

Our World is Magnetic.

For professionals working with magnetic technologies



In this issue:

Airborne Developments

 NEW version 8 of redesigned complete Airborne System GSMP-35AM with VLF Option.
 NEW Airborne GSM-90AV VLF-EM system

Ground Developments

• **NEW release** of **GSMP-35 version 8** backpack mounted Potassium magnetometer / gradiometer

Magnetic Observatories

• SuperGradiometer and dldD Systems, designed for earthquake research, were installed in Oaxaca, Mexico

- Network for Magnetic Observatories
- New Suspended Potassium dldD System

Archaeology

• Updated with new discoveries book *Magnetic Surveying in Archaeology 10 Years of Using the Overhauser GSM-19 Gradiometer*

- New design of our website. Please take a look and express your opinion <u>www.gemsys.ca.</u>
- GEM on the road <u>upcoming events</u>

GEM's Upcoming Events

• **SME 2009** February 22-25, Colorado Convention Centre, Denver, CO, USA

• PDAC 2009 March 1-4, Metro Toronto Convention Center, Toronto, Canada

• **SAGEEP 2009** March 28-April 1, Renaissance Worthington hotel, Fort Worth,TX, USA

• **SAA 2009** April 22-26, Atlanta Marriott Marquis hotel, Atlanta, GA, USA

• EAGE 2009 June 8-11, Amsterdam RAI Building, Amsterdam, The Netherlands





Airborne Developments



New version 8 of redesigned complete Airborne System GSMP-35AM with VLF Option

GEM's Potassium sensors provide the highest sensitivity available in the industry. The new tri-axial bird uses larger volume (70 mm) sensors that are specifically designed for low-gradient applications such as exploration for diamonds, gold, silver, platinum & palladium, which map geologic structures that are weakly magnetic and may have concentrated precious metals.

GEM's R&D team made successful efforts to modernize Airborne System. The new bird has maximized sensitivity of sensor location, redesigned electronics and dismountable elements for easy transportation.

High sensitivity (0.0007 nT) together with high sampling rates (20 readings per

second) allows you to make very detailed mapping.

Using GEM's Complete Airborne System you will receive:

- High definition range of multi-sensors configurations (Magnetometer, Vertical Gradient or Tri-Axial Magnetic Gradiometer).
- TRA series Radar Altimeter.
- 20 Hz DGPS with SBAS (WAAS / EGNOS / MSAS) and OmniStar (Subscription not included).
- GEM Data Acquisition Software with real time Data and altitude display.
- · All weather highest sub-pico Tesla Sensitivity.
- VLF option.

http://www.gemsys.ca/PDFDocs/GEM Airborne Solutions.pdf For more info click here Request for quotations click here





GEM's New Airborne GSM-90AV VLF-EM System

The VLF-EM system is a two frequency multi-component receiver that measures the in-phase and quadrature-phase fields from two separate radio transmitters in the VLF frequency range (e.g. 15-30 kHz). Such measurements can identify low conductance structures containing sulphide-bearing fluids rich in precious metals.

The GSM-90AV VLF-EM is a state-of-the-art airborne system that acquires data simultaneously from up to 2 transmitter frequencies. Data include in-phase, out-of-phase, horizontal component (x),

vertical component (y) and field strength in pT.

With data quality exceeding standard VLF instruments, GSM-90AV represents a unique blend of physics, data quality, operational efficiency, system design, and options that clearly differentiate it from other VLF systems.

A very low frequency (VLF) investigation is well suited to the location of geologic faults (and approximating their altitudes), some types of geologic contacts, and buried conductive bodies including water-bearing faults. The VLF-EM frequency method is a passive system as it utilizes a fixed position transmitter broadcasting a frequency between 15 and 30KHz.

In a VLF investigation, the magnetic field components of the transmitted signal are measured.





This method can delineate contrasts in conductivity at depth and is used in the search for contacts, faults, mineralized bodies, overburden, fractures, voids and for a variety of other purposes, including the location of utility lines and siting of water wells.

Targets are of two primary types:

- 1) linear trends of considerable length that are more than 30 degrees from the horizontal.
- 2) broader zones of lateral changes in conductivity related to such features as plumes or alteration zones.

http://www.gemsys.ca/PDFDocs/GEM Airborne Solutions.pdf

For more info click <u>here</u> Request for quotations click <u>here</u>

Ground Developments

As ground magnetics is one of the most-frequently employed and effective geophysical methods applied to mineral exploration, GEM continues to implement new strategies for enhancing measuring techniques and results.

Our Research and Development team has led to the development of the next generation of Potassium magnetometers GSMP-35 version 8 designed to assist exploration groups and contractors acquire, high-quality magnetic results.

New release of GSMP-35 version 8 backpack mounted Potassium magnetometer / gradiometer

GEM is releasing a new version of its GSMP-35 optically pumped Potassium magnetometer (K-Mag) designed to provide backpack-based, hands-free operation while acquiring high sensitivity ground-based magnetics data. The first presentation of the instrument will take place at PDAC 2009 (March 1-4, 2009 in Toronto).

The main features of GSMP-35 include:

 Low power consumption 	 Light weight
(16 hours of continuos operation)	 Compact design
 Very high sensitivity 	New introductory price

The system eliminates the use of supporting sensor poles (with the backpack), thereby providing convenience and greater efficiency during survey operations (with the console).

The new K-Mag technology also delivers sensitivity and high sampling (20 times / second) for mapping of subtle geologic signals. The system's high gradient tolerance and higher range of measurement (up to 3 Gauss,



optional) is especially useful for exploring in areas with iron formations, magnetite outcrops, and other similar targets. The new K-Mag will give you the following advantages:

 Sensitivity 	0.0025 nT @ 1 Hz
 Resolution 	0.0001 nT
 Absolute accuracy 	+/- 0.1 nT
 Gradient tolerance 	30000 nT/m
 Sampling rate 	1, 5, 10, 20 Hz
 Electronics box weight 	0.63 kg
 Electronics box size 	229mm x 56mm x 39mm

http://www.gemsys.ca/PDFDocs/GSMP-35.pdf For more info click here Request for quotations click here

DIRECT TCP/IF



Each year, earthquakes injure more than 17,000 people and cause more than \$40 billion in property and environmental damage globally. In looking for ways to mitigate these losses, researchers are investigating different methods, including seismic, strong motion, GPS, electromagnetic, magnetic, radon and others.

New installation in Oaxaca, Mexico

GEM has completed new experimental magnetic observatory installation in Oaxaca, Mexico. The system consists of SuperGradiometer and dIdD instruments designed for earthquake research and prediction.

The main goals of the project were establishing reference conditions to detect magnetic precursors of earthquakes based on known precursors to eliminate the influence of diurnal variations of magnetic field, the need for a high sensitivity measurement of components was perceived.

Ergonomic design, high sampling rate, flexibility to enable real-time transmission to satellite and phone links help to keep real-time data. Ruggedness is

assured through rigorous testing and the system is covered by the industry's longest and most comprehensive warranty (2 years).

GEM's SuperGradiometer is based on the Potassium SuperGradiometer system and designed with data quality, high gradient sensitivity and elimination of cultural noise. Data quality is ensured through ultra-high sensitivity magnetic gradiometer, which leads the industry (0.05 pT @ RMS at a sampling rate of 1 Hz) and precision sensor design. The SuperGradiometer can achieve gradient sensitivities of 1fT/m (10⁻¹⁵ T/m) with a sensor spacing of 50 m – a major advantage over traditional long-baseline measurements (total field with reference station for removal of diurnals), which have sensitivities on the order of 1nT. The SuperGradiometer also minimizes cultural noise from nearby infrastructure thereby improving measurement results.

GEM's Potassium Suspended dIdD (delta Inclination / delta Declination) vector instrument is designed for obtaining high resolution total field and variability measurements. The Potassium Suspended dIdD comprises a revolutionary 35 mm Potassium sensor (2.5pT sensitivity @ 1Hz) with a bidirectional set of bias coils.

Visit our web-site and find more information about the SuperGradiometer http://www.gemsys.ca/apps earthquake research.htm

Network for Magnetic Observatories

GEM developed a new system for Magnetic Observatories designed to set up several magnetometers in a network for the monitoring and analysis of the magnetic field of the Earth. The real time data can be used for earthquake research, volcanology, space studies and mineral exploration.

It is possible to connect several magnetometers to one network, so the system can be managed remotely. You can operate and manage the network and GEM magnetometers over the LAN, WAN or Internet and replace dedicated PCs and lengthy serial cables with fast and reliable networking technology. This remote access capability increases efficiency, saving you time and money while providing easier management from any browser, anywhere at any time.













New Suspended dldD Potassium Vector System for Observatories

GEM introduced the dIdD (delta Inclination / delta Declination) Potassium vector system for high precision results in obtaining total field and variability measurements. The high sensitivity Potassium sensor (0.05 nT/Hz1/2@ 1 sec) provides high speed measurements. The Suspended dIdD comprises a small diameter (250 mm), spherical Potassium sensor with a bidirectional set of bias coils. Data is acquired directly to a GEM Potassium magnetometer.

The Suspended dIdD simplifies the set-up of magnetic observatory installations by eliminating the need for fluxgate magnetometers and thermally insulating structures. In addition, the new system minimizes ongoing system calibrations, which, in turn, frees personnel to concentrate on more essential tasks (such as interpreting and understanding data).

These important new benefits are achieved through system design:

* Temperature coefficients that reduce drift to less than 0.1 nT / °C (compared with 0.5 nT / °C for high-end fluxgate magnetometers).

* Physical suspension of the Potassium sensor (shown experimentally to contribute to reduced drift);

* Long term drifts that are less than 2 nT / year - matching or exceeding the best component measurement at any observatory and Suspended dldD system.

For more info click <u>here</u> Request for quotations: SuperGradiometer click <u>here</u> Request for quotations: Suspended dIdD click <u>here</u>

Archaeology

Archaeologists are increasingly looking at remote sensing methods as techniques to explore sites with minimum disruption to the surroundings. This work is delivering new means of mapping prehistoric and historic sites in three dimensions rather than traditional two-dimensional methods. Magnetics is a primary remote-sensing technique that offers both ease-of-use and cost efficiency. Its main benefits lie in the ability to resolve details non-invasively, the wide range of artifacts and cultural objects that are detectable, and the low cost of magnetics in comparison to other methods.

Updated with New Discoveries

New extended 2008 version of a book named Magnetic Surveying in Archaeology. More than 10 years of Using The Overhauser GSM-19 Gradiometer in which Tatyana N. Smekalova takes you in a journey of the practical aspects of magnetic surveys for the investigation of various archaeological sites.

Archaeologists will definitely have an interest in this new work produced by researchers in Russia, Denmark, Ukraine, Greece, Syria, Norway, and Egypt over the last 12 years. The book begins with an overview of methods of magnetic surveying followed by a description of magnetometers. The remainder of the book provides case histories from many sites across Africa, the Middle East and Europe but general lessons may also be applicable to investigations in other parts of the world.

For more info click <u>here</u> Request for quotations: SuperGradiometer click <u>here</u>







New Design of GEM's Web-Site

At GEM we like to hear from our customers. If you have any suggestions, commendations, complains, great ideas, industry-related articles, testimonials, or questions of any type we would love to hear from you. We guarantee a prompt respond.

Visit <u>www.gemsys.ca</u>

Important Note: Our goal is to only communicate with people who would like to hear from us. If you would like to stop your subscription, please click <u>here</u>. If you have received this message through a colleague and would like to be added, please click <u>here</u>.

For any comments or questions about our e-newsletter please contact: francisco.lopez@gemsys.ca

Copyright 2007. GEM Systems, Inc. Advanced Magnetometers. All rights reserved with the exception of organizations that have contributed links to this issue. Our thanks to the contributors who have made this edition possible, and who are identified in the text of related articles or through their company websites. Note that some quotes relating to industry-specific trends may have been obtained from public-domain sources, and are not intended to promote GEM Systems, Inc. Other examples may not necessarily reflect GEM products; rather these examples are intended to illustrate the use of magnetics and magnetometry for selected applications.