

GEOLOG

The Newsmagazine of the Geological Association of Canada

Geological Association
of Canada

c/o Department of
Earth Sciences

Memorial University of
Newfoundland

St. John's, NL

Canada A1B 3X5

Tel: 709 737-7660

Fax: 709 737-2532

www.gac.ca

Digital Field Mapping: Pocket PCs and GIS

Doug Irwin (doug_irwin@gov.nt.ca)
C.S. Lord Northern Geoscience Centre
Yellowknife, NT



In the last 12 to 15 years, digital field data collection has become increasingly important in regional geological mapping and exploration programs. Initially, computers were used in the field to collect observations in either a database or spreadsheet and then, after the field season, used to generate maps via CAD programs. As computers became faster and smaller, both the database and the map were generated in the field (e.g., Geological Survey of Canada's *FieldLog*).

Since 1988, government bedrock mappers in the Northwest Territories have been using computers in the field and have realized, through experience, that data entry, especially the earlier systems (*AutoCAD* and *FieldLog*), typically increased the geologist's workload. For instance, a day or several days of traversing resulted in an evening or "office" day of entering and plotting data, leaving less time for geological discussion and compilation. Initially, one system used to combat this problem involved *Newton* handhelds in conjunction with a GPS and *FieldLog*. This system allowed data collection on the outcrop and downloading at night into *AutoCAD*. However, co-ordinating data collected on the outcrop through the GPS took copious amounts of time and significant work was still required to manipulate the data once in *AutoCAD*.

With the technological shift towards producing geology maps as GIS products, the conversion of the field database and the *AutoCAD* files to a GIS product was either done in-house or the final map and database product had to be easily GIS-importable. Both procedures involved more time and effort to ensure a smooth transition of data into a GIS platform. Several agencies currently use Palmtops (or PDAs) with cabled GPS to enter point data in a *dBase*-compatible format, which is then downloaded and imported into a GIS.

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Ted Irving Awarded OofC



Her Excellency the Right Honourable Adrienne Clarkson, Governor General of Canada announced 100 new appointments to the Order of Canada and six promotions within the Order on January 17, 2003. The new appointees include four Companions, 33 Officers and 68 Members as well as an appointment of a British subject as an Honorary Officer.

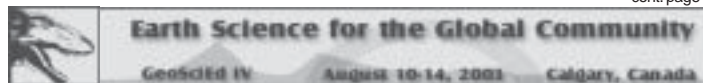
Included among the appointments is GAC Member Edward (Ted) Irving of North Saanich, B.C. who was awarded as a Member of the Order of Canada.

Ted is a highly respected geologist and geophysicist. His specialty is the study of rocks that contain traces of the earth's ancient magnetic field. His work has resulted in many important contributions, including helping to reconstruct the motions of the continents and adding to our knowledge about Canada's physical origins. He also helped to create global databases on paleomagnetism and developed field and laboratory procedures that have become worldwide standards. A Fellow of both the Royal Society of London and of Canada, he has been widely recognized for his profound influence on the earth sciences.

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GEOLOGICAL ASSOCIATION OF CANADA

The MISSION of the Geological Association of Canada is to facilitate the scientific well-being and professional development of its members, the learned discussion of geoscience in Canada, and the advancement, dissemination and wise use of geoscience in public, professional and academic life.

The VISION of the Geological Association of Canada is a geoscience community that is knowledgeable, professionally competent and respected, whose input and advice is relevant, widely sought and utilized, and whose vital contribution to the economic prosperity and social well-being of the nation is widely acknowledged.

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GAC Councillors

Danielle Giovenazzo, Laval, QC
dgiovenazzo@falconbridge.com

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fran.haidl@ir.gov.sk.ca

Philip Hill, Sidney, BC
phill@nrcan.gc.ca

Carmel Lowe, Sidney, BC
clowe@nrcan.gc.ca

Michael Marchand, Calgary, AB
marchndm@telusplanet.net

Robert Marquis, Val d'Or, QC
robert.marquis@mrn.gouv.qc.ca

Michael Michaud, Toronto, ON
mmichaud@srk.com

Jeremy Richards, Edmonton, AB
jeremy.richards@ualberta.ca

Richard Wardle, St. John, NL
rjw@zeppo.geosurv.gov.nf.ca

Graham Young, Winnipeg, MB
gyoung@cc.umanitoba.ca

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Memorial University of Newfoundland

St. John's, NL, A1B 3X5

Tel: 709 737-7660

Fax: 709 737-2532

E-mail: gac@esd.mun.ca, Web: www.gac.ca

Editor

Craig J.R. Hart

Yukon Geology Program

Box 2703 (K-10)

Whitehorse, YT, Y1A 2C6

Tel: 867 667-8519

Fax: 867 393-6232

E-mail: geolog@gov.yk.ca

Associate Editors

Sean Fleming

Vancouver, BC

Lucy Wilson

St. John, NB

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ADVERTISING: Paid advertising is accepted. Digital copy is preferred. Contact the Editor for more information or go to the GAC website and click on Publications then Geolog and look for the Rate Card. Deadline for remaining 2003 issues are May 28th, September 12th and December 5th, 2003.

GEOLOG (ISSN 0227-3713) est le bulletin trimestriel de l'Association Géologique du Canada, à St. Jean, Terre-Neuve-et-Labrador. **GEOLOG** s'adresse aux membres de l'AGC et son contenu reflète le caractère polyvalent de cette organisation. Nous invitons la soumission de nouvelles et articles courts pouvant intéresser les membres, incluant les thèmes de sensibilisation du public aux sciences de la Terre. Les articles suscitant des échanges d'opinions et d'informations entre les secteurs académique, industriel et gouvernementaux sont également la bienvenue. **GEOLOG** accepte et publie les articles dans les deux langues officielles du Canada. Les idées sont celles des auteurs et ne représentent pas nécessairement la position officielle de l'AGC. **GEOLOG** n'est qu'un des nombreux forums offerts par l'AGC aux scientifiques à travers le monde.

RECEVEUR DES POSTES: Veuillez faire parvenir les changements d'adresse à l'Association Géologique du Canada, dont l'adresse est indiquée ci bas.

ABONNEMENT: L'abonnement à **GEOLOG** est un des privilèges dont bénéficient les membres de l'AGC. On peut se procurer un formulaire d'adhésion par courrier ou par fax en communiquant avec l'Association Géologique du Canada. Une copie de ce formulaire peut aussi être imprimée à partir de notre site Internet. Le coût de l'abonnement pour non-membres.

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Why are these geologists happy? Check out page 17.

This **GEOLOG** benefits from the contributions and assistance of Ed Freeman, Brian Sylvester, Peter Pepperman, Robert Ledoux, David Liverman, Carmel Lowe, Roger Mason, Murray Gingras, Bob Cathro, Alwynne Beaudoin, John Clague, Karen Dawe, Sandy McCracken, Doug Irwin, Chris Yorath, Cheng Quiming, Brad Hayes, Frank Simpson, Panya Lipovsky, Maurice Colpron, Jim Mortensen, and those that contributed letters. Thanks to all, and regrets to anyone that I missed. Thanks to webmasters and webmistresses that have allowed me to use bits and pieces, logos and text from their websites. Karen Dawe and Sandy McCracken undertook the job of proofreading, although any faults remain the accepted responsibility of the Editor. Richard Hartmier's photos of Mt. Logan adorn the Mastheads. This **GEOLOG** was produced with support from the Yukon Geology Program, Whitehorse, Yukon and the Centre for Global Metallogeny, University of Western Australia, Perth, Australia. The next deadline for **GEOLOG** is May 28th, 2003 — your contributions are welcome! **CJRH**

Préambule

Presidential Preamble



Pulling Together as a Community

I'd like to share with you several thoughts that have been with me for some time. On the surface, these thoughts seem disconnected, but I've come to realize that a common thread weaves through all of them – the thread is a failing on the part of the Canadian earth science community to work as one to address societally relevant issues and to show the value of our discipline to the public.

Research funding. As a Canadian geologist, I am dismayed that the solid and environmental earth sciences have fared so poorly in NSERC reallocation exercises over the last decade. For those of you who are not aware of this process, NSERC, Canada's principal science and engineering granting agency, has been reallocating about 10 percent of its grant monies on a four year cycle based on proposals made by its Grant Selection committees, which include GSC08 (Solid Earth Sciences) and GSC09 (Environmental Earth Sciences). During the last two reallocation exercises, earth sciences has put about \$3.7 M on the table and received only \$2.7 M back, a loss in its total grant allotment of \$1 M. We have fared very poorly compared to most of the other sciences, including chemistry and computer and information sciences. Why? NSERC has been unimpressed with our vision of earth science research in the future. The Reallocations Committee concluded that our submission did not convey a sense of where the discipline is currently heading. The vision for the discipline in the last reallocation document presented earth sciences as an old discipline taking on new technologies to be applied to new areas. My own read, based on my participation in one of the reallocation exercises, is that we are trying to be everything to everybody and, as a result, we craft proposals that satisfy no one. Let's face it – it's pretty hard to meld mantle processes and till genesis within a single coherent proposal (I use this only as an example). My suggestion is that our community rally around a proposal that focuses on the two most important contributions we can make to Canada – protection of health, and supply of Earth resources. We should feature the innovative science that will ensure Canadians have the resources that are essential to their lives. Can you imagine this being done without earth scientists? Of course not! Let's also show that geoscience is essential for protecting the lives of Canadians from natural disasters and contaminated water.

Deep time. I was struck by Gordon Winder's letter in the last issue of *Geolog*. Gordon points out that many churches in Canada do not recognize that the Earth is old. They either sidestep the issue or subscribe to James Ussher's view that the Earth was created in October 4004 BC. Such a point of view is a denial of the very core of our science, yet Canadian earth scientists are largely quiet on the issue. We do ourselves a disservice by sitting back and not bringing this matter to the attention of all churches, as well as the broader public. As Gordon points out, "the earth is old, churches must be told." I would go farther; our community has a responsibility to educate ALL Canadians about deep time and evolution.

Climate change. The debate over the Kyoto Protocol brought into sharp focus the different opinions that exist within the Canadian earth science community over climate change. I became acutely aware of these differ-

ences as President of GAC when I asked members for their input on what our society's stance should be on climate change. The opinions ran the gamut from "of course, we should endorse Kyoto" to "there is no evidence that increases in atmospheric carbon dioxide have or will affect climate." Given the range of opinions held by our members, GAC has not taken a position on this issue. I think, however, all of us can agree on one thing – earth sciences has a lot to offer in the continuing debate on climate change. An important contribution that we can, and must, make is to show that climate has changed due to natural causes in the past. Past changes in climate, even in the recent geologic past, have been huge. When assessing current trends in climate, people must be aware that natural processes may play a role, together with burning of fossil fuels and land clearing. Equally important, we are well positioned to show the labyrinthine interconnections of processes that operate on Earth and the importance of feedback loops and self regulation. Can anyone other than earth scientists provide this information? Canadian earth scientists need to develop a strategy for assuming their rightful place in the climate change debate. Not to do so is an example of how detached we have become from the public.

Fragmentation. Why do we have so many earth science societies in Canada? Presumably because each society meets the needs of a select group of earth scientists – Quaternary scientists (CGRG, CANQUA), petroleum geologists (CSPG), geophysicists (CGU, CSEG), mining geologists (CIM, AEG), and so on. Do we really need all these societies? Might our community have more influence with a single society that represents all of the estimated 10,000-15,000 earth scientists in this country? Could we have a single society composed of divisions that represent our subdisciplines, but one with a single newsletter, a high-quality journal, and effective lobbying and education capabilities? I'd welcome this, but I'm not so naïve to think it's likely to happen. The Canadian Geoscience Council (CGC) exists for this purpose, yet it is not being supported by its member societies and is in danger of dying. Again, I think we do ourselves a disservice by failing to work together under the umbrella of society. It's not impossible – last year, the European Geophysical Society (EGS) and the European Union of Geosciences (EUG) joined to form a single society, the European Geosciences Union (EGU), that speaks with one voice for earth scientists in Europe.

Back to the common thread in my thoughts. All of us should devote a little of our time and energy to build an organization or a framework that can bring Canadian earth sciences the public recognition and support it deserves and that is essential if it is to flourish rather than wither. We need to look beyond our specific sub-disciplines and strive to work together to advance the cause of earth sciences. We need to speak with a common voice to secure more government support for our academic researchers, to demonstrate the critical importance of resources to society, to show people that the Earth is more than 6000 years old, and to show the public how to adapt to climate change.

*John Clague
President, GAC*

From the Geolog Editor



Finally some discourse

This issue of Geolog is one of my favourites.

It presents some features on advances in geological mapping techniques, (something that hasn't really changed in 100s of years), letters responding to GAC President John Clague's query for comments on the Geological vs. Geoscience debate, responses to the GSC's apparent "forward-looking" statement, and a new feature on historical developments in Economic Geology ... as well as the other reliable components such as Mélange and Calendar.

Discourse, advances, forward-looking, backward-looking, navel-gazing ... I think that this is all great stuff.

Those who map, or use maps, will realize the importance of the digital mapping revolution-that is starting at the outcrop and ending, not at the printed page, but in databases and on the internet.

Those who are old enough, will know that the geology vs. geoscience debate has been bantered around a few times previously, but are the reasons for making the change now different from what they were in the past? And how important is tradition?

Those of us who care about the GSC know that it is an organization having difficulty redefining itself. Some of us never thought it really had to, but except for the success of its TGIs (see p. 25), it seems to have been spinning its wheels deciding what direction to go in.

This issue of *Geolog* sees contributions from two new associate editors - Lucy Wilson at University of New Brunswick and Sean Fleming at University of British Columbia — their input will help to keep *Geolog* fresh, as well as having the geographical extremes of the country covered.

Oscillations

Gerry Middleton will be receiving the Twenhofel Medal from SEPM in Salt Lake City. Noel James got it last year. Gerry wonders if this the beginning of a trend? • *The Encyclopedia of Sediments and Sedimentary Rocks*, which Gerry Middleton has been editing, is now in press and should appear in the spring/summer of 2003. It will be published by Kluwer. • Douglas Smylie of York University has been awarded the J. Tuzo Wilson Medal, the highest honour bestowed by the Canadian Geophysical Union for his work in global geodynamics. In the 1960s, Smylie and a colleague proposed that earthquakes excite the Chandler Wobble, and idea that has attracted attention for decades. In the 1990s he announced the detection of the center of mass mode of the inner core based on an innovative mode splitting approach that also continues to be controversial. • A great honour was bestowed on Emeritus Professor and former McGill Chair (then Department of Geological Sciences), James E. Gill (deceased), as he was inducted into the Canadian Mining Hall of Fame on January 16, 2003. • At the University of Regina, Guoxiang Chi has recently been hired as the department's new professor in clastic sedimentology and mineral deposits. • Richard McCrea, a PhD student supervised by George Pemberton at the University of Alberta, is featured in the current March 2003 issue of the National Geographic, check out "Dinosaurs - Cracking the mystery of how they lived." • Elsewhere at University of Alberta, Benoit Rivard was promoted to full professor, Octavian Catuneanu was granted tenure, and Karen Tomic was granted tenure and promoted to Associate Professor. • Grant Mossop has been elected to the Senate of the University of Calgary. With the GSC in Calgary, Dr. Mossop is also an Adjunct Professor at the University of Calgary in the Dept. of Geology & Geophysics. He is well known as the author of the *Geological Atlas of the Western Canada Sedimentary Basin*. • The Southwest Section of the American Association of Petroleum Geologists honoured McGill Assistant Professor Bruce Hart with their 2002-2003 Distinguished Educator Award at their Annual Meeting in Fort Worth, Texas in early March. • Catharine Farrow has moved from INCO to take a position with FNX Mining, also in Sudbury.

Oscillate recently? Tell geolog@gov.yk.ca

Information for Contributors/Directives aux Auteurs

Submissions are preferred as **digital files** sent as e-mail attachments to geolog@gov.yk.ca or on a **disc** via the post to the Editor. Discs will be returned if sent with self-addressed mailer. Documents should be sent as unformatted text (*.doc, *.txt or *.rtf) files. Graphics should be as CorelDraw (*.cdr), Windows metafiles (*.wmf) or Acrobat (*.pdf) file types, and images should be at 300 dpi, greyscale without internal compression (preferably *.tif). Files greater than 2MB should be compressed or zipped before sending via e-mail. Additional information on other file formats can be obtained from the Editor. **Hard copy** text, graphics and photo images are also welcome. All contributions may be edited for clarity or brevity.

The **DEADLINES/ÉCHÉANCIERS** for submissions and advertising for Volume 32 of GEOLOG is 28 May, 12 September and 05 December 2003.

Nous préférons que les articles nous soient soumis sous forme de fichiers numériques, annexés à un courriel, ou sur disquette, par courrier conventionnel adressé au Rédacteur en Chef. Les disquettes seront retournées si elles sont accompagnées d'une enveloppe affranchie avec adresse de retour. Les documents doivent nous parvenir en version texte non formaté (*.doc, *.txt ou *.rtf). Les graphiques doivent avoir un format CorelDraw (*.cdr), Acrobat (*.pdf) ou Windows metafiles (*.wmf), et les images doivent avoir une résolution de 300 dpi dans un format non comprimé (préférentiellement *.tif). Les fichiers de dimensions supérieures à 2 Mo doivent être comprimés avant envoi par courriel. Veuillez communiquer avec le Rédacteur en chef en ce qui concerne la possibilité d'utiliser d'autres formats. Nous acceptons aussi une **copie imprimée sur papier** du texte, graphiques et images. Le Rédacteur en chef se réserve le droit de modifier l'article à des fins de clarification ou de brièveté.

This letter supports the nomination of Dr. E. (Ted) Irving for the Order of Canada

Dr. Edward Irving is one of Canada's most well known scientists. He is a nationally and internationally respected geologist and geophysicist whose 45-year professional career has been devoted to the study of the earth's ancient magnetic fields and their use in unraveling the history of the planet's tectonic plates. Through the study of the directions of these fields as they are preserved in rocks, and in over 200 publications in international scientific journals, Dr. Irving has made major contributions to the hypotheses of continental drift, sea-floor-spreading and plate tectonics, ancient climates and continental glaciation, the origin of mountain systems in western, eastern and arctic Canada, the evolution of the Arctic Ocean Basin and many other subjects. In 1964 he published his well-known book entitled *Paleomagnetism and its Applications to Geological and Geophysical Problems* (John Wiley & Son, 399 p.) which, for twenty-five years was the standard reference text on the subject for the world. Throughout his career he devoted great efforts toward the establishment of the paleomagnetic reference fields throughout geological time, without which it would not have been possible to reconstruct the motions of the continents nor confirm that large fragments of western Canada originated in distant latitudes, far from the continent to which they have since become accreted. His research has led to our knowledge on the frequency of reversals of the geomagnetic field and the behaviour of ground waters in ancient sedimentary basins. A characteristic feature of Dr. Irving's science is his degree of precision and careful attention to accurate measurement; he has developed field and laboratory procedures which have become the standard methods used world wide.

Dr. Irving's intellect was recognised early when he received three scholarships during his grammar school years in England. Following three years in the British Army, serving in the Middle East, he entered Cambridge University, reading geology. Staying on as a research assistant and graduate student he studied paleomagnetism under S.K. Runcorn with whom he co-authored several papers. Following his graduate studies at Cambridge he became a research fellow at the Department of Geophysics at the Australian National University and later professor of geophysics at the University of Leeds. Emigrating to Canada in 1967 he joined the Earth Physics Branch (later Geological Survey of Canada) of the Department of Energy, Mines and Resources (Natural Resources Canada) where he remained for the rest of his career, serving the last twenty years at GSC's Pacific Geoscience Centre at which, since his retirement in 1992, he has been an Emeritus Scientist.

Dr. Irving's professional activities have included the establishment of paleomagnetic laboratories in Australia, Ottawa and at the Pacific Geoscience Centre in Sidney, B.C. He was among the first to develop procedures for the accurate measurement of remnant magnetisation of rock specimens and to further develop and apply Fisher statistics to paleomagnetic data on a spherical surface. He began global paleomagnetic data compilations which have led to the establishment of global data bases providing scientists throughout the world with information supporting their research. He has served on numerous committees including chairmanship of the Geodynamics sub-committee of the Associate Committee of Geodesy and Geophysics (National Research Council of Canada), chairman of the Earth Sciences Division, Academy of Sciences of the Royal Society of Canada and as a member of the Earth Sciences Grant Selection Committee of the Natural Sciences and Engineering Research Council of Canada. He has supervised many graduate students and has maintained close associations with Canadian Universities including the University of Victoria where, in 1999, he was awarded an Honorary Doctorate of Science.

Dr. Irving's many awards include the Christien Mica Gondwanaland Medal (1960-62), the Logan Medal of the Geological Association of Canada (1975), the Walter H. Bucher Medal of the American Geophysical Union (1979), the Wilson Medal of the Canadian Geophysical Union (1984), the Wegener Medal of the European Geophysical Union (1995) and the Day Medal of the Geological Society of America (1997). He is a Fellow of the Royal Society of Canada, a Fellow of the Royal Society of London, a Fellow of the American Geophysical Union, an Honorary Fellow of the Geological Society of London and in 1998 was honoured with being invited as a Foreign Associate of the US National Academy of Sciences.

In addition to his formal scientific interests, Dr. Irving is an avid gardener and specialist in growing rhododendrons. He published an important paper describing the origin of these plants and the degree of climate control on their distribution and population variability, with particular reference to India where they originated. This has led to several invited talks on the subject. He is a director of the Horticultural Centre of the Pacific situated near Victoria.

Dr. Irving is married, has four children and four grandchildren.

Prepared by Chris Yorath and supported by David Strangway and David Strong



Gremlins were at work in the last issue of GEOLOG that saw the headline heralding the Governor General presenting J.O. Wheeler with the Royal Canadian Geographical Society's Massey Medal. We regret the oversight and take this opportunity to publish the full photo of John's acceptance of the medal from the GG, herself.



photo credit: MCpt Cindy Molyneux

To have a truly useful field system, three components of the system must work together; hardware, software and humanware. The geologist's enthusiasm to use the first two to their full extent is paramount.

For the last two summers (2001-2), a bedrock mapping crew in the southeast Slave Province (Walmsley Lake area) has successfully used Compaq IPaq Pocket PCs (PPC) to collect field data. Loaded with ESRI's ArcPad 5.01 software, the PPCs enable the geologists to enter data as ESRI point, line, or polygon shape files onto georeferenced maps or images. ArcPad shape files are compatible with Arcview 3.x and need only be downloaded from the PPC at the end of each traverse.

The Walmsley Lake ArcPad database is a series of shape files modeled after the FieldLog system. The shape files for point data include station location, structure, photographs and sample locations. The shape files for line data entry include contacts, linear and planar features (shear zones, faults, topographic lineaments), and individual traverse locations. Since the database tables are associated with shape files, the tables are flat, but relationships can be set up in ArcView using the year and station number to define unique numbers.

Geological units, as polygon data, are not collected on the outcrop due to the dynamic nature of daily mapping and the difficulty of polygon editing. Geological units are interpreted from field observations and line data (contacts) at base camp. NWT mappers, utilizing 15 years of experience, digitize geological polygons in AutoCAD and then export them into ArcView 3.x. Though the NWT mappers did not enter geological unit as polygon data in ArcPad, the option still exists.

Multiple customized data-entry forms are used for each shape file to utilize the limited screen size of the PPC. Some limitations, such as no functionality for static or dynamic default values, were encountered with the entry forms. ESRI's ArcPad 6.01 and Application Builder apparently address these issues.

A new location or record is added by simply tapping the user's location on the map or image on the PPC screen. A data-entry form then appears containing pull-downs (look-up tables), check boxes (e.g., mineral check list) and text fields (descriptions). Optionally, coordinates can be entered, either manually from a handheld GPS

or from a GPS connected to the PPC via cable, flash card or PC card. The PC card and flash card options increase the cost of the unit and the demand for battery power.

For the most part, the PPCs are durable, provided they are handled with some care. Sturdy zippered nylon cases were used during fair weather traverses. During less favourable conditions, plastic cases with a transparent, writable screen were used to protect the PPC from moisture. Although external back-up battery packs were available, no serious internal battery life problems were encountered.

Minimal training for the geologists was needed. The PPCs, without ArcPad, were given to each geologist a few days before the field season to familiarize them with the PPC and its software. One day was spent learning the ArcPad interface, its data entry forms, and the process of downloading and uploading data files, maps, and images. Each geologist was responsible for their own database residing on their PPC. Pre-determined ArcView project files were used on the base computer, so that each geologist could view/edit their or all the data in ArcView 3.x. After a few days' use, all the geologists were quite comfortable with the PPC.

The PPC ships with several programs (including Solitaire) that can be useful in the field. For instance, Notes or Pocket Word allows for detailed field observations including sketches. Excel can be used to describe lookup table codes for clarification. The picture viewer can be used to view scanned images, such as lithological classification schemes, legends or photographs. The PPC uses are limited only by the imagination.

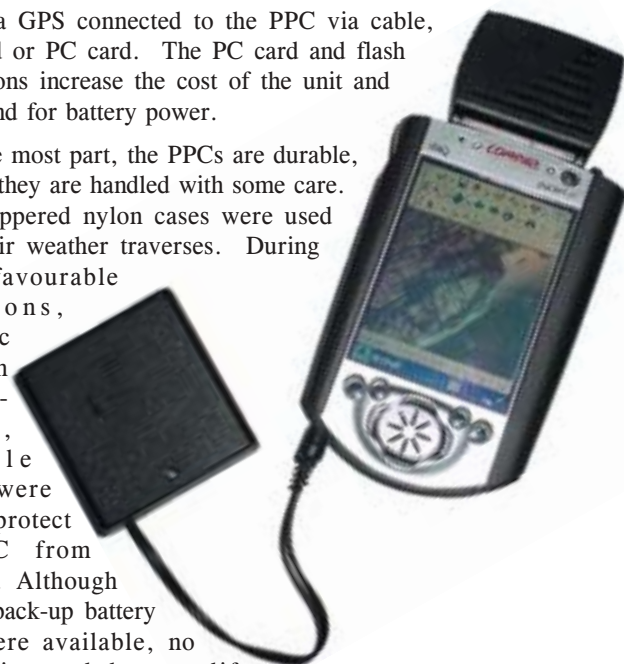


photo credit: Panya Liposky

From Digital Mapping to Spatial Information Extraction in Geographic Information Systems

Cheng Qiuming

CFI Geomatics Research Lab, Department of Earth and Atmospheric Science, Department of Geography, York University, Toronto, ON, Canada, M3J 1P3, e-mail: qiuming@yorku.ca

Current address: Special Professor and Vice-Chair, Academy Committee of the Earth System and Mineral Resources Lab, China University of Geosciences

Geographic information systems (GIS) have provided powerful tools for handling spatial data including data acquisition, visualization, mapping and analysis, etc. There is no doubt that application of GIS has brought field geological mapping, map publication and geological data distribution into a new generation. In addition to the efficiency of map manipulability and accessibility, there are some significant advantages of using unconventional digital mapping in comparison with the conventional paper-based mapping. The following criteria are suggested criteria for future digital mapping consideration.

Data Acquisition vs. Mapping

Traditionally, field geological mapping often involves numerous individual point observations to be interpreted to create point, line and polygon features on the paper copy. Although each geologist would likely interpret the data differently, in most cases with the benefit of other geological constraints or a geological model. For example, orientated structural data are very often plotted as the “average” or an “estimation” of numerous data points but seen by the reader as uninterpreted information, or the most basic of type of data. Such interpretations will always result in a degree of error to be integrated into the mapped features. It is, however, impossible to know the actual error involved in each feature types on the geological map. For a complex environment, such as complex fault-fold systems, the simplest interpretations may not be the best option to minimize the estimation error. From a digital mapping point of view, it is convenient to keep the primary data of field observations, as well as the interpolated map, as integral products so that one can be aware of, and assess the potential errors involved in the process of observation data interpretation.

Map vs. Information

Maps as information carriers provides not only spatial data but also spatial patterns. The latter involves spatial properties of the data and not just data itself. How best to reflect the actual geological variability on the ground should be the primary concern for representing map classes using colour template and/or symbolology. The information carried on the map will be different if different map classifications are used. For example, a representation based on some statistical classifications may not reflect the significant geological distinctions. As a digital map, various classification methods can be used and new methods have been developed which not only consider the statistical properties but also the spatial patterns and scaling properties (e.g., generalized self-similarity) in map classification. This advantage of using digital mapping can increase the amount of information from the same geological map.

Map Visualization and Information Extraction

To visualize, recognize and to comprehend map patterns is the process by which we gain information from a geological map. Although human eyes can capture vast amounts of information by reading a map, which may not even be possible to be described using complex

mathematical map processing techniques. However, the features on most geological maps often show patterns that give mixed signals, caused by various overlapped geological processes. For example, most geological processes, such as mineralizing or metamorphic processes, are typically impossible to resolve from the map patterns as overlapping information cannot be displayed. Robust methods are needed to deconstruct the map patterns into separated components to reflect more simple and a unique processes. Extracting such information from traditional paper maps, even those that have been digitized, is impossible. Newly created maps must be developed such that map processing techniques for information extraction can be undertaken effectively. Such techniques have become a novel research discipline in the GIS field and include using weights of evidence, neural networks and prospectivity mapping.

Multiple Features vs. Information Integration

As mentioned previously, to create a geological map should consider not only geological information storage but also information extraction and map comprehension. The processes involved in the spatial analysis or comprehension of a complex geological map is often based on analysing the spatial and temporal relationships among multiple features. Integration of comprehensive information extracted from multiple features on a digital map has become a common process for analysing, modelling and predicting purposes. For example, combinations of complex spatial and attribute conditions can be set by means of integration of SQL and spatial query to assist in geological modeling and for deeper information extraction.

Scale vs. Scaling

For conventional geological maps, scale is a primary legend item that represents the ratio of unit length on the hard copy map over the actual size on the ground. Map scale determines what detailed features should be represented symbolically in order to maintain suitable map readability. Since a digital map can be visualized on a computer screen with variable sizes, the map scale has ultimately lost its significance. In addition, altering map display extent has become so easy that the change of complex spatial patterns can be accordingly visualized. A predetermined ratio of size of features and scale of map can be used to display the digital map to maintain a good readability. The development of fractal and multifractal theory has provided a means for describing the regularity of change of spatial patterns as the map scale changes. The scale invariant property (scaling) not only exists in many types of geological patterns, but is also useful for characterizing the level of detail of a geological map.

In summary, digital mapping has not only brought geological information acquisition, storage and distribution into a new generation but has also provided opportunities for efficient extraction of geological information and for better geological comprehension. Some of the concepts and methodologies herein discussed have not yet been commonly implemented in most of the current GIS packages.

Digital Mapping Techniques in the Palm of your Hand

Developments from the Yukon Geological Survey

Panya Lipovsky and Maurice Colpron

Yukon Geological Survey, Box 2703 (K-10), Whitehorse YK

The collection, management and publication of geological data have rapidly become dominated by digital techniques. Large amounts of digital data are now being produced, demanding efficient methods for the capture, storage, analysis and final presentation of geological information. The Yukon Geological Survey (YGS) is addressing these increasing digital demands at all stages of the geological mapping process, including field data collection, map production, and distribution of final products.

The tools for capturing digital geological data must be simple and flexible in order to accommodate the wide spectrum of field studies conducted by the YGS and the varying needs and abilities of the field geologists. These tools must also ensure consistency in the data collected and conformance with corporate and national standards (e.g., North American Data Model).

The YGS has developed a series of tools that facilitate digital data capture in the field and efficient production of geological maps using standard drafting and GIS software (*AutoCAD*, *ArcView* and *ArcGIS*). These tools have made it possible to go from field data collection to the release of high-quality digital interactive maps within a six month period.

Field Data Management using GeoFIELD

GeoFIELD is a customized Microsoft Access 2000 database application that was developed at the YGS to facilitate data entry/recording and the production of geologic maps while in the field. The need for designing *GeoFIELD* arose from the incompatibility

between *FieldLog* (a *dBase III* program that was developed at the GSC – see *Geolog*, v. 30, pt. 1) and recent releases of *AutoCAD Map*. *GeoFIELD* writes data to a Microsoft *Access* database and allows digitizing and plotting of station locations and structural data in an *AutoCAD Map* drawing using a Visual Basic for Applications interface. *GeoFIELD* can also be used effectively within the GIS environment as Microsoft *Access* provides easy connectivity with leading GIS software (e.g. *AutoCAD*, *ArcView*, *ArcGIS*, and *MapInfo*).

GeoFIELD provides a user-friendly interface within a familiar Windows environment. Its extensive picklists are easily customizable and ensure consistency and quality control during data entry. The widespread availability and easy customization features of Microsoft *Access* make *GeoFIELD* a flexible application that can be adapted to varying needs. In addition, Microsoft *Access* provides the ability to easily build complex database queries and generate reports.

Handheld Data Capture

GeoFIELD can be used very effectively with Palm OS handheld devices for collecting digital data directly in the field. At the YGS, Pendragon Forms 3.2 software (<http://www.pendragon-software.com>) was used to create a series of forms which mirrored the database structure and picklists of *GeoFIELD* (similar designs are already widely used - see *Geolog*, v. 30, pt. 1, p. 8, for an example). The handheld forms were designed with the knowledge that not every geologist is necessarily keen to embrace yet another



new technological challenge. The interface was therefore kept as simple as possible to allow for quick familiarization and minimal loss of valuable field time. Only information essential for efficient digital map production (station location, lithology, structural information, samples collected and photos taken) was required for entry into the handheld unit. The handheld device was not viewed as a replacement for the traditional field notebook, but rather as a complement to it. The real advantage of using the handheld device is that it allows for instant synchronization with *GeoFIELD*, therefore enabling rapid daily map updates.

The YGS opted for the use of Palm OS devices because they are relatively cheap (~1/3 of the price of a handheld computer running *Windows CE*) and don't require expensive software to set up. A number of manufacturers sell basic Palm OS handheld units that operate with disposable alkaline batteries and have the capability of GPS attachments.

From outcrop to interactive map products

GeoFIELD has been used and tested extensively by YGS geologists over the past two years. Efficient digital capture of our field data has allowed for timely release of Open File maps and rapid production of digital compilations on CD-ROMs, which include spatial data in various GIS formats, YGS publications, field databases and colour photographs. Ultimately, the results of geological mapping projects are incorporated into the Yukon-wide regional compilation displayed on our internet Map Gallery. *GeoFIELD v.2.2*, *Pendragon Forms* templates and a comprehensive manual are freely available for download from the YGS website (www.geology.gov.yk.ca). While comments and suggestions for future improvements to *GeoFIELD* are welcomed, YGS does not provide technical support for this application beyond what is presented in the accompanying manual. For more information visit our website or contact us at: Panya.Lipovsky@gov.yk.ca or Maurice.Colpron@gov.yk.ca

Pacific Centre for Isotopic and Geochemical Research Opens

The Pacific Centre for Isotopic and Geochemical Research (PCIGR) in the Department of Earth & Ocean Sciences at UBC was officially opened by Jim Mortensen (photo below) and Dominique Weis on December 12, 2002. This new, state-of-the-art analytical facility houses five new mass spectrometers (stable isotope, noble gas, thermal ionization, and high resolution and multi-collector ICP-MS), and includes newly constructed mass spectrometry laboratories as well as a new clean laboratory for processing radiogenic isotope samples. In addition to several new faculty members at UBC, four new staff members (research associates and post-doctoral fellows: Jane Barling, Bruno Kieffer, Wilma Pretorius and Tom Ullrich) have also joined the research team to complement the existing technical staff. The PCIGR is a major regional analytical facility that supports the research of more than twenty-five individual faculty members from UBC, University of Victoria, Simon Fraser University and University of Alberta.

On-going research collaborations with various Canadian and U.S. government agencies as well as industry consortia and a wide array of international university researchers is also supported by the facility. Laboratory construction and equipment



acquisition for the PCIGR was obtained from the Canadian Foundation for Innovation, the Stuart Blusson Endowment to UBC, the BC Knowledge Development Fund, and the University of British Columbia. A very wide range of research can be carried out in the new facility, including laser Ar-Ar dating, tracer geochemistry (precise and low-level trace element analyses by HR-ICP-MS, Sr, Nd and Pb isotopic compositions by TIMS, high-precision Hf and Pb isotopic compositions by MC-ICP-MS), the application of heavy stable isotopes (Fe, Cu, Zn, Mo, etc.) to petrological, mineral deposits and oceanographic studies, and wide-ranging environmental studies employing both light (C, H, O, S) and heavy stable isotopes. In a near future, the application of conventional U-Pb geochronology by ID-TIMS methods will also be expanded to include *in situ* laser ablation ICP-MS dating methods, as well as (U-Th)-He geochronology.

The new radiogenic isotope laboratory is dedicated to the late Dr. Richard L. (Dick) Armstrong, who was instrumental in establishing UBC as a major centre for isotopic research. Over 200 EOS alumni, as well as members of the Geological Survey of Canada, BC Geological Survey Branch and Yukon Geology Program attended the official opening reception and laboratory dedication.

Details about the available instrumentation, analytical capabilities and research personnel and programs at the PCIGR are available at the facility website at: www.eos.ubc.ca/research/pciGR/PCIGR.htm. Additional information can be obtained from either Jim Mortensen (jmortensen@eos.ubc.ca) or Dominique Weis (dweis@eos.ubc.ca) who are Co-Directors of the new facility.

CSPG Position On Global Climate Change Science

The CSPG has been asked by many members, and encouraged strongly by its Past Presidents, to state a position on the controversial subject of global climate change. Although the Society has traditionally avoided taking public positions, the Executive has agreed that we must take a clear stand as professionals, and as knowledgeable scientists of the Earth.

Geologists should have an authoritative voice in this messy and politicized public debate, which has been marked by many misrepresentations of science and manipulation of the public media by those on every side. In particular, petroleum and other “soft-rock” geologists, who work daily with the products of earth’s varying climate over geological history, have a vital and essential perspective to contribute. We are also accustomed to synthesizing evidence from many branches of science in our day-to-day work.

Expert opinions expressed by the CSPG focus entirely on the science of global climate change, and do not address the political and economic issues which dominate the media. The CSPG advocates no position on the Kyoto accord, nor on other public actions promoted in response to perceived climate change. We must say very strongly, however, that the science is the basis of the entire climate change debate – arguments built upon a poor understanding of the science are doomed to be wrong.

The CSPG position has been presented to the membership in draft form, and comments have been invited from all members. This final position paper reflects the input received, and has been approved by a strong majority of respondents.

Climate change scientific arguments are many, and are far too involved to be reviewed in this short position paper. However, the reader is referred to the following summaries of current global climate science:

- WMO UNEP Intergovernmental Panel on Climate Change (www.ipcc.ch/) - summaries of the findings of the IPCC, widely quoted in support of arguments linking anthropogenic gas emissions and climate change.
- “The CSPG Backgrounder to Global Climate Change”, a brief review of the key scientific issues, by CSPG member D.L. Barss and associates. This paper has been posted on the CSPG website.
- “Are Observed Changes in the Concentration of Carbon Dioxide in the Atmosphere Really Dangerous?”, an exhaustive review of global climate science by Chris de Freitas of the University of Auckland (Bulletin of Canadian Petroleum Geology, June 2002; also posted on the CSPG website).

The Climate Change Debate

Many people argue that “greenhouse gases” emitted by human activities have upset natural climatic balances, causing anomalous global climate change since the mid-20th century (see, for example, the David Suzuki Foundation website, www.davidsuzuki.org). Claims of “scientific consensus” backing these ideas are not well-

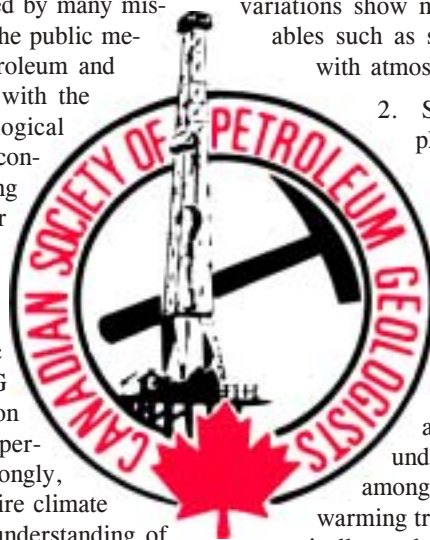
founded, however, as summarized in the “CSPG Backgrounder”, which draws the following conclusions:

1. Global climate change has been a constant throughout the history of the Earth, driven by a variety of global and astronomical natural factors. The variability of and interactions among these factors are the subjects of active research, but are still very poorly understood by climate scientists. Observations of past climatic variations show much better correlation with astronomical variables such as solar activity and orbital changes than they do with atmospheric CO₂ levels.
2. Since the beginning of the 20th century, atmospheric CO₂ has risen with accelerated production of CO₂ by human activities. However, using the best attempts to remove biases from temperature data, there is not a good correlation between atmospheric CO₂ and global temperatures.
3. Global circulation models attempt to represent climatic influences with numerical equations, and are used to predict future climate variations. However, they are hampered by our poor understanding of the relationships and feedback loops among many of the key variables. GCM predictions of warming trends through the 21st century have decreased systematically as the models have become more sophisticated.
4. These observations suggest that global climate change is a natural and fundamental part of earth history, and that the effects of human activities on global climate are likely a poorly-understood fourth-order factor.

The CSPG Position on Global Climate Change

Based on these conclusions, the Canadian Society of Petroleum Geologists proposes the following position on global climate change:

- Global climate change is a natural and continual process on Earth. Climate changes similar to and much more severe than those happening today have occurred repeatedly throughout historic and geologic time, as the result of many natural factors.
- Climate science is only beginning to understand these factors and their interactions. There is no “scientific consensus” that “greenhouse gases” produced by humans are driving any unusual climate changes.
- Mankind’s greatest efforts to reduce production of carbon dioxide, a natural component of the atmosphere essential to virtually all life, will not significantly affect climate change. The climate will change naturally, and mankind must adapt, as all life has done throughout the Earth’s history.
- Regardless of the outcome of global climate change debates, mankind should not be distracted from the worthwhile goals of using all resources wisely, and of reducing its production of polluting chemicals that are truly harmful to life on Earth. We should further develop our scientific understanding of the earth, oceans, and atmosphere, to guide us in reducing our negative impacts as effectively as possible.





Letters to GEOLOG

Grinding GSC's Gears

What has been going on with the Geological Survey of Canada?

For years, I have been hearing rumblings that all is not well within the walls of Canada's premier geological organization. In corporate government-speak, we see a little reorganization here (translated hire new management), a few retirements there (translated fewer staff). And of course there are the new chants generated by some corporate advertising guru probably sitting within earshot of the Peace Tower on Parliament Hill. How can any of us forget that lyrical tune "the energy of our resources, the power of our ideas"? How many field positions have disappeared since we purchased those 10 words?

Maybe I am a little bit slow, but the latest plan reported in *Geolog* (v. 31, pt. 4) under the banner "Shifting Gears at the GSC", smacks as yet one other of many similar pieces of corporate governmentese. In my opinion, Shifting Gears reads more like grinding gears or how to fit a square peg into a round hole. We have such gems of wisdom as "ESS (that's Earth Science Sector for those of us living outside the world of Ottawa acronyms)... is positioning itself to maximize its relevance and clearly define its role... to be both responsive and relevant..." in such issues as "connecting Canadians" and, my favourite, "strong and safe communities"... Step aside RCMP, we have ESS.

Cutting to the heart of the matter, our bureaucratic betters tell us, this top down ESS "vision" and "program" is "designed to address a fundamental issue identified by the Government of Canada". Whatever that so-called "fundamental issue" is you can be sure that resource companies will be damned. We are told ESS is looking at "connecting Canadians" by "generating specific products (targeted outputs) that have impact on the receptor community". I guess these new government programs will leave all of us with a warm and cozy feeling as we go to sleep in our stronger and safer communities.

As usual, and at the core of this Government document, one thing is clear - a new management team is being created to ensure delivery of the new ESS (read Government of Canada) agenda. ESS managers armed with a budget of \$180 million will oversee a "high performance, issues-driven, results-based organization". The new ESS, we are told, "will devote its resources to delivering" or worse yet, "influencing others to deliver ... earth science information needed by Canadians". That said, they will simply "endeavour" to have appropriate staff available for their as yet unidentified "targeted outputs".

The formulation of "targeted outputs" is reported to be through "consultation". I don't know about you and your region, but I certainly don't recall any general call from the Government of Canada for discussing a program for "connecting Canadians" with a new, kinder, gentler ESS. Maybe *Geolog* had a spelling mistake, and ESS Managers and ADM's are simply looking for 'connected' Canadians.

Perhaps like yourself, when I finally finished this government brief I was left without any explanation of how a new "effective and relevant program in the Geological Survey of Canada" contributes in any significant way to our understanding of the geology and natural resources of Canada. What is being done to encourage mining, mineral and petroleum development in Canada, the creation of new wealth - "the energy of our resources"? What is being done to encourage us to look at Canadian geology in new ways - "the power of our ideas"? And most important of all, who is going to pay the bills?

Maybe, it is a result of too much latté from the cafés of the Byward Market but I feel a serious disconnect has occurred between the urbanized and gentrified senior bureaucrat managers, directors and ADMs of the GSC and the people in industry and academia that they work with every day. The plain truth is that Canada is a very large country and one where we have a fundamental, simplistic and generally weak understanding of the sum total of its geology and resources; more, not less mapping is needed. So too, and without a strong voice from our most senior Public Servants in Ottawa, politics, politicians, and taxes have left our minerals industry in disarray; soon, I suspect, our friends in the energy sector will be in the same boat. And academics, the people assigned to train our next generation of geologists and geophysicists - well forget them, ESS can now offer their own brand of training. The new ESS mantra is to connect Canadians by "creating and sharing opportunities".

For the people that are your real long-term partners and clients in resource industries and academia, the issues are quite simple. Without strong resource industries in the myriad of northern and rural communities that form the backbone of our country, there will be no tax and royalty base for creating and sharing any opportunities in the earth sciences. Without well funded academics covering the entire range of earth science disciplines, and with freedom to study the esoteric as well as the applied, there will be no new minds to generate ideas that power new initiatives.

In Canada, geology and surveying are the underpinning of everything else that drives this country - that is everything from our forests, farms and fishery, to our automotive and high-tech industries. Within the body of corporate governmentese that forms the entire "Shifting Gears" document the words **geology** and **survey** are not mentioned once. That is for me the most telling point.

When is the GSC management going to stop pandering to whatever political winds are blowing in Ottawa? It does absolutely nothing to enhance your image as Canada's premier geological survey. Stop grinding your gears, get back to what you do best, and put **geology** and **survey** back into the Geological Survey of Canada.

Elliott Burden
St John's, NL

The “Geological” Tradition

GAC President John Clague is to be commended for his interest and initiative in expanding the association’s role across the full earth sciences community (*Geolog*, v. 31, pt. 4). Indeed, there are many things that can and must be done in this regard. I maintain, however, that changing the first word in the GAC’s name from “geological” to “geoscience” is not among them.

There are at least two reasons why the proposed name change should not be adopted. The first arises from a justified sense of professional tradition and pride. Canadians are notoriously prone to forget their history and heritage; the narrowly-averted Mt. Logan/Mt. Trudeau renaming disaster is a case in point. The GAC is, and has been for some time, this nation’s professional society for geologists. Dr. Clague is correct in suggesting that an organization’s name is very important because it can capture the core values of that group. By the same token, if the word “geology” is expunged from this association’s title, then the GAC will fail to properly honour its fundamental role and traditions.

Second, such a name modification would also fail to recognize the full depth and breadth of the earth system science contributions made both by geologists and – ironically – other disciplines. On one hand, geologists do not have to justify their existence to themselves by changing the names of their professional societies and university departments as intellectual fashion dictates. On the other hand, if the GAC becomes this nation’s geoscience, rather than geological, society then what are we to make of the Canadian Geophysical Union, for example? Are they not geoscientists as well? Would we then be obliged to regard the CGU as a competing or secondary geoscience organization?

The central intellectual challenge facing the Geological Association of Canada at the dawn of the new millennium is how to maintain its proud and valuable heritage as a professional society for geologists, while not only remaining relevant, but indeed walking point on the trail to new, interdisciplinary knowledge and understanding. I thank Dr. Clague for strongly advocating a dialogue within the GAC on this general issue. However, the above goal will not be accomplished by an organizational name change, nor by altering the organization’s logo, as was sadly done by the Geological Society of America a short while ago. Rather, the answer may lie – at least in large part – with the establishment of much stronger and more concrete ties between Canada’s currently-splintered natural science communities.

This is obviously easier said than done, but let me offer a couple of tentative suggestions. One possibility might be the development of a joint annual earth systems science super-conference. It could either replace the annual meetings of the participating professional societies, or be a speciality conference focussing on technical linkages between disciplines. As a geophysicist and hydrologist, some potentially allied organizations that immediately spring to my mind include the Canadian Geophysical Union, Canadian Water Resources Association, and Canadian Meteorological and Oceanographic Society. There are no doubt many others, including perhaps some organizations from the life sciences, as earth scientists have much to offer with respect to understanding post-glacial species distribu-

tions, habitat quantity and quality, and of course evolutionary biology. A second, similar possibility is the establishment of a refereed journal dedicated to truly interdisciplinary earth system science research. While some existing journals claim to have accomplished this, on balance it is questionable whether they have really succeeded, and certainly none focus on Canadian issues. In both cases, the GAC has a very strong potential for taking a central, leading role – if it chooses to.

*Sean Fleming
Vancouver BC*

An Unpleasant Sibilation

In a recent issue of *Geolog* (v. 31, pt. 4) Dr. J. Clague, as part of his Presidential Preamble, entitled “What’s in a Word?” made a suggestion concerning the Geological Association of Canada that deserves some scrutiny. Dr. Clague suggested that it is time to rename the “Geological Association of Canada” and proposed the name “Geoscience Association of Canada” as a replacement. In support of this suggestion, Dr. Clague stated that “Geology” is, in fact, “only part...of Geoscience”. He also cites the fact that many former university “Departments of Geology” have felt it necessary to rename themselves “Departments of Earth Sciences” or “Departments of Geosciences” in an effort to capture all studies related to “the Earth System” not included under the banner of “Geology”. Readers who are “geologists” will realize that the definition of “Geology” is, in fact, exactly the same as that for “Geoscience” or “Earth Science”. The moniker “Geoscience” is simply a contraction of “Geological Sciences”. Geology is the study of the “Earth system”. Nothing more, and nothing less!

An honest argument in favour of Dr. Clague’s proposed name change would include a frank admission that many people, even scientists, are ignorant of the true meaning of the term “Geology”. He, deliberately, or unwittingly, reinforces this ignorance by describing “geophysicists, physical geographers, soil scientists and engineering geologists” as “earth scientists who are not geologists”. This begs the question of exactly who does Dr. Clague feel warrants the appellation “geologist”. I find it interesting that I have not heard of any movement to change the name of our sister organization, the “Geological Society of America”, to “Geoscience Society of America”. Geology seems to have far more recognition south of the border as a wide-ranging scientific discipline on a par with Biology, Physics or Chemistry than in Canada. My Alma Mater in the United States of America at least has a “Department of Geological Sciences”, rather than the execrable “Department of Geosciences”, with the implication that Geology is a broad-based science worthy of more respect than that accorded to it by Dr. Clague. Finally the phrase “Geoscience Association of Canada” is an unpleasant sibilation in comparison with the forthright “Geological Association of Canada”.

*David W. Morrow
Calgary, AB*

Jargonistic Gobbledy-Gook

Re: Shifting Gears at the GSC (Geolog, v.31, pt. 4)

What a load of gobbledy-gook! The jargon used makes one wonder whether the Geological Survey of Canada still exists.

Why don't they get on with their primary role of giving Canadians a geological base from which to work, be it for environmental, mining or research purposes.

What a pathetic end for a former world class earth science organization!

Chris Gleeson
Iroquois ON



Fifth British Columbia Paleontological Symposium

May 2 - 5, 2003, Nanaimo, BC

Presented by the BC Paleontological Alliance and featuring the world-renowned vertebrate paleontologist, Dr. Betsy Nicholls of the Royal Tyrrell Museum. An exciting variety of presentations, workshops and field trips that will appeal to all members of the professional and amateur paleontological community. Contributed papers are invited for oral presentations and posters for the Symposium. Artists are invited to submit works in various media for the popular juried art show "Fossil Rebirth".

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Geoscientific Technospeak

I agree there is a lot in a word; but what does the word mean? According to the *AGI Glossary of Geology* geoscience is a short form for the collective disciplines of the geological sciences and is synonymous with geology. Geology means the study of the planet earth (from the Greek words *geo* for earth and *logos* for science). So if we want to make it an English term, call it Earth Science. However, this usage is misleading because earth science is generally considered to include such subjects as geophysics and meteorology.

Geoscience is a technospeak word, which is half Greek, half English. Why are geologists hiding behind this technospeak word? Biologists do not need to do this. There is a term Bioscience, but this is used for sciences in the medical fields. The biologists use the term biological sciences, so we could use geological sciences, but why this technospeak word geoscience?

I think one of the reasons why we do a lousy job educating the public and politicians about what we are doing is that we are starting to hide behind the word geoscience. The next step would be to call the GSC Geoscience Survey of Canada. That would be the best step to kill what is left of geological surveys in this country (and killing the science of geology on the way). Adrienne Clarkson would not know for sure what a Geoscience Survey does.

Geophysicists are a type of geologist (or call it earth scientist), but they will generally join societies for geophysicists. If they are working in applied geophysics, they may join organizations like GAC. I don't think they will be more inclined to join GAC, if we call it the Geoscience Association of Canada. There is a need for a national geology society (just as there is for national geophysical and engineering geology societies). There is also a need for an umbrella Earth Science society (which is the Canadian Geoscience Council), but there would still be a national geology society such as Geological Association of Canada. There is probably a need to change the name of the Canadian Geoscience Council to Canadian Earth Science Council.

In conclusion, I would like to urge GAC to not change its name to Geoscience Association of Canada. Let's be proud geologists and stand behind the science of geology. Instead, let's get rid of the technospeak term geoscience. This would result in possibilities of Earth Sciences cooperating with Life Sciences and obtaining the research funding that is needed.

Willem Langenberg
Edmonton AB

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Association News

Should we change our membership rules?

The GAC presently has two categories of membership:

1. Voting members, consisting of:
 - (a) Fellows; and
 - (b) Distinguished Fellows.
2. Non-voting members, consisting of:
 - (a) Associates;
 - (b) Corporate members; and
 - (c) Honorary members.

Our rules require that Fellows (and, therefore Distinguished Fellows) possess a degree in Geology, or a closely related field, and have at least one year's experience in Earth Science (through practice, teaching or research). At the discretion of Council a person without this professional background can be admitted as a Fellow. It is possible to transfer from Associate to Fellow on presentation of suitable evidence of qualification.

Could it be that the present regulations were framed at a time when the practice of 'Geology' was seen as *the* core discipline among the Earth Sciences (*pace*, my Geophysicist friends).

Does it matter?

Well, yes, I think it does. Over the past 20 years or so the Earth Sciences have experienced an explosion in the range of scientific activity that is carried out under that 'umbrella' title. Many people now practicing within this diversified field have backgrounds in mathematics, physics, chemistry, biology, engineering, geography, environmental science, climatology, meteorology ... (did I miss anyone?).

Is it possible that some of these practitioners do not see the GAC as a part of their professional lives because they see us solely as 'Geologists'? Clearly, the GAC *is* open to the notion of admitting as Fellows a diverse clientele. However, our rules hardly provide a welcome and might actually deter potential members from bringing us the benefit of their experience and expertise. I would like to change this to make it clear that *anyone* with *any* background who is engaged in Earth Sciences is welcome to our Association.

But, wait a moment. Why stop there?

Why is it that a university degree is a prerequisite for *voting* rights in the Association?

Associates (except students) pay the same membership fee as Fellows but are then discriminated against in the influence they can have in Association affairs. Whereas my own undergraduate and graduate student experiences were enlightening (and sometimes entertaining), time and experience have taught me that qualifications do not confer omniscience!

In addition to making explicit that we welcome members with non-traditional backgrounds, I would like to change the rules to allow anyone eligible to join the Association to have voting rights. That is to say, I would like to remove the membership category 'Associate' and have a membership structure that consists of Fellows, Distinguished Fellows and Corporate Members.

What do *you* think?

Roger Mason

GAC Secretary/Treasurer

SHORT COURSES

Professional Development Opportunities

The following short courses will be given by the Geological Association of Canada at its annual meeting to be held in Vancouver, British Columbia, May 25 to 28, 2003:

- **Sequence Stratigraphy of Clastic Systems** - *Octavian Catuneanu*
- **3-D seismic interpretation** - *Bruce Hart*
- **GIS for geoscientists** - *Jeff Harris, Graham Bonham-Carter and Qiuming Cheng*
- **Iron-oxide-copper-gold deposits** - *Richard Todsdal, Moira Smith and Murray Hitzman* (co-sponsored by GAC-MDD and MDRU)

Plus full program of geoscience sessions, field trips and social events. Meeting co-sponsored with Mineralogical Association of Canada and the Society of Economic Geologists. For more details, visit VANCOUVER 2003 at www.vancouver2003.com.



ALKALINE Cu-Au PORPHYRIES and Fe-OXIDE Cu-Au DEPOSITS: Distinct Deposit Types, a Continuum or Genetic Lineage?

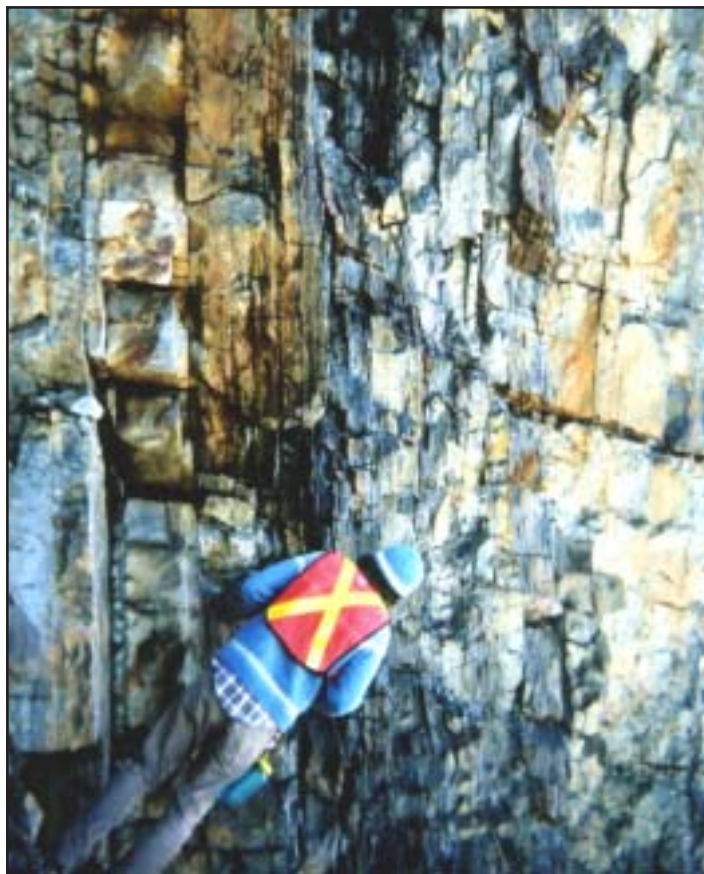
A short Course sponsored by the Mineral Deposit Research Unit (MDRU), the Mineral Deposits Division (MDD) and the Geological Association of Canada (GAC)

May 24 and 25, 2003
(preceding the Vancouver, GAC-MAC-SEG Meeting)

Vancouver Sheraton Wall Centre

\$CDN 350 for Professionals
\$CDN 175 for Students with valid ID

Registration: GAC-MAC-SEG Vancouver 2003
www.vancouver2003.com



A bit of photographic trickery showing Aaron Desroches looking at some tilted Carboniferous, Albert Formation strata. Photo supplied by Murray Gingrich. Do you have a photo for Geolog?



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HOWARD STREET ROBINSON FUND

The Robinson Fund was established in 1977 by the Geological Association of Canada, using a bequest from the estate of Howard Street Robinson. The fund is dedicated to the furtherance of scientific study of Precambrian Geology and Metal Mining by:

- sponsoring an annual Distinguished Lecturer Tour whose focus alternates between Precambrian research and economic geology (lecturer alternately chosen by the GAC's Precambrian and Mineral Deposits divisions);
- supporting Special Projects including publications, symposia and conferences.

Proposals for special projects on Precambrian Geology or Metal Mining should be submitted to the Robinson Fund Committee. Projects should be sponsored or organized through the GAC or one of its Divisions or Sections. Proposals that have a wide appeal or degree of accessibility to the GAC membership are preferred.

For further information and proposal submissions, please contact:

*Benoit Dubé, Chairman, Robinson Fund
Geological Survey of Canada
2535 Laurier, CP 7500
Ste-Foy, QC, G1V 4V7
418 654 2669
dube@gsc.nrcan.gc.ca*





Students News

52nd Atlantic Universities Geological Conference, October 2002

The 52nd Atlantic Universities Geological Conference was held at the University of New Brunswick, in Fredericton, New Brunswick, between October 24th and 26th, 2002. Participants arrived from Acadia, Dalhousie, Memorial, Saint Mary's, and St. Francis Xavier universities. In all, 121 students registered for the conference. A complement of several professionals and university academics from Atlantic Canada supplemented the registrants. Sixteen students delivered papers at the conference: a new AUGC record. All presentations were of exceptional quality.

Christine Cunningham, the student chair of the conference, raised \$15,000 to support the related activities. Donations were received from Imperial Oil, Shell Canada, Atlantic Provinces Council on the Sciences (APICS), the Atlantic Geological Society, Conoco Canada Resources Limited, Canadian Society of Petroleum Geologists, Maritimes and Northeast Pipelines, Association of Professional Engineers and Geoscientists of New Brunswick, Devon Canada, the City of Fredericton, Jacques Whitford Associates, Major Grilling Group, and the Potash Corporation of Saskatchewan. Well done to the organizer and our generous sponsors!

The activities began with registration and a social. Almost all the participants spent the evening discussing student life and geological interests over refreshments and karaoke.

A day of geological field trips were offered by UNB faculty and a member of New Brunswick's Department of Natural Resources and included: acid mine drainage in the Minto coalfields (Tom Al and Karl Butler); metallogeny at Mount Pleasant and Clarence Stream (Dr. Dave Lentz); and a look at the Albert Formation near Sussex, New Brunswick (Murray Gingras and Dave Keighly with help from Ian Armitage and Paul Wilson). The day was capped with a huge barbeque, hosted by Jason Kellog.

Presentations of the student research in Atlantic Canada occurred the next day with each presenter (oral and poster) receiving a certificate from the AGS, and a one-year subscription to Atlantic Ge-

ology as presented by Dr. Dave Keighley, the DNRE New Brunswick hydrocarbon geologist.

Les Fyffe (DNRENB), Dallas Davis (Geological Consultant), Dave Keighly (DNRENB) and Murray Gingras (UNB Geology) judged all of the talks. Posters were adjudicated by Jennifer Underschutz (Imperial Oil). The APICS award is based on the scientific quality and relevance of the topic, the amount of the original work done by the student, and his/her understanding of the subject, was received by Amy Tizzard of Acadia University. The Frank Shea Memorial Award for the best paper dealing with Economic Geology was earned by Patrick Collins of Dalhousie University. The Canadian Society of Petroleum Geologists Trophy for the best presentation of a paper was awarded to Nicolette Stanley, who studies at UNB. The Imperial Oil Best Poster was won by Kim Morrissey from Memorial University.

A cocktail reception, ably conducted by Shahin Dastgard, provided the context for the awards presentation. Following the awards, a boat race between the participating universities ensued. Teams from each representative university competed against each other with a team of professors and professionals thrown in for good measure. The team of indentured boat racers (Brendan Murphy, Sandra Barr, Chris White, Dave Keighly and Murray Gingras), the Professornals, easily won the meet.

The conference could not have succeeded without all of the many students who volunteered their time. Thanks to Larry Amskold, Tamara Holmes, Ian Armitage, Jillian Hudgins, Vernon Banks, Jason Kellock, Matt Clark, Rob Richard, Shahin Dashtgaard, Nicolette Stanley, Aaron Desroches, Nesha Trenholm, Lynn Diamond, Ian Armitage, and Barton Blakney for jobs well done. Several faculty and staff of the UNB Geology Department contributed to and supported the conference, especially Karen Shea, Christine Lodge and James Whitehead.

Murray Gingras and R.K. Pickerill





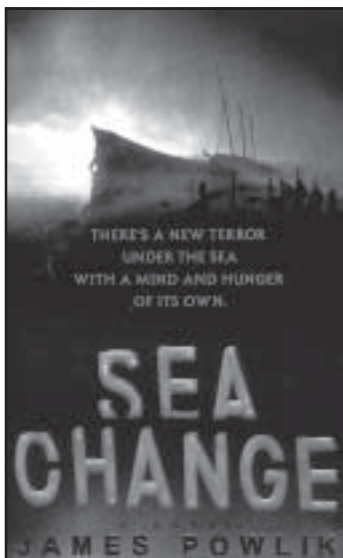
Reading on the Rocks

Sea Change

James Powlik (1999). Dell Publishing, New York, ISBN 0-440-23508-1 (Pbk.), 481 p. \$9.99

In the Pacific Ocean off the west coast of BC and Washington, there is something really nasty in the water. Something that is killing fish, marine mammals, and humans in particularly horrific and grisly ways. It causes massive respiratory distress, dissolves flesh from bones, and acts with startling rapidity. At first, scientists don't have a clue what it is. The deaths have occurred in widely separated areas and there seems nothing to link them. Brock Garner, ex-Navy intelligence officer and perpetual graduate student, is drawn into the hunt to find the cause. He spends hours carefully examining tissues from the autopsies and looking through published reference types of dinoflagellates. Finally, he puts a name to the killer - a species of *Pfiesteria*. Until now only known from the US east coast, it is a particularly virulent dinoflagellate with a complex life history and especially potent toxins. Where could this marine pathogen have come from? The west coast type looks like an entirely new species and nothing quite like it has been described previously. But Dr. Charles Harmon, professor emeritus, distinguished scholar, and expert on marine pathogens and infectious fish diseases, has an uneasy feeling that he recognizes it. He thinks he has seen something like this before. And he should know because, after all, he wrote most of the current textbooks on dinoflagellates. Harmon communicates his suspicions obliquely to Brock, his former son-in-law, and thereby catalyzes the search for a defence.

By no great coincidence, Brock is also working in marine sciences, though his specialty is oceanography. As part of his research, he has designed and built a plankton sampler, a temperamental piece of equipment nicknamed Medusa, that comes in handy for tracking the killer. Except that this dinoflagellate doesn't seem to be behaving quite the way one would expect. Brock has worked with harmful algal blooms (HABs) before. In fact, he once predicted a Red Tide that didn't happen and as a result almost destroyed his own career. So he is particularly leery about predicting what this organism might do. If he cries "Wolf!" again, he'd better be certain he has the wolf in sight. And yet this dinoflagellate mass is unaccountably staying intact. It is drifting inexorably south, against the main current, heading into Puget Sound, aiming straight for Seattle. If it gets there, Brock knows that loss of life could reach immense proportions.



Brock, of course, is not working alone; he is part of a research team. Once news of the deaths gets out, and the connections are made, many other people become involved. The fishers are worried that their livelihood will be destroyed. They don't see the point in getting upset over an impalpable threat; the deaths are localized and scattered and the fish stocks they rely on don't appear to be reduced at all. People in coastal communities are concerned that the tourist industry will be damaged. Meanwhile, the Mayor of Seattle is desperately trying to devise an emergency plan for a type of disaster that no one had anticipated. Some of Brock's fellow scientists and students from the Bamfield Marine Station on Vancouver Island join the work to track the dinoflagellates, a JGOFS research vessel is drafted into the task, and Bob Nolan, a wealthy environmental activist with an eye for publicity, tries to steal the limelight. A loose coalition of diverse folk try to devise a plan

to neutralize the threat.

This entertaining book falls into the emerging genre of eco-thriller. All are based on a similar pattern. Think of something unpleasant in the environment, something that people don't much like anyway (an insect, a virus, a dinoflagellate). Distort its characteristics just enough to be plausible but hideously scary. Let it go rogue. Then have a hero battling nature gone wild. It's a classic twist on the good against evil theme. It's better, of course, if the science is credible. And Powlik has strong credentials to write this story. He has a doctorate in marine sciences from UBC, studied copepods in Barkley Sound, and has worked in the Pacific northwest. The Canadian flavour runs through this story; Garner is named for General Brock, the hero of Queenston Heights, and Canadian scientists cobble together field equipment from assorted spare parts. *Pfiesteria* too is a real taxon; some species have destructive characteristics and have been implicated in fish kills along the US east coast. Nevertheless, I enjoyed finally reading a book about tiny dinos instead of the large kind with teeth. But I am not sure I want to go swimming in warm coastal water any time soon!

*Alwynne B. Beaudoin
Edmonton, Alberta*



GAC/MAC 2004 May 12 - 14
St. Catharines, Brock University
gacmac04@brocku.ca



History of Economic Geology

Browsing through library basements reviewing dusty volumes of mining journals and microfilm provides a fascinating look at the emergence of mining (economic) geology as a separate specialty about a century ago. The journals involved include The Mining & Scientific Press (San Francisco), The Engineering and Mining Journal and the Transactions of the Institute of Mining Engineers (New York), the Transactions of the Institution of Mining & Metallurgy, and The Mining Magazine (London) between 1890 and 1920.

The review was undertaken for a biographic article I am writing on Thomas A. Rickard. Although he was one of the leading mining engineers of his time, he also had an affinity for geology and was a skillful and prolific writer who went on to become a prominent mining journalist and author. After a professional career that involved frequent global travel, and long periods of residence in London, New York, Denver and San Francisco, he lived with his wife in Victoria, BC for his last twenty years until his death in 1953.

This is one of a series of short articles, based on the archives from a century ago, that will focus on the origins of economic geology and on Canadian links.

Bob Cathro

Geologists and Engineers

Economic (or Mining) Geology blossomed in the latter part of the Nineteenth Century, primarily in the U.S. Southwest during the rapid period of mining exploration that followed the discovery of the Comstock silver camp in Nevada in 1859. The first mining geologists were mining engineers who began to specialize in the description of mineral deposits because of their interest or experience in sampling, ore reserve estimation, or underground exploration. According to T.A. Rickard (1910),

“The study of ore deposits for a hundred years owed its progress to German research. In England, the detection of fossils and the correlation of strata absorbed the attention of geologists to the exclusion of investigation into the nature of the mineral aggregates that are the subject of mining. ... Englishman founded geology and Germans started the systematic study of ore deposits; but it was in America that economic geology won proper recognition”.

Rickard received his degree from the Royal School of Mines (London) and came from a long line of Cornish mining engineers.

An interesting exchange of views on the importance of mining geologists was printed in The Engineering and Mining Journal (EMJ) in the first half of 1903. EMJ was a weekly technical magazine that was eagerly read throughout the international mining world. Some of the points that were raised then have been discussed ever since: have geologists made any discoveries or were they all made by untrained prospectors; and, did mining engineers need geologists at all? Those who have worked for exploration organizations headed by mining engineers (or worse, lawyers or accountants) will sympathize with the challenge faced by the early mining geologists in gaining respect.



Thomas A. Rickard in 1935, aged 71, after his retirement to Victoria”.

The exchange was prompted by a letter titled ‘*The Geologist in Practical Mining*’ by J.E. Spurr of the USGS. He had only intended “to emphasize the value of the application of the science of geology to mining operations, and to urge that it receive earnest attention and study from all those interested in such undertakings”. However, his clumsy wording inadvertently touched a raw nerve in several mining engineers and generated a number of heated letters about “who is the better geologist – the prospector, the miner, the mine captain, the mining engineer, or the professional geologist.” (July 4, 1903).

Waldemar Lindgren, who was also at the USGS, attempted to bring some balance to the debate, as follows.

“Some twenty years ago, the mining engineer with a thoroughly theoretical and practical education was a somewhat rare specimen as a superintendent of mines. No mine was considered to be on a solid basis unless run by one of the ‘practical’ – preferably Cornish – captains, most excellent and energetic men, ... but as a class no doubt lacking that foundation of science that is absolutely indispensable to the mining engineer. ... The necessity for a scientific foundation ... is becoming universally recognized. It is unessential whether this has been obtained in mining school or by self-education. ... I draw no line between the mining engineer and the mining geologist ... I cannot conceive of a successful mining geologist who is not also a mining engineer. But though the ordinary mining engineer is well schooled in geology, it has been my experience ... that he may often be confronted by complicated questions in which his knowledge proves insufficient, and here is where the specialist, the professional mining geologist, comes to his rescue. ... And these questions, more often than not, are related to that most practical subject, the ore reserves. Nor is it

cont. next page

always safe to differentiate the 'practical' from the 'theoretical' results of the mining geologist. A mere reference to the recently discovered secondary nature of chalcocite suffices to illustrate this." (May 9, 1903).

Rickard, who was then the editor of EMJ as well as a pioneer mining geologist, summed it up "as a friend of both parties" in an editorial, as follows.

"Astronomy is to navigation what geology is to mining. You cannot safely steer a ship across the trackless waste without a compass and a quadrant ... nor is it wise to try to find a way amid the darkness of the world underground without the transit of the surveyor and the map of the geologist. Nevertheless, a ship in charge of astronomers would afford a dangerous method of travel, ... a mine directed by geologists would soon become only a hole in the ground. ... Mining is one of the most difficult occupations followed by humanity, there is no room for disregard of aid from any source. Let the geologist realize the smallness of the base on which his top-heavy theories stand, and let the miner recognize the narrowness of the experience of which he boasts." (May 23, 1903).

Reference

Rickard, T. A., 1910, *Geology Applied to Mining: Mining and Scientific Press, San Francisco, April 2, p. 479-481 and April 9, p. 516-518.*

Note: Mining and Scientific Press was founded in May 1860 and was the oldest mining publication on the continent. It thrived because San Francisco was the most important mining equipment manufacturing center in the U. S. - perhaps the world - until the completion of the transcontinental railroads began to shift equipment manufacturing to the east. Rickard was the owner from 1906 until he sold it to EMJ (McGraw-Hill) in 1923, and was also the editor for most of that period.

Robert J. (Bob) Cathro
bobcat@direct.ca

Yukon Placer Miners in a Jam

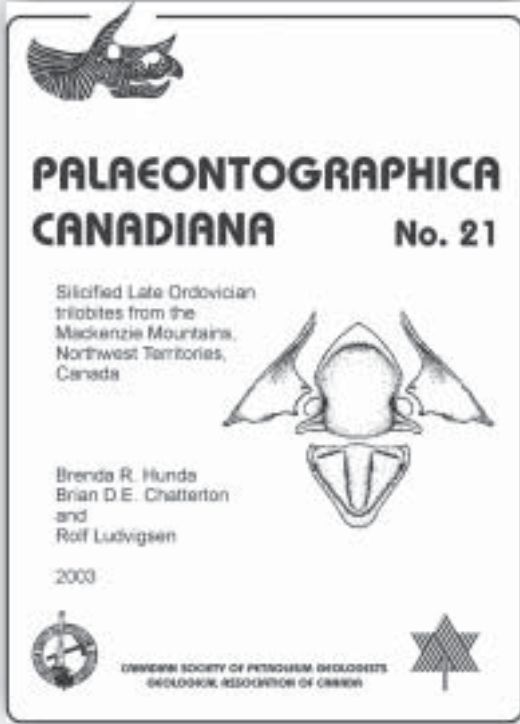
A decision by the Honorable Robert G. Thibault, Minister of Fisheries and Oceans, is about to put an end to placer mining in the Yukon. The Yukon was built on a history of placer mining having produced over 15 million ounces of gold in the past 105 years. Even today about 200 operating mines, mostly small Mom and Pop organizations (the Yukon family farm some say), contribute 80,000 to 100,000 ounces of gold each year to Yukon's bottom line, but Yukon placer miners may soon be a thing of the past.

Since 1993, placer mines have been operating under the Yukon Placer Authorization that allows placer mining to occur under strict regulations that have evolved over the past 20 or so years. A recent review by a committee of stakeholders presented a series of recommendations to the Minister. Ignoring the committee's recommendations, the Minister scrapped the provisions of the YPA, thus paving the way for DFO to close down placer operations for altering fish habitat.

There are a few issues for geologists in this. Firstly, where is the science? What scientific information was used in this decision-making? What are the natural vs. man-made sediment loads and how are fish adversely affected? How does placer mining, under the terms of the YPA, affect fish? What about habitat? Do reclaimed creeks provide good fish habitat?

Secondly, placer miners have played a vital role in supporting the advancement of many scientific issues from archeology, to vertebrate paleontology to Late Cenozoic climate reconstructions. Placer miners are increasingly recognized for their geological, environmental and archeological contributions by professional organizations. For this reason and others, geologists should consider supporting their cause.

Additional information is available from the Klondike Placer Miners' Association website: <http://www.kpma.ca/home.htm>



PALAEOGEOGRAPHICA CANADIANA

Palaeontographica Canadiana No. 21
Silicified Late Ordovician trilobites from the Mackenzie Mountains, Northwest Territories, Canada.
Brenda Hunda, B.D.E. Chatterton, and R. Ludvigsen, 2003,
87 p. incl. 21 pl.

Collections of silicified trilobite from the Whittaker Formation for two sections near Avalanche Lake, Northwest Territories, demonstrate faunal changes through the latest Ordovician, up to the base of the Silurian. The trilobites were collected from horizons of Edenian to Gamachian (latest Ordovician) in age, directly below the Ordovician/Silurian boundary. Thirty-three species, representing 15 families are identified in the two sections. Fifteen new species are identified, described, and classified.

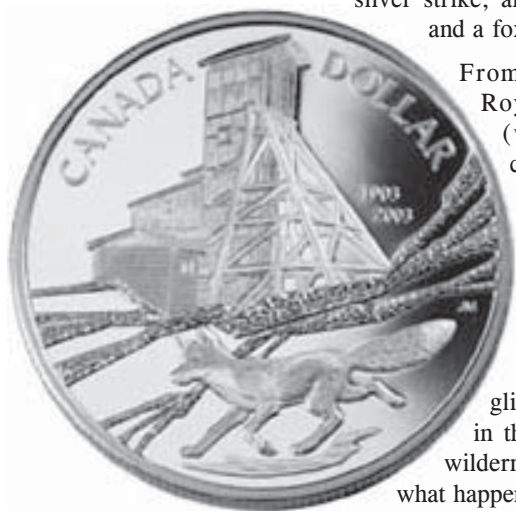


Mélange

GeoStamps

Canada Post's *Collection* magazine for Spring 2003 shows a set of 10 postcards, the "Canadian Rockies Edition". Having bought these, I discovered that they barely qualify as GeoStamp material. They are nice tourist postcards, and include Mt. Rundle, Cascade Mountain, Mt. Robson, Valley of the Ten Peaks, and a view from Sulphur Mountain. The stamps are disappointing however. I expected a themed stamp but instead it is just the usual Canadian flag stamp, which will deliver the card to anywhere in the world.

More significantly though, is the announcement in the same issue of a silver dollar from the Royal Canadian Mint. The 2003 Silver Dollar commemorates the 100th Anniversary of the Cobalt, Ontario silver strike, and shows a headframe and a fox (explanation below).



From the website of the Royal Canadian Mint (www.rcmint.ca/), comes this description...

"This year's commemorative silver dollar is struck in 99.99% pure silver!

Imagine discovering a glimmering vein of silver in the middle of Ontario's wilderness! This is precisely what happened to Fred La Rose, a blacksmith who was forging rails for the railway in northern Ontario in 1903. According to local legend, he tossed his hammer to scare off a pesky fox but struck a rock, revealing a vein of silver the size of which the world had never seen! Literally overnight, Cobalt became an international sensation as countless prospectors and mining companies rushed to stake their claim at this incredible site! Only 125,000 available for sale individually worldwide."

If you use the order form in *Collections* (or call in your order 1-800-565-4362), the Proof Silver Dollar will cost you \$36.95 plus tax, the Brilliant Uncirculated Silver Dollar is \$28.95.

The coin can also be ordered over the Internet at the Royal Canadian Mint. The price for the Proof dollar is \$33.95 plus taxes and possibly shipping (options include Fed Ex and Canada Post X-Press Post).

Sandy McCracken
Calgary AB

McGill Funds SedPet Chair

Great news recently for the McGill University Department of Earth & Planetary Sciences: Shell Canada pledged \$300,000 towards the TH Clark Chair in Sedimentary and Petroleum Geology. EPS Professors Eric Mountjoy, Bruce Hart and AE (Willy) Williams-Jones, Rick Young of Calgary, and the McGill Geology Alumni (Calgary) are well rewarded for their considerable efforts towards making the TH Clark Chair Endowment Fund a reality.

More Recognition for U of Windsor Earth Sciences Development Project

The IDRC-funded project on rural water supply in India, involving U of Windsor Earth Sciences, the Pune NGO, BAIF Development Research Foundation, and the tribal and rural people of Akole Taluka, Maharashtra State, has been recognized as a *Best Practice Using Indigenous Knowledge* by the Netherlands Organization for International Cooperation in Higher Education (Nuffic) and UNESCO's Management of Social Transformations Programme (UNESCO/MOST). It is among 22 projects, selected from 60 submissions, worldwide. Selected projects are innovative, make a difference, have sustainable effects, and have potential to be a source of inspiration to others, in finding solutions to problems of poverty and social exclusion. They all include indigenous knowledge systems, as part of the project management strategy. Previous, international recognition for the project was reported in *Geolog*, v. 29, pt. 1. For more information, contact Frank Simpson, Canadian Project Leader (franks@uwindsor.ca).



Technology transfer. Members of Canadian and Indian project teams discuss water supply with members of Gujarat Research Institute for Socio-economic Rehabilitation, Vadodara, and villagers of Halenda, Saurashtra Peninsula, Gujarat State, India (Photo credit: GRISERV, Vadodara, Gujarat).

U of T's "Three Chairs" Dinner

On a snowy Saturday evening November 26, 80 persons, from as far away as Connecticut, Philadelphia, Calgary, Ottawa and Sudbury, gathered in the University of Toronto Faculty Club to honour the Geology Department's previous three Chairs who are retiring within a single July-to-July year. It was a unique and historic occasion.

Geoff Norris (department member since 1967 and Chair from 1980-1990), although he turned 65 this past August, has the good fortune of continuing on until July 1, 2003. John Westgate (department member since 1975 and Chair from 1990-1995) and Jeff Fawcett (department member since 1964 and Chair from 1995 to January 31, 2001) joined the ranks of the "apparently" retired on July 1, 2002.

Altogether, this triumvirate headed U of T Geology for a total of 20.5 years and contributed 101 years of service to the University of Toronto. They hired nine of the current faculty, all of the permanent administrative staff and most of the technical staff.

The evening started with a reception and the partying just kept going. Champagne toasts were offered by Teresa Narduzzi to her father Geoff Norris; by Andrew Westgate to his father John; and by Richard Grieve, Chief Scientist of the Geological Survey of Canada, to his PhD supervisor Jeff Fawcett. Pekka Sinervo, Vice Dean brought greetings and congratulations from the Faculty of Arts and Science and the University. In the spirit of "a chair for a Chair", each retiree received a wood armchair with a suitable inscription that they occupied while gracious words were spoken over them by Pekka for Jeff, by Bob McNutt, recently principal of University of Toronto at Mississauga, for Geoff and by Steve Scott for John. Not only good words but also gifts contributed by the active faculty flowed, too from the current Chair's favourite four-letter store 6 bottles of white and 6 bottles of red vintage wines from around the world nicely packaged by the LCBO.

(from FRED ... www4.geology.utoronto.ca/FRED/fred.html)



Call For Short Courses

GAC invites submissions from anyone interested in organizing a short course for the GAC Annual Meeting scheduled for Brock University (St. Catherines, Ontario) 2004. Suggestions are also welcome for other venues, post-2003.

Interested persons should contact the GAC Short Course Coordinator, Dick Wardle, at 709 729-2107 or

rjw@zeppo.geosurv.gov.nf.ca

The Rocks of Old Quebec

A pedestrian tour on the building and ornamental stones of Old Quebec is available for viewing on the internet. It includes a short history followed by a description of the stones of prestigious historical buildings and commemorative monuments of Quebec City (63 sites and 90 pictures). The title of the document is "À la découverte des pierres de construction et d'ornementation du Vieux-Québec: Un circuit pédestre". The URL is <http://www.ggl.ulaval.ca/ledoux/accueil.html> and available in French.

Paper copies in English or in French are available at the Ministère des Ressources naturelles du Québec, Service de diffusion, 5700, 4ième avenue ouest, Charlesbourg (Québec), G1H 6R1. The English copy title is "Building and ornamental stones in Old Québec, MB 2001-04, 66 pages, 90 pictures, \$10.50. The French copy title is "À la découverte des pierres de construction et d'ornementation du Vieux-Québec: Un circuit pédestre", MB 2001-05, 68 pages, 90 photos, 10,50\$.

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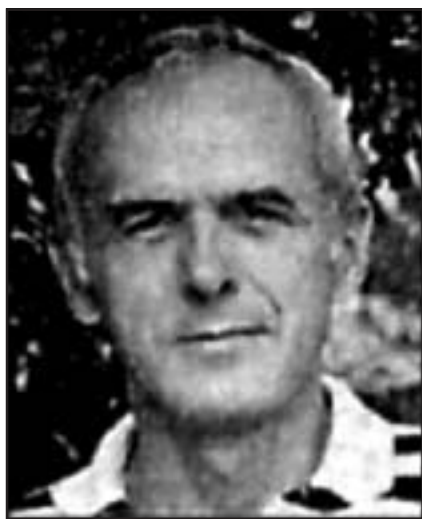
Victor G. Milne 1934-2002



Born in Scotland, Vic completed his undergraduate studies in geology at the University of Aberdeen. Emigrating to Canada in 1957, he spent the summer of 1958 working with the GSC then switched to the Ontario Department of Mines. After a brief stint in western Canada, he returned to stay with the ODM in 1962 in which year he received a PhD from the

University of Toronto for his thesis, *The petrology and alteration of some spudumene pegmatites near Beardmore, Ontario*. Vic was named chief geologist of the Precambrian Section, Geological Branch in 1972. In 1981, he was appointed a Deputy Director of the Southwest Region, MNR. He returned to become the second Director of the OGS upon Ed Pye's retirement. Vic oversaw the move of the OGS from Toronto to Sudbury in 1990 and remained Director until retirement in 1992. Vic is survived by his wife, Florence, and three children, Catherine, Leslie and Gordon.

Douglas R. Grant



We are saddened to pass on the news that Doug Grant passed away in January. He had been severely ill for some time following a brain aneurysm in August 2002, and had been in a coma. He was a graduate of Dalhousie University with a BSc and MSc in Geology and a PhD from Cornell. He was a research scientist with the GSC for 30 years during which time he made contributions to the geology of Nova

Scotia and Newfoundland. He contributed internationally in many ways including involvement in UNESCO projects. In 1995 he took early retirement and founded Terracon Geoscience International. He was last active at the ACID workshop in Spring 2002 at Dalhousie, where he was in fine form, listening to the numerous presentations and contributing insightful comments when asked. He led a short field trip to exposures just outside Halifax and enjoyed showing these sediments to a varied group of participants.

Doug was one of the dominant figures in Canadian Quaternary studies over the last 40 years, particularly so for anyone working in

Edgar G. Pye 1925-2002



Born and educated in Toronto, Ed entered the geology department of the University of Toronto, and began his career with the Ontario Department of Mines in 1948 when he participated in the mapping of Ashmore and Errington Townships under the guidance of W.D. Harding. His continued mapping and data collection about the geology of northwestern Ontario with the ODM, led to his appointment in

1952 as Resident Geologist, Port Arthur. He completed his PhD thesis, *A petrographic study of the textures of basic and ultra basic igneous rocks* in 1953. Dr. Pye, in addition to his geological surveys, believed strongly in public education and in addition to offering prospecting classes in Port Arthur, published *Geology and Scenery - North Shore of Lake Superior*, the first in a series of guidebooks for the general public. In 1966 he transferred to Toronto as Chief Geologist in the Geological Branch of the Ontario Department of Mines, becoming Director of the Branch in 1972, then part of the Ministry of Natural Resources. He worked tirelessly to promote the importance of Geological Branch activities and on April 1, 1978 was able to celebrate the inauguration of the Ontario Geological Survey. Ed continued as Director, OGS until his retirement in 1983. Among the initiatives undertaken during his tenure with the OGS were: the Jack Satterly geochronology laboratory at the Royal Ontario Museum; expanded mineral deposit studies; the Ontario Geoscience Research Grants Program; the Ontario Mineral Exploration Program; and the province's system of core libraries. Following retirement Ed continued to write, revising his North Shore of Superior guidebook and submitting short articles to the Canadian Rockhound in between producing a variety of paintings. Ed Pye, the first Director of the Ontario Geological Survey, died November 3, 2002.

Our condolences go to his wife Joyce and daughters Debora and Joanne and their families.

the Atlantic Provinces. Certainly for those working in Newfoundland it seems wherever we go we are following in Doug's footsteps. A superb air-photo interpreter he built his career with the Geological Survey of Canada on a series of mapping projects in Newfoundland and Cape Breton. His published maps cover the entire West Coast of Newfoundland, and his interpretations leading from this work colour our own today. His very brief paper outlining multiple deglacial ice caps has been cited again and again as field studies bear out this interesting idea. His Northern Peninsula work clearly delimited the extent of Laurentide ice sheet glaciation on the Island of Newfoundland. Numerous other concepts on Late Wisconsin ice limits, drift prospecting, weathering zones, nunataks and sea-level still influence discussion today. Always open to new ideas he embraced testing of the nunatak hypothesis with cosmogenic dating methods.

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TGI, Northern Science, Climate Change and the Federal Budget

The recent Federal budget provides \$16 million over the next two years to expand federal programs, including an additional \$6 million over the next two years for the Polar Continental Shelf Project to provide air transport and land-based infrastructure to Arctic researchers. A further \$10 million over two years will be provided to continue the popular and successful Targeted Geoscience Initiative, allowing the program's mission to be extended to the energy sector, including energy oriented activities in Canada's North. The granting councils will also be asked to enhance their support for northern research as part of the increased funding they receive in this budget.

Since 1997 the federal government has announced almost \$1.7 billion in climate change expenditures. The recent budget provides additional funding of \$2 billion over five years to support climate science, environmental technology, cost-effective climate change measures and partnerships in areas such as renewable energy, energy efficiency, sustainable transportation and new alternative fuels.

Hi-Tech Rino

Technology has played an increased roll in geological field programs during the past ten years and that trend continues with the development of the Rino 110 and 120. These devices are state-of-the-art GPS navigation and two-way communications combined.

You can essentially "beam" your exact location to another Rino user although only within a two-mile range. With this feature you can keep track of the positions of several other users. The radio functionality of the Rino provides two-way communications, on one of seven voice-only channels, but again, for only a two mile range. There's also a voice scrambler and a vibration mode.

The units also have enough memory to download detailed maps. The Rino has a built-in basemap of American road and highway detail, along with 8 MB of internal memory for downloading additional road, street, and points-of-interest data from a number CD-ROMs. The unit is waterproof and can interface with a PC with a cable that is included in the Rino 120 model.

As many geologists carry both a GPS and a hand-held radio, these devices could add some increased efficiency to a field program, or could be a life-saving feature in an outdoor emergency, however, the limited range decreases the product's usefulness in most programs. The Rinos retail for between \$200 and \$300 US. Additional information can be found at <http://www.garmin.com/products/rino/> or some outdoor sporting goods shops.



A Mammoth Event

Yukon will host the 3rd International Mammoth Conference from May 24-29, 2003. Three days of technical and poster sessions in historic Dawson City will give an in-depth look at current research on mammoths and their environment. There will be a mid-conference excursion to the Klondike Goldfields, one of the world's major sources of woolly mammoths and their fauna.

For details contact John.Storer@gov.yk.ca or visit their website at: <http://www.yukonmuseums.ca/mammoth/index.htm>

U of T Accepts Jack Satterly Geochron Lab

In January, the Department of Geology at the University of Toronto voted overwhelmingly to accept the Jack Satterly Geochronology Laboratory. A month previously, the Royal Ontario Museum decided to no longer support the Lab after a successful tenure of more than 20 years (see *Geology* v. 31, pt. 4). The U of T administration has endorsed this initiative in principal and is now seeking ways to find funding for the position of laboratory director, and for the costs of building new laboratory space. If approved, the move will probably occur in June of 2003. Approximately 60 letters of support were sent to university administration in endorsing the lab and likely played a role in influencing the university's high level of support.

CGU & Tuzo Medal

The 29th Annual Scientific Meeting of the Canadian Geophysical Union will be held at the Banff Centre, May 10-14, 2003. The theme of this year's meeting is "Challenges and Opportunities for Geophysics in Canada".

This year there will be a *new* award for the best student paper in Geodesy. In addition, there are three CGU and CGU-HS awards for oral presentations: CGU best student paper award (all fields of geophysics), Chevron Canada outstanding student paper in seismology, and the D.M. Gray Award for best student paper in Hydrology. There are also two awards for poster presentations: Shell Canada best student poster award (other than hydrology), and the Campbell Scientific award for best student poster in hydrology. Each of these awards comes with a \$500 monetary prize.

The J. Tuzo Wilson medal will be awarded at the annual banquet on May 14. Please visit for details of the nomination procedure. In a break with tradition, the CGU will be announcing the J. Tuzo Wilson medallist prior to the Banff conference (late April).

Canadian
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Calendar

2003

* April 6-10

Environmental and Engineering Geophysics Society Annual Meeting (SAGEEP 2003), San Antonio, TX
Tel: 303 756-3143; Fax: 303 691-9490; E-mail: eggs@neha.org

* April 7-10

International Conference on Hydrology of the Mediterranean & Semi-Arid Regions
E-mail: montpellier2003@msem.univ-montpw.fr
Web: www.mpl.ird.fr/montpellier2003

April 7-11

2003 EGS, AGU, and EUG Joint Assembly, Nice, France
Web: <http://www.copernicus.org/egsagueug/>

April 8-9

Northwestern Ontario Mines & Minerals Symposium, Thunder Bay, ON
E-mail: mwopa@tbaytel.net

April 8 - 11

12th Calgary Mining Forum, Calgary, AB
Tel: 403 259-6734
Web: www.meg.calgary.ab.ca

April 15-16

Northeastern Ontario Mines and Minerals Symposium, Cobalt, ON
Tel: 705 567-4377

* April 22 - 25

ProEXPLO, Lima, Peru
Ore-forming systems: Searching for new types of deposits; Fe-oxide(-Cu-Au) systems: similarities and differences with other intrusion-related deposit types
E-mail: proexplo@iimp.org.pe
Web: www.proexplo.com.pe

* April 26 - 28

Workshop in Mineral Exploration: Gold Exploration, Sudbury, ON
SEG Student Chapter at Laurentian University
E-mail: nlafleur@nickel.laurentian.ca

* April 26 - May 6

SEG-GAC Student Chapters at UBC, Field Trip, Geology and Mineral Deposits of Central Peru
E-mail: rtosdal@eos.ubc.ca
Web: www.segweb.org/PeruAd.pdf

May 2 - 5

Fifth British Columbia Paleontological Symposium, Nanaimo, BC
Tel: Maggie McColl, 250-753-3245, local 2334; E-mail: mccoll@mala.bc.ca
Web: www.mala.bc.ca/faep/paleo.htm

May 3-11

Environmental Geochemistry Iberian Pyrite Belt Field Course, Portugal
E-mail: wxchavez@nmt.edu
Web: www.segweb.org/IberianCourse.htm

May 4-7

CIM 2003, Montreal, PQ
Canadian Institute of Mining Metallurgy and Petroleum. Tel: 514 939-2710. Fax: 514 939-2714
Web: www.cim.org/MCE/montreal2003/

* May 10-14

Canadian Geophysical Union Annual Meeting, Banff, AB
Web: www.cgu-ugc.ca/

* May 18 - 24

39th Forum on the Geology of Industrial Minerals, Sparks, NV
E-mail: tgarside@unr.edu
Website: www.nbmj.unr.edu/imf

May 21-23

Sustainable Development Indicators in the Mineral Industries, Heliotopos Conferences
Tel: +30 10 9730697. Fax: +30 10 9883059. E-mail: sdimi@heliotopos.net
Web: www.heliotopos.net/conf/sdimi2003

May 25-28

11th Symposium on Deformation Measurements, Santorini, Greece
Web: www.heliotopos.net/conf/11fig

May 25-29

Joint GAC-MAC-SEG Annual Meeting, Vancouver, BC
Tel: 604 681-5226; E-mail: Vancouver2003@nrcan.gc.ca
Web: www.Vancouver2003.com

May 26-28

2nd Internat'l Symposium on Contaminated Sediments, Quebec City, PQ
Web: <http://www.scs2003.ggl.ulaval.ca>

May 29 - June 1

Geology Without Frontiers: Magmatic and Metamorphic Evolution of the Central European Variscides Blansko, Czech Republic
Jaromir Leichmann, Tel: +420 (5) 41 12 92 61; Fax: +420 (5) 41 21 12 14; E-mail: cgs@mail.natur.cuni.cz
Web: www.natur.cuni.cz/~cgs/nofrontiers/

* June 1 - 12

SEG-UNESCO Metallogeny Course, Quito, Ecuador
Web: www.unige.ch/sciences/terre/mineral/ore/min_ore.html

* June 2-5

Canadian Meteorological and Oceanographic Society 37th Annual Congress, Ottawa, ON
Web: www.cmso.ca

* June 2-6

International Glaciological Society, International Symposium on Snow and Avalanches, Davos, Switzerland
Web: www.igsoc.org/symposia/2003/davos/

June 4-6

ECROFI XVII, Budapest, Hungary
Web: ecrofi17.geology.elte.hu

June 8 - 10

3rd Canadian Conference on Geotechnique and Natural Hazards, Edmonton, AB
Web: <http://www.geohazards2003.eba.ca>

* June 11-13

Canadian Water Resources Association 56th Annual Conference, Vancouver, BC
Web: www.cwra.org

* June 14 - 18

Chapman Conference: Ecosystem Interactions with Land Use Change, Sante Fe, NM
Tel: 202 777-7340; Fax: 202 328-0566; E-mail: asinger@agu.org
Web: www.agu.org/meetings/cc03acall.html

* June 22-27

8th International Kimberlite Conference, Victoria, BC
Web: www.8ikc.ca

* June 29 - July 2

International Water Congress: Watershed Management for Water Supply Systems, New York, NY
American Water Resources Association, Tel: 315 470-6571; E-mail: pebchair@esf.edu or ruthanna@bestweb.net

June 30 - July 11

International Union of Geodesy and Geophysics (IUGG2003), Sapporo, Japan
Web: www.jamstec.go.jp/jamstec-e/iugg/index.html

July 14 - 18

Cities on Volcanoes, Hilo, HI
<http://www.uhh.hawaii.edu/~cov3/>

* August 9 - 21

SEG/IGCP 473 Field Symposium, Paleozoic Geodynamic Processes and Metallogeny of Chinese Altay and Tianshan, Urumqi, China
E-mail: jingwenmao@263.net
Web: www.nhm.ac.uk/mineralogy/cercams/activities/Urumqi_firstcircularlast.doc

* = new entry

August 10 – 14

GeoSciEd IV: Earth Science for the Global Community, Calgary, AB

Web: www.geoscienced.org

August 18-21

9th International Symposium on the Ordovician System & 7th International Graptolite Conference, San Juan City, Argentina

E-mail: galbanesi@arnet.com.ar

Web: ceor.seos.uvic.ca/ordovician or iago.stfx.ca/people/mmelchin/silurian9.htm

August 16 – 21

State-of -the-Arc, Cascades, WA

E-mail: leeman@ruf.rice.edu

* August 19 – 21

Fermor Flagship Meeting, World Class Mineral Deposits and Earth Evolution, Cardiff, UK

E-mail: mcdonaldil@cf.ac.uk

Web: www.mdsg.org.uk

August 24-28

SGA Meeting, Athens, Greece

Web: www.igme.gr/sgaconference.htm

* August 24 –28

SEG Symposium at SGA Meeting, Exploring for Tethyan ores: Development from historic roots, Athens, Greece

E-mail: molnar@abyss.elte.hu

Web www.segweb.org/meetings.htm or www.igme.gr/sgaconference.htm

* August 25-29

International Glaciological Society, 7th International Symposium on Antarctic Glaciology, Milan, Italy

Web: www.igsoc.org/

August 27 - September 3

International Geochemical Exploration Symposium, Association of Exploration Geochemists, Dublin, Ireland

Web: www.aeg.org

August 31 -September 3

North Atlantic Minerals Symposium (NAMS), Dublin, Ireland

Tel: 709-729-5946; E-mail: bfk@zeppo.geosurv.gov.nf.ca

Web: www.gov.nf.ca/nams/

September 2 – 6

Fifth Hutton Symposium on the Origin of Granites, Toyohashi, Japan

E-mail: Hutton-V@m.aist.go.jp

Web: www.gsj.jp/Info/event/hutton

September 7–11

International Symposium on Environmental Geochemistry, Edinburgh, Scotland

Web: www.iseg2003.com

September 10-12

Debris-Flow Hazards Mitigation: Mechanics, Prediction, and Assessment, Davos, Switzerland

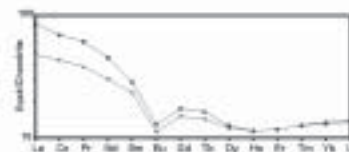
Web: www.wsl.ch/3rdDFHM

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* September 17 – 19

IGWMC Modflow & More 2003, Golden, CO

Tel: 303 273-3103; Fax: 303 384-2037; E-mail: igwmc@mines.edu

October 6 – 10

Chilean Geological Congress & Andean Metallogenesis Symposium, Chile

Web: www.udec.cl/cgeologico

* October 6 – 10

Andean Metallogenesis Symposium at 10th Chilean Geological Congress, Chile

E-mail: jperello@aminerals.cl
Web: www.segweb.org/meetings.htm or www.udec.cl/cgeologico

* October 22 – 26

AIMMGM Annual Meeting, Acapulco, Mexico

E-mail: david_giles@penoles.com.mx
Web: <http://aimmgmac-son.org.mx/>

November 2 – 5

GSA 115th Annual Meeting, Seattle, WA
Geological Society of America. Tel: 303 357-1038; Fax: 303 357-1072;

Web: www.geosociety.org/meetings/index.htm

* November 24 –25

Sustainable Minerals, London, UK
E-mail: fmcevoy@bgs.ac.uk

* December 1 – 5

NWMA Meeting and SEG Technical Session, Spokane, WA

E-mail: vaalbara@u.washington.edu
Web: www.nwma.org

* December 8 – 12

American Geophysical Union 2003 Fall Meeting, San Francisco, CA
Web: www.agu.org/meetings

More events on-line at:
www.gac.ca/PUBLICAT/GEOLOG/calendar.htm
hyperlinks and all...



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