analysis of the transition between geological domains. They consist of a Border Effect module to characterise the relationships between domains and grades and in a module on Contact Analysis to illustrate the grade behaviour at the contact between two domains.

They come in addition to Isatis 2010's exclusive Multivariate Uniform Conditioning enabling the global and local estimation of recoverable resources of secondary minerals according to a cut-off applied to the main economic mineral and Direct Block Simulations making simulations a practical tool in many mining risk projects by saving considerable time and disk space.

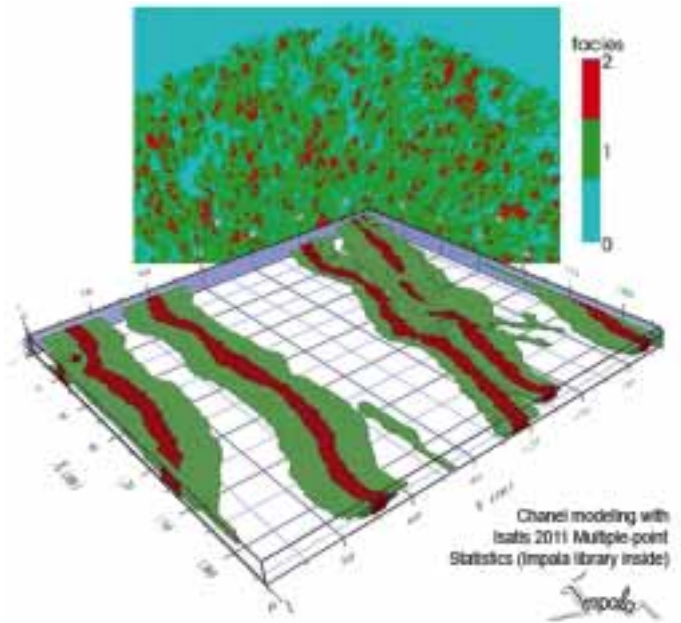
Another noteworthy development is Local Geostatistics for improving mapping, grade estimation, facies modeling or uncertainty assessment. The technique locally optimises

A Geovariances Isatis 2011 image showing channel modelling statistics

the geostatistical parameters involved in variogram-based models, which ensures a better adequacy between the model and data. The Isatis Local Geostatistics algorithm is multivariate and allows the calculation of the local experimental variograms in several directions simultaneously, which makes it unique.

Furthermore Isatis provides a one-of-a-kind intelligent Local Automatic Variogram Fitting tool which identifies local anisotropies and builds a fully multivariate local model simultaneously. Isatis 2011 also includes new Multiple Point Geostatistics implemented with the optimised Impala library from Ephesia Consult.

Geovariances has also just established a new



office in Brisbane, Queensland, through the acquisition of the geostatistical resource evaluation and consulting company Tenzing. The suite of services currently provided worldwide from France by Geovariances, including software technical support, consulting, training and mentoring, will thus be strengthened in Australia and in the Asia Pacific region at large. **IM**

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CUTTING EDGE PROSPECTS

Using the third dimension to generate quality prospects and attract partner interest

For an exploration company whose business model depends on using data to entice potential joint venture partners, choosing appropriate software to process and display that information in a meaningful way is crucial to success.

"We take a project with no data or very little data and bring it up to joint venture status," says Brian Cellura, generative manager for B.C.-based Miranda Gold Corp. "The software is the critical link between the data collection and the GIS environment because it allows us to move the data into a 3-D model that is ultimately what you want to present to partners."

Cellura and his team use Geosoft's Target for ArcGIS to combine different types of data with historical drill logs to arrive at a visual display that can point to new drill targets on Miranda's

gold projects in Nevada, Alaska and now Colombia. The data is presented in a 3-D format to potential partners willing to spend the money required to take the project to the next level of exploration.

For instance, by using Target to produce a 3-D rendering of drill hole data from the company's Redlich project in Esmeralda County, Nevada, Miranda's geologists were able to confirm that the previous project operator had missed the main gold zone because they were drilling in the wrong direction.

Although Miranda has yet to announce a major discovery, the junior has been successful in farming out properties without diluting its share structure or treasury. Currently, the junior has 15 projects on the go and about \$10 million in the bank with the goal of generating 1-2 new projects in Nevada every year.

Cellura is methodical in his approach to project generation. The first step is to evaluate land status to determine what ground is open, or coming open, for staking. He then combines ASTER (Advanced Spaceborne Thermal Emission and Reflection Radiometer) data with Digital Elevation Models (DEM) to identify any major structures or alternation associated with gold.

If the area looks intriguing, the next step is to find as much historical data as possible and plug it into the database. "One of the nice things about working in the United States is that in almost every area, someone has done something at some point," says Cellura.

Read the full article and find more resources online at www.earthexplorer.com.

Geosoft celebrates **25** YEARS of empowering earth explorers to make discoveries through data