ASH FALL

Newsletter of the Volcanology and Igneous Petrology Division
Geological Association of Canada

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From the Editor

In this issue of Ashfall we have contributions from Glyn Williams-Jones highlighting a field trip to the Cascades, Patricia Corcoran provides a summary of the recent Archean Symposium and associated field trip, a summary of research activities at Laval by Réjean Hébert and Gregory Shellnut reporting on the activities of Canadians at the University of Hong Kong. The content of each issue is entirely dependant on contributions from volunteers like these, without their efforts there would be no Ashfall. Consequently I would like to encourage all of you to think about submitting something to the newsletter. It can be a report of activities at your institution, interesting research results you would like to share, reports of field work activities, or just a few neat photos, basically anything that you think mught be of interest to other VIPers. Without contributions from you there can be no Ashfall.

There have been a few volcanic events of note since our last issue. The Hawaiian Volcano Observatory has recently posted some spectacular time lapse movies of eruptions at Pu`u `O`o on their web site. One of these includes footage of the infilling of the main crater on July 5-6 2007 - well worth a look. Also in the news Ol Doinyo Lengai, featured on the front page of Ashfall 65, erupted on 4 September producing an ash plume that was reported by a pilot and visible on satellite imagery. Ashfall lasted about 12 hours in the village of Engare Sero, about 18 km N.

Granite clasts in a granite matrix breccia, Schultze Granite, Arizona. Photo courtesy Pete Hollings

Eroded volcanic neck with tuff ridge in foreground, Arizona. Photo courtesy Pete Hollings

EHaz Volcano Instability course and associated Cascades Field Trip

Glyn Williams-Jones

Department of Earth Sciences, Simon Fraser University

In late July, as part of a unique online seminar course (EHaz – Earth Hazards) for volcanology students, John Stix and I took part in a 2 week field trip across the Cascades Range.

The class, which consisted of advanced undergraduate and graduate students from six universities across North America (McGill University, Simon Fraser University, Universidad de Colima, Universidad Nacional Autónoma de México, Michigan Technological University and the University at Buffalo) used conferencing software (www.marratech.com) to bring together the students and 14 experts from around the world to discuss Volcano Instability and address the possibility and consequences of the catastrophic collapse of volcanoes.

Photo 1: Mt Shasta megablock - this block shows the original complex structure of the pre-300ka edifice. Note John Stix (in white had and green shorts) for scale.

Following on last year's extremely successful course on Supervolcanoes (http://www.geo.mtu.edu/EHaz/Supervolcanoes.htm) and its associated field trip to Yellowstone and Long Valley calderas, a group of 20-30 people (we had lots of people coming and going!) spent two weeks traveling through the Cascades Volcanic range. We started off by visiting the world-class debris avalanche deposits of Mt Shasta (California), where we saw house sized megablocks from the 300-380 ka event – total estimated volume of the slide, 45 cubic kilometers! The group then moved on up to Crater Lake to see the remnants of the 6845 BP Mount Mazama eruption and then onto Mt St. Helens where we looked at both the pre- and post 1980 deposits – the hummocky terrain of the debris avalanche really does mirror that of Shasta but on a much smaller scale. Unfortunately we were not able to get into the crater as the new dome (now at a whopping 92.7 million cubic meters, as of April 20th) continues to extrude at 0.3 m^3/s (in 2005, it was averaging 2 m^3/s!).

Photo 2: The Mexican contingent were on track to "claim" all of the Cascade volcanoes for Mexico!

Following that, we headed up to Mt Rainer where Jim Vallance (CVO but formally of McGill) showed us the amazing lahar deposits that Rainier is so famous for. The most impressive, the Osceola Mudlfow (4,800 BP radiocarbon), had a total volume of 3.8 km^3, filled valleys of the White River to depths of 80-150 m and inundated 200 km^2 of the Puget Sound lowlands before flowing 20 km underwater to the present suburbs of Seattle/Tacoma!

Photo 3: Mt Rainier seen from the NE – its no wonder that it is able to generate such impressive mudflows!

Not to be outdone and to bring in a bit of Canadian Content, we drove up to the Hope slide in British Columbia to look at the similarities and differences of a non-volcanic slide. The 1965 failure (actually 2 "small" events at 4 and 6 am) moved 47 million cubic meters of Cretaceous greenstone down the slope, generated two ~ M3.1 earthquakes

Photo 4: Hard at work on airfall pumice deposits on the rim of Crater Lake.

and killed 4 people unlucky enough to be driving along Highway 3. To finish it all off in style, Kelly Russell and Graham Andrews (both of UBC) lead us through the deposits of Mt Meager (near Pemberton and part of the northern extension of the Cascade Range). The welded block and ash flow deposits from the 2360 BP eruption filled the Lillooet River and then failed catastrophically – these are part of only a handful of such deposits from around the world!

Photo 5: The crater of Mount St. Helens with the 1980-85 dome in the fore front bracketed by the worlds youngest (and probably dirtiest glaciers!). In the back of the crater can be seen the currently active dome with fumarolic activity from a number of sites.

So a fantastic trip with fabulous weather (amazing really for the "Wet Coast") and a great bunch of students – I strongly recommend hitting the Cascades for any of you that haven't had the chance!

More information about this course and the associated trips can be found at the main EHaz website (www.geo.mtu.edu/EHaz).

Cheers, Glyn

Photo 6: World class welded Block and ash flow deposit (upper unit) overlying part of an unwelded phase of the Mt Meager 2360 BP eruption.

Research at Université Laval, Québec City

Réjean Hébert

Since 1998, I have been involved in various research projects in Tibet with the collaboration of Chinese colleagues based in Beijing, Shanghai, Chengdu and Lhasa. The projects of the group "GEO: genène et évolution des ophiolites" were devoted to the reassessment of the Yarlung Zangbo Suture Zone ophiolites and related mélanges and flysch formations. Teams made of Canadian students and scientists and collaborators in Tibet and China revisited numerous ophiolite massifs in order to establish their Lower Cretaceous age, their formation within arc-backarc systems and their quick tectonic displacement soon after their genesis. We discovered new garnet amphibolite occurrences. Their age and composition suggest that they derive from the closing of backarc spreading segments. The next projects will be the examination of the extension of ophiolitic chain to the west and eventually connect with Ladakh area.

We recently dicovered that Miocene magmatic rocks are present within the Yarlung Zangbo Suture itself. These shoshonitic rocks derive from mid- to lower-crust partial melting. These newly discovered occurrences provide an excellent opportunity to look though the window and witness the nature of the Tethyan rock pile stacked under the ophiolite massifs and test the channel flow model. Geochemical models will tell if Indian plate is involved with the partial melting and outline implications for the nature of the suture zone itself.

The GEO projects are multidisciplinary. This hollistic approach is appropriate to investigate such amazing and complex geologic natural laboratory. Several new results will be presented at Québec 2008 next May.

Canada and Hong Kong what's the geological connection?

J. Gregory Shellnutt

University of Hong Kong

On July 1st of this year the Hong Kong Special Administrative Regional government celebrated the 10th anniversary of the return to Chinese sovereignty. On the same day another country across the Pacific Ocean and a little to the north celebrated its 140th anniversary. At first glance Hong Kong and Canada seem to have very little in common however with the tiniest of investigations it's clear the two have a deeply rooted friendship which has lasted for over one hundred years. Hong Kong, a city which elegantly blends the East with the West, is home to over 200,000 Canadians and their presence is noticed in almost every corner of the territory. If you wish you can eat at White Spot Triple O's restaurant, or indulge in poutine with a bottle of Molson Canadian at a local pub called Cul-de-Sac while watching the Grey Cup championship. But there is another uniquely Canadian influence in Hong Kong and it is well grounded, literally.

In the early 1990s The University of Hong Kong (est. 1912) decided that an Earth Sciences department would be an excellent compliment to the existing science programs and began a search to find someone well suited to develop such a program. They managed to convince Professor John Malpas of the Memorial University of Newfoundland to oversee the development of an Earth Sciences department which emphasized geology, geochemistry and geophysics. In addition to John Malpas, Min Sun and Mei-Fu Zhou were recruited from The University of Saskatchewan and Laurentian University to teach and develop research projects in petrology, geochemistry and economic geology. In addition to their expertise, they brought their Canadian perspective on the geological sciences. In just over 10 years the department is blossoming into an influential geological institute in the Asia-Pacific region and Canadians are at the forefront of its development.

Between them John, Min and Mei-Fu have supervised over 30 graduate students including about 20 Ph.D. students. Their work focuses on geological problems such as orogenic belt and ophiolite complexes, magmatism in large igneous provinces, and the Precambrian geology of China. Their work stretches from the Mediterranean (e.g. Cyprus and Syria), throughout China and to the islands of the south Pacific. Their teaching styles emphasize fieldwork as the cornerstone of geology and routinely take students to mainland China (e.g., Tibet, Beijing, Taishan, Hainan, Wuhan, Guangdong), Taiwan and Cyprus for field courses. As a teaching assistant for both John and Min and Ph.D. student of Me-Fu, I've seen first hand the enthusiasm from the undergraduate students as they make their first geologic map or identify minerals in hand specimen outside of the university environment. Having completed my M.Sc. and B.Sc. at The University of Western Ontario and Saint Mary's University, respectively, there is something familiar about their teaching styles and engagement with the students. Perhaps it's patience, passion or persistence but much like Canada it's difficult to pin down, there is just something 'Canadian' about it.

In the coming years The University of Hong Kong will be expanding under the ambitious Centennial Campus Project (http://www3.hku.hk/centcamp/) guided by Professor Malpas. He, with Vice Chancellor Lap-Chee Tsui (formerly of University of Toronto) and Dean of Science Sun Kwok (formerly of University of Calgary), will be laying the foundations for the future of HKU and, like many parts of Hong Kong, it will be influenced by Canadians.

I arrived in Hong Kong looking for new experiences both professionally and personally. Working in China and living in Hong Kong has given me an incredible experience while being able to be part of a growing Earth Sciences department which is not all that different from home.

Current Activities

John Malpas - Current research activities include: 1) Trace element partition coefficient determinations by LAM-ICP-MS and application in petrogenetic study of island arc basalts. 2) Mantle processes and heterogeneity: evidence from ophiolites and 3) Complete reappraisal of northland ophiolite, northern New Zealand, overhaul of the SW Pacific geotectonic plate model. Professor Malpas is also involved with coordinating the strategic development of HKU and is Chairing the Centennial Campus Project Group.

Min Sun - Precambrian Geology of North China Craton, geochemical processes in Central Asian Orogenic Belt, paleo-climate study of South China Sea using coral geochemical proxies.

Mei-Fu Zhou - Currently developing projects which focus on PGE geochemistry of mafic/ultramafic layered intrusions, magmatic Ni-Cu-(PGE) sulphide deposits petrogenesis of podiform and stratiform chromite deposits, Permian igneous activities in the Eurasian continent, and Neoproterozoic magmatism of the Yangtze Block.

Greg Shellnutt - My Ph.D. research at HKU has focused on the plutonic rocks of the Emeishan large igneous province (ELIP). In particular the association of magmatic Fe-Ti-V oxide-bearing layered gabbros and their genetic links to contemporaneous and spatially associated peralkaline granitic plutons. I will begin a post-doctoral position at Academica Sinica in Taiwan during the fall.

Archean Symposium 2007: A Global Comparison of Archean Terranes

The Archean Symposium, co-sponsored by the University of Western Ontario (UWO), the Volcanology and Igneous Petrology Division (VIP), and the Global Precambrian Sedimentation Syndicate (GPSS), was a wonderful success! The symposium, which took place from August 19th-25th included a two-day conference at UWO, followed by a 2.5-day fieldtrip to the Abitibi greenstone belt in and around Rouyn-Noranda, Quebec. We were fortunate to host participants from many different countries, including Brazil, Canada, France, Germany, Japan, South Africa and the United States. This international group of people represented the diversity and global distribution of Archean successions, and made for lively discussions in the conference room and on the outcrops. The oral presentations concerned

Pillowed volcanic facies in a komatiite-komatiitic basalt-Mg basalt sequence, Stoughton-Roquemaure Group

a wide variety of Earth Sciences disciplines, including early life (Wladyslaw Altermann, Nathan Bridge, Shoichi Kiyokawa), isotopic studies (Chris Fedo, Beatte Orberger), geochronology (Elton Dantas, Desmond Moser), structural geology (Dazhi Jiang, Shoufa Lin), geochemistry (Pete Hollings, Francois Leclerc), sedimentology/stratigraphy (Wulf Mueller, Adam Bumby, Grant Young, Wayne Nesbitt), terrane analysis/greenstone belt models (Phil Thurston, Benjamim Bley de Brito Neves, Jean Goutier), and geophysical characteristics (Dave Eaton, Catherine Robin). Several other registrants elected to participate through questions and discussions, or by contributing posters, all of which helped make the meeting a success.

Half of the group continued on with the symposium by participating in the fieldtrip, during which the weather cooperated for the most part, and the meals at the Hotel Noranda were delectable. The fieldtrip itinerary (outlined below) entailed thirteen stops over two and half days, lead by Wulf Mueller from UQAC.

Wulf Mueller and Benjamim Bley de Brito Neves examine elongated boulders in the Granada basin conglomerate.

Day 1. Spinifex Ridge and Blake River Caldera Complex

Stop 1-1. Spinifex Ridge outcrop west

Stop 1-2. Spinifex Ridge outcrop east

Stop 1-3. Picke Group and Blake River caldera unconformity

Stop 1-4. Variolitic basalt flows

Stop 1-5. New Senator caldera basaltic magma lake

Stop 1-6. New Senator mafic flows and hyaloclastite

Day 2. Hunter Mine & Stoughton-Roquemaure Groups

Stop 2-1. Felsic dyke swarm

Stop 2-2. Komatiite-komatiitic basalt-Mg basalt sequence

Stop 2-3. Pyroclastic turbidites and chert-magnetite iron-formation

Stop 2-4. Caldera margin with hydrothermal chert-magnetite-jasper deposits

Hydrothermal jasper-magnetite iron-formation, Hunter Mine Group.

Stop 2-5. Zone of sulphide mineralization

Day 3. Granada Basin

Stop 3-1. Granada basin sedimentary deposits

Stop 3-2. Granada basin conglomerate

Comparisons were made between similar volcanic and sedimentary deposits in South America, South Africa, Australia, and India, although the interpreted origins of specific rock types (e.g. chert and iron-formation) differ significantly. The fieldtrip provided an opportunity to examine igneous rocks comprising Volcanic Cycles 1 (2735-2720 Ma), 2 (2720-2705 Ma), and 3 (2705-2696 Ma) of the Abitibi belt. These volcanic cycles, in addition to a younger cycle 4, record the evolution of two oceanic arcs during arc formation, arc evolution, arc-arc collision, and arc fragmentation.

I'd like to extend sincere thanks to our sponsors for making the Archean Symposium 2007 a profitable experience for all concerned. Special thanks go out to Lyndsay Moore, Meriem Grifi, and Alexandre Aubin who helped immensely with the preparation of the event.

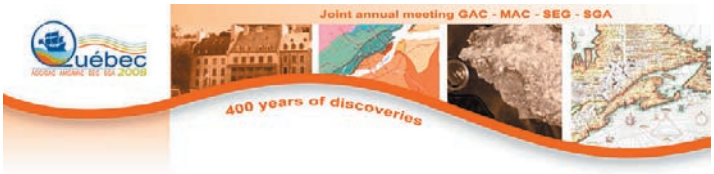
We're looking forward to the next international Archean Symposium!

Patricia Corcoran

University of Western Ontario

Field trip participants discussing the turbidite deposits of the Granada basin.

Meeting Announcements



GAC-MAC 2008

The Volcanology and Igneous Petrology Division is sponsoring the following activities at the Quebec City meeting, May 26-28, 2008.

Special sessions

1. Bimodal volcanism: petrogenesis and tectonic setting- Convenors: Jaroslav Dostal and Brendan Murphy

2. Anorthosites to rapakivi g ranites: a tribute to the Career of Ronald F. Emslie - Convenors: Mike A. Hamilton, James S. Scoates and Tapani Ramo

Short Courses

Submarine volcanism and mineralization: modern through ancient - Convenors: Brian Cousens and Steve Piercey

Pre-Meeting Field Trip

Effusive and explosive subaqueous volcanism in the Abitibi greenstone belt - Leaders: Wulf Mueller, Real Daigneault, Vital Pearson and Damien Gaboury

For more details visit the web site

At the Quebec City meeting the VIP Division is sponsoring a Special Session

Bimodal Magmatism: petrogenesis and tectonic setting

Bimodal igneous suites consist of the products of coeval mafic and felsic magmatism. Intermediate compositions are subordinate. Bimodal suites are especially common in continental rifts and in specific settings in arcs. Despite their importance, the petrogenesis of these suites, and the role of the tectonic setting in their origin are controversial. This session will investigate the origin of these suites in ancient and modern settings, from a geochemical, petrologic, structural and tectonic perspective.

Organizers

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