



# Explorer

Annual Information Update

Annual Review 2012

**Northern Vancouver Island  
Exploration Geoscience Project**

**Horn River Basin**

**Northeast BC Regional  
Seismographic Network**

**Scholarship Winners**

**Where are they now?**





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*Dr John Thompson  
Chairman of the Board,  
Geoscience BC*

## Message from the Chair

On behalf of the Board, staff and numerous volunteers associated with Geoscience BC, it is my pleasure to present this year's Explorer Magazine (2012-2013).

There are so many people involved in Geoscience BC that it is hard to do justice to the effort, thought and goodwill that goes into the organization. Support from the Provincial government underpins the work of Geoscience BC, based on an effective funding and organizational model that is unique nationally and globally. As important, is the broad support that we enjoy across the Province from partners, clients, communities and First Nations. While our primary goal is to deliver high quality geoscientific data to attract investment and facilitate development, Geoscience BC continues to be viewed as an honest broker delivering unbiased information to all stakeholders. As a result, Geoscience BC plays an increasing role in advancing public understanding of responsible resource development.

In 2012, we had active programs in several parts of the Province supporting both mineral exploration and oil and gas development. New innovative water programs and seismic assessment in northeastern BC in collaboration with industry partners is generating results that support responsible drilling while also addressing concerns from communities and First Nations. For mineral exploration, programs continued in the northwest and a new program in northern Vancouver Island in partnership with the Island Coastal Economic Trust was welcomed by northern island communities and First Nations.

Geoscience BC continues to use new technologies and new approaches to produce the best data through cost effective programs guided by staff, consultants and our broad based volunteer technical advisory committees. In addition to partners in government, we collaborate with universities in BC and support students through our annual Applied Geoscience Scholarships and research projects. These activities are part of

collective efforts in BC to maintain and enhance the technical and educational strength of the BC natural resource industries.

Each year as we review the results, we seek to measure the benefits derived from Geoscience BC programs both to validate and improve our approach. Data on staking, exploration programs, discoveries, and investments in water treatment facilities demonstrate a significant return on the investment in Geoscience BC. Anecdotal evidence also suggests that many of these activities translate into jobs throughout BC.

Turning our knowledge creating efforts into responsible development and employment is perhaps the best reward we can have for the hours of dedicated work by all those working for and with Geoscience BC. Once again I thank all involved with this wonderful organization for creating the results of which we can all be proud.

**Dr. John Thompson**  
*Chairman of the Board,  
Geoscience BC*



Dr. C.D. ('Lyn') Anglin  
President and CEO  
Geoscience BC

## Message from the President & CEO

The past year has been another exciting one for Geoscience BC. It has been particularly rewarding to launch a new partnership in southwest BC: the Northern Vancouver Island Exploration Geoscience Project. This project is receiving up to \$400,000 in funding from the Island Coastal Economic Trust. Additional support has been provided by the Ministry of Jobs, Tourism and Skills Training, the Nanwakolas Council, Rivercorp in Campbell River, and a number of Mayors, Councillors and the Regional Districts representing northern Vancouver Island.

Geoscience BC launched a second new partnership project this year in northeastern BC to monitor and research seismicity associated with natural gas development activity, co-funded with the

Canadian Association of Petroleum Producers through the Science and Community Environment Knowledge (SCEK) Fund. This project is also supported with in-kind contributions of expertise and knowledge from the BC Oil and Gas Commission, and Natural Resources Canada. We also continue to work with the Horn River Basin Producers Group on an ongoing water monitoring study in the Horn River Basin, including partners in the Fort Nelson First Nation and the Acho Dene Koe First Nation.

In addition, Geoscience BC and our partners the Northern Development Initiative Trust continue to see benefits accrue from our QUEST and QUEST-West projects. One of the most significant short-term benefits has been the contribution

that QUEST-West results made to the discovery of new ore at the Huckleberry Mine southwest of Houston. Also, many companies continue to invest in exploration activities in the area of the QUEST and QUEST-West Projects that started with the announcement of and release of data from these projects.

Finally, Geoscience BC is looking forward to launching a number of new projects in 2013 that will continue to stimulate new mineral exploration and oil and gas development projects in BC.

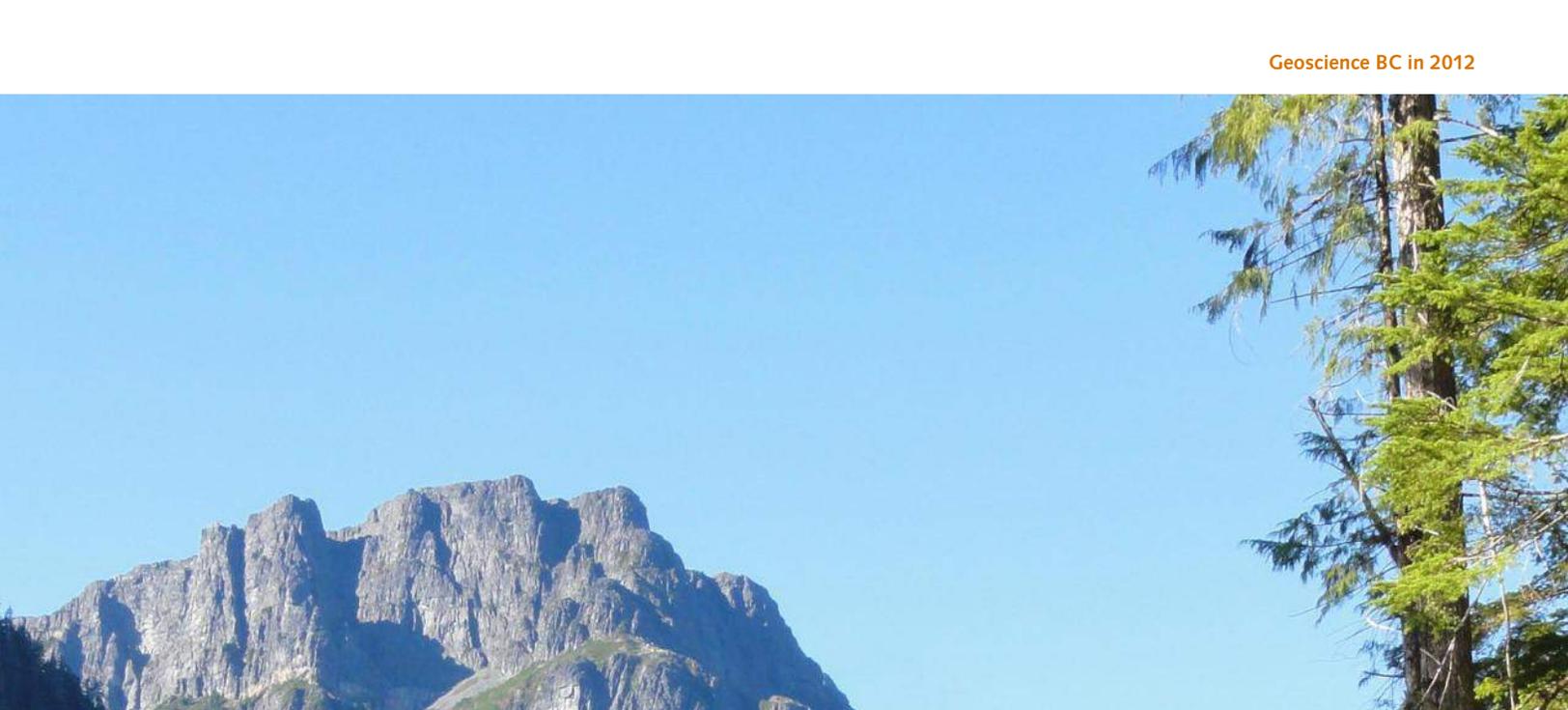
A handwritten signature in black ink, appearing to read 'C. Anglin'.

Dr. C.D. ('Lyn') Anglin  
President and CEO  
Geoscience BC

*'Lyn Anglin (front right) with participants of the Campbell River "Mining – What's it all about" workshop.*



Photo by G. Delgatty.



# Geoscience BC in 2012

**This has been another very successful and exciting year at Geoscience BC. We hired new staff, held a successful strategic planning session, launched two new major initiatives, released new reports and data sets, coordinated four public workshops, and participated in numerous conferences and meetings. Here are just a few of our highlights from 2012:**

### New Staff

In June 2012 Geoscience BC was pleased to welcome Carlos Salas as Vice-President, Oil & Gas. Carlos came to Geoscience BC from Canadian Discovery Ltd. in Calgary, where as Managing Director he provided technical guidance and mentorship along with petrophysical and geophysical support for their various business arms.

With Geoscience BC Carlos is working closely with industry and Geoscience BC's advisors to identify project opportunities, design and deliver new projects, and coordinate activities with partner organizations. Carlos is also engaging with the public and industry to provide information on oil & gas resources in BC, and Geoscience BC's role in promoting responsible development of these resources.

### New Major Projects

Geoscience BC launched two new major projects in 2012: the Northern Vancouver Island Exploration Geoscience Project and the Induced Seismicity Monitoring Program.

The Northern Vancouver Island Exploration Geoscience Project was launched in July 2012 in Campbell River. Geoscience BC and the Island Coastal Economic Trust

jointly fund the project, with additional support from the Ministry of Jobs, Tourism and Skills Training through the Campbell River Regional Economic Pilot Initiative. Project activities include a regional airborne magnetic survey, a regional geochemical program, and community workshops. For more information, go to pages 6 and 7.

The Induced Seismicity Monitoring Program, launched in September 2012, is a partnership between Geoscience BC and the Canadian Association of Petroleum Producers, with in-kind support from the BC Oil & Gas Commission and Natural Resources Canada. The project will set up six new seismograph stations in northeast BC, with the aim of increasing our understanding of induced seismicity generated by fluid injection during hydraulic fracturing. For more information, go to page 11.

### New Data and Reports

This past year also saw the completion of many Geoscience BC programs. Fourteen separate reports were released through Geoscience BC in 2012, including the Summary of Activities 2011 volume, a compilation of sixteen papers from various projects. For more information on 2012 data and report releases, go to page 22.

### Workshops

Geoscience BC was pleased to coordinate four workshops this year. The Kamloops Exploration Group and Minerals South conferences both featured a Geoscience BC-led short course, and two community workshops were held on Vancouver Island as part of the Northern Vancouver Island Exploration Geoscience Project. Combined, over 120 people (both technical and non-technical) participated in these Geoscience BC workshops.

### Strategic Planning Session

In September 2012 Geoscience BC held a successful strategic planning session in Sidney BC. Participants included Geoscience BC Board members, staff, Technical Advisory Committee members, industry and industry association representatives, and government representatives. The productive full-day session was facilitated by Ellen Frisch (OnPoint Consulting), and was followed by a reception and dinner. Thanks again to all participants!

Photos:

*Bottom Left: R. Lett, Northern Vancouver Island Exploration Geoscience Project.*

*Bottom Right: QUEST-Northwest project area.*

*Opposite page top photos: Northern Vancouver Island geochemical sampling.*

*Opposite page bottom photos: Geoscience BC Strategic Planning Session.*

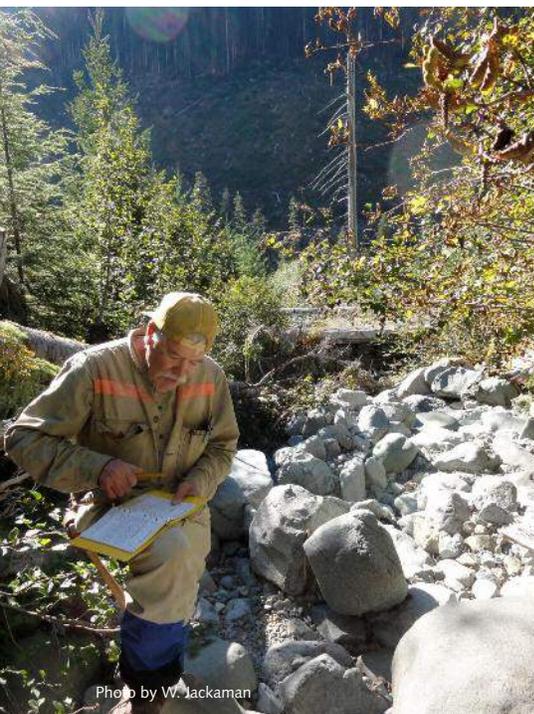


Photo by W. Jackaman



Photo by B. vanStraaten



Photo by W. Jackaman

Photo by W. Jackaman



Photo by S. Reichfeld



Photo by D. Jepsen



Photo by D. Jepsen

## Conferences and Meetings

Geoscience BC staff and consultants attended numerous conferences and workshops this year, giving presentations on Geoscience BC-supported projects at many events. Events attended in 2012 include:

- American Association for the Advancement of Science Annual Meeting
- BC Natural Resource Forum
- BC Waste and Water Association Hydraulic Fracturing Workshop
- Campbell River Economic Forum
- Canadian Aboriginal Minerals Association Conference
- Canadian Science Policy Conference
- Canadian Society of Petroleum Geologists, Geoconvention 2012
- CAPP Environmental Issues Conference
- Energy and Mines Ministers Meeting
- Kamloops Exploration Group Conference
- Kiskatinaw Watershed Forum
- Mineral Exploration Roundup
- Minerals North
- Minerals South
- Prospectors and Developers Association of Canada Conference (PDAC)
- Regional District of Bulkley Nechako Business Forum
- Select Standing Committee on Finance and Government Services
- Shale Gas and Tight Oil Water Management Conference
- Union of BC Municipalities
- Vancouver Resource Investment Conference
- Various Local Government Association Meetings (Vancouver Island and Coastal Communities, Southern Interior, Lower Mainland, North Central)



*“The project is designed to help attract and stimulate mineral exploration and investment on northern Vancouver Island...”*

## Northern Vancouver Island Exploration Geoscience Project

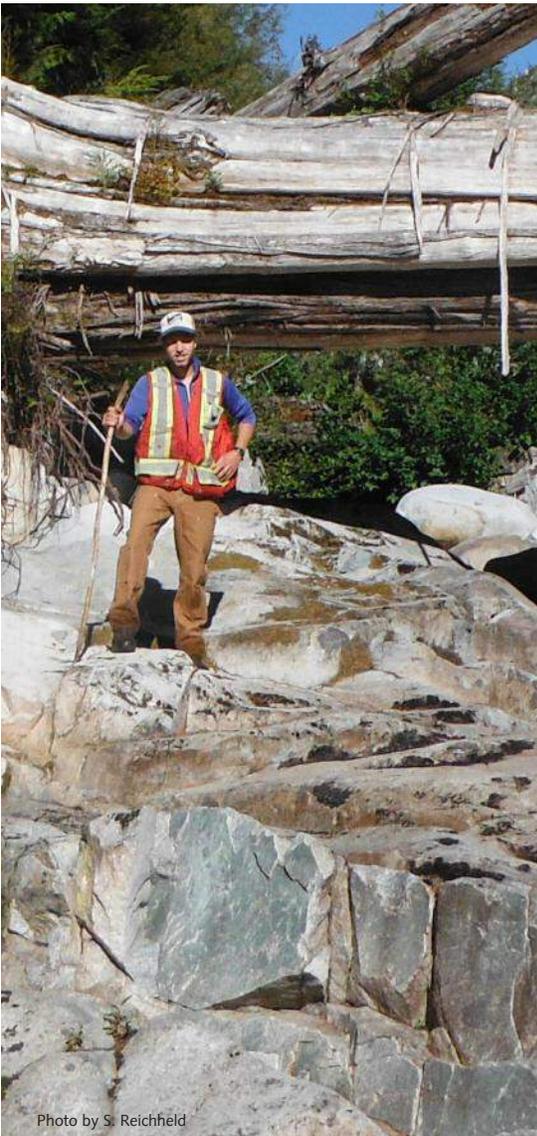
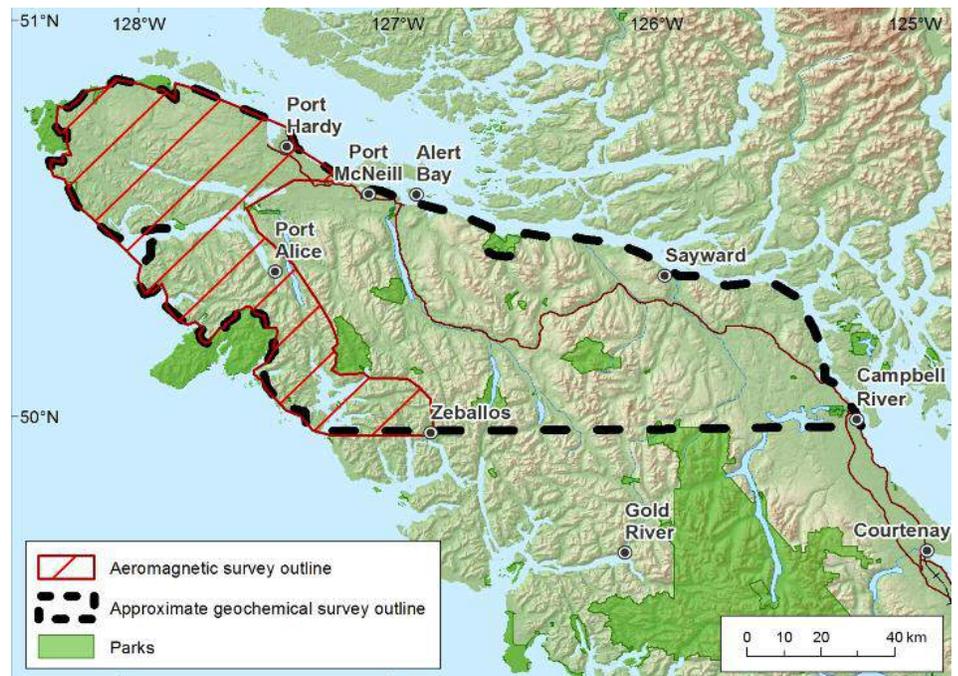


Photo by S. Reichheld

Fieldwork, Northern Vancouver Island

The Northern Vancouver Island Exploration Geoscience Project is Geoscience BC's latest major mineral geoscience initiative. The project is designed to help attract and stimulate mineral exploration and investment on northern Vancouver Island, increase the understanding of the region's mineral potential, and provide local First Nations and communities with more information on the geology of the region. The project area includes communities such as Port Hardy, Port McNeill, Alert Bay, Port Alice, Sayward, Zeballos and Campbell River.

Geoscience BC is funding the project in partnership with the Island Coastal Economic Trust (ICET), which is contributing up to \$400,000 to the project. This is the first mining sector project for ICET, who provide funding to create new and sustainable regional economic growth through strategic investments in targeted sectors in the north Island, coastal and Sunshine Coast regional economies.



Northern Vancouver Island Exploration Geoscience Project area.

The project has also received strong support from the BC Ministry of Jobs, Tourism and Skills Training and Rivercorp (Campbell River), who have provided generous support for stakeholder engagement in the project development phase, through the Campbell River Regional Economic Pilot initiative.

The Northern Vancouver Island Exploration Geoscience Project has three main components: an airborne magnetic survey, a regional geochemical program, and an education and outreach program aimed at local First Nations and community members.

The airborne magnetic geophysical survey was flown during August and September 2012, and covers much of the northern

and northwestern part of Vancouver Island, including the communities of Port Hardy, Port Alice and Zeballos (see map). Geo Data Solutions GDS Inc. flew the survey, at a line spacing of 250 m. The results of the airborne magnetic survey will be released at the Mineral Exploration Roundup conference in January 2013.

The regional geochemical program includes both new stream sediment sampling and the reanalysis of existing glacial till samples. The sampling program was completed in late 2012, and results are expected in spring 2013. Noble Exploration Services Ltd. is managing the regional geochemical program.

The project has also supported two community awareness sessions on geoscience, mineral exploration and mining. Both sessions took place in fall 2012, and were very successful. For more information and photos from these workshops, turn to pages 12 and 13 (Geoscience BC Workshops).

For more information on the Northern Vancouver Island Exploration Geoscience Project, go to [www.geosciencebc.com/s/NorthernVancouverIsland.asp](http://www.geosciencebc.com/s/NorthernVancouverIsland.asp).

*Photos:*

*Left: Stream sediment sample collection.*

*Top right: Stream sediment sample processing.*

*Bottom right: Stream sediment sampling.*



Photo by W. Jackaman



Photo by W. Jackaman

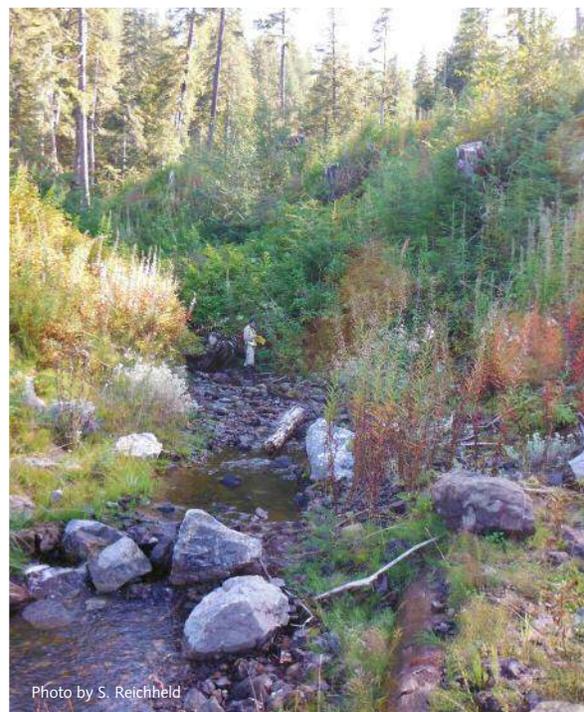


Photo by S. Reichheld



Photo courtesy of Geo Data Solutions

# QUEST-Northwest Project Update

This past year (2012) was another busy year for Geoscience BC's QUEST-Northwest Project. Of the fourteen Geoscience BC data releases in 2012, half were for QUEST-Northwest Project components. Geoscience BC also flew a third airborne magnetic survey in the project area in 2012.

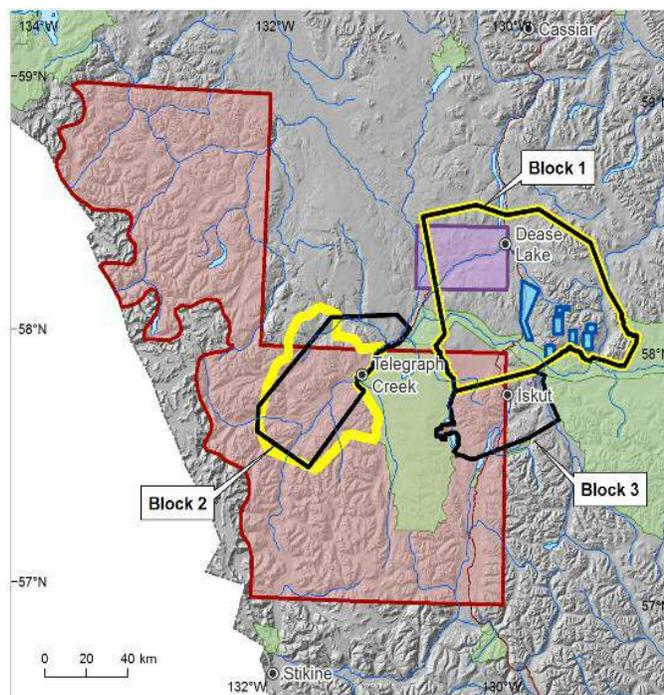
The QUEST-Northwest Project was originally initiated in 2011 to attract new investment and support existing exploration activities in BC's highly prospective northwest region. The project area includes the communities Dease Lake, Iskut and Telegraph Creek.

Results of the Block 1 and 2 airborne magnetic geophysical surveys (flown in 2011 by Aeroquest Airborne and Geo Data Solutions GDS Inc.) were released in early January 2012.

Geo Data Solutions GDS Inc. flew Block 3 in August 2012. This third survey will be released in early 2013, and will incorporate industry magnetic data in the center of the survey area (purchased from New Chris Minerals Ltd). All three Geoscience BC surveys were flown at a 250 m line spacing, and the industry data at a 100 m line spacing.

All geochemical data for the project was released in 2012, with geochemical reanalysis results released at the KEG conference in April, followed by new geochemical sampling results in June. Two bedrock geology maps were also released in 2012, both the result of a partnership project between Geoscience BC and the BC Geological Survey. The Dease Lake–Little Tuya River geology map was released in April 2012 at KEG, and the Hotailuh Batholith study (report and map) was released in December.

**Did you know?**  
Geoscience BC collected over 46,000 line kilometers of airborne magnetic data in the QUEST-Northwest project area.



Geoscience BC's QUEST-Northwest Project activities.

# Continuing Work in the Horn River Basin

Photo courtesy of Kerr Wood Leidal.

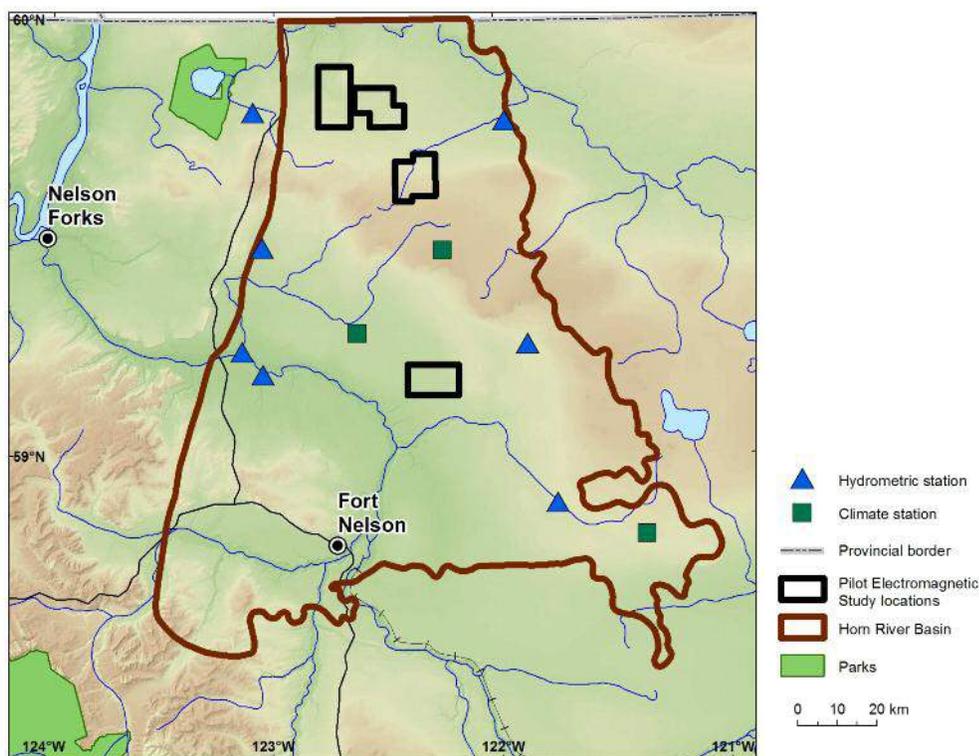


This past year (2012) saw a continuation of Geoscience BC's involvement in Horn River Basin research projects. Originally launched in 2009, the Horn River Basin Project has been a collaborative effort between Geoscience BC and the Horn River Basin Producers Group aimed at supporting responsible development of the Basin's gas resources.

Phase 1 of the project was focused on the study of deep saline aquifers, and was completed in 2011. Phase 2 of the project was launched in 2011, with three separate components, one of which is currently active. All Phase 2 components are funded through Geoscience BC and the Horn River Basin Producers Group.

The first component of Phase 2 was a pilot airborne electromagnetic survey project, carried out by SkyTEM Canada Inc. This pilot project, flown at a 200 m line spacing over four test blocks held by Horn River Basin Producers Group member companies (see map), was aimed at examining the applicability of airborne electromagnetic surveys for mapping near-surface groundwater. Results from this pilot project were released in March 2012. Four individual companies (EOG Resources Canada, Imperial Oil Resources, Quicksilver, Stone Mountain Resources) contributed funding to the project, in addition to the support from the Horn River Basin Producers Group and Geoscience BC.

The second component of Phase 2 was a continuation of the Phase 1 deep saline aquifer mapping project, as new well data was integrated into the Phase 1 project results. This component was carried out by



*Horn River Basin Phase 2 activities. Hydrometric and climate monitoring stations are shown by triangles and squares, and the footprint of the four pilot electromagnetic surveys are indicated in black.*

Petrel Robertson Consulting Ltd. (who also carried out Phase 1), and was released on Geoscience BC's website in March 2012.

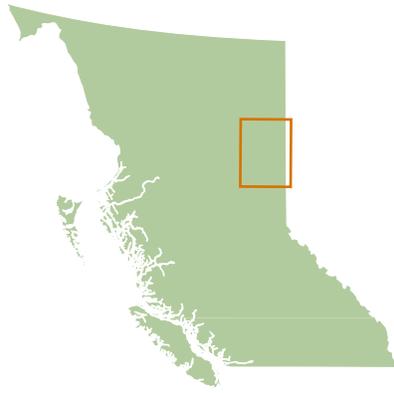
The third component of Phase 2 is a three-year regional surface-water study, focused on collecting surface-water quality and quantity data. A water monitoring network has been developed in the Horn River Basin, and includes three main components: 1) hydrometric and climate monitoring (see map); 2) water quality and biological monitoring; and 3) data management and reporting. Members of the Fort Nelson and Acho Dene Koe First Nations are receiving water monitoring training as part of the project. Ultimately, the project aims to collect accurate water flow, water quality and climate data to characterize baseline conditions in the Basin. This information will then support the sustainable planning and use of water in unconventional gas development, and provide data to the BC Oil and Gas Commission, the public and industry to use in making informed decisions. The project is managed by Kerr Wood Leidal Associates Ltd.

## NEWT: A tool for understanding water in Northeast BC

The NEWT (NorthEast Water Tool) software tool utilizes modelled hydrological (i.e. rainfall and climate), surface cover, and topographical data from northeast BC and through mathematical manipulation of these various mapped grids, provides monthly and annual runoff for rivers and lakes. This software tool is currently being utilized by the oil and gas regulatory body in BC (BC Oil and Gas Commission) to administer water licence requests and is freely available on their website.

The end result is transparent information which can be used by oil and gas operators, First Nations and the public. The NEWT models were developed by Alan Chapman (BC Oil and Gas Commission) and Ben Kerr (Foundry Spatial), and the tool was developed by Pacific Geospatial Ltd. The BC Oil and Gas Commission, Ministry of Forests, Lands and Natural Resource Operations, and Geoscience BC provided project funding.

To access the NEWT, go to: <http://bcogc.ca/public-zone/northeast-water-tool-newt>



*Water is critical to all aspects of unconventional oil and gas development especially during the drilling and completion phases.*

## Montney Water Project Update

**The Montney Water project, initiated in 2010, is designed to provide a comprehensive inventory of water sources and potential for deep geological disposal sites in the Montney Gas Play (located around the communities Dawson Creek and Fort St. John). The project has created a comprehensive database of surface water, ground water and deep saline aquifers in the Montney area.**

Water is critical to all aspects of unconventional oil and gas development especially during the drilling and completion phases. Sustainable development of these resources necessitates astute water management practices, which are based on science-based information.

Final project deliverables include surficial geology compilation maps, new water well and aquifer data, deep subsurface aquifer characterization maps and reports, posters on local watersheds and technical articles

describing project activities. All Montney Project activities are now complete, and most project results are accessible through Geoscience BC's website at <http://www.geosciencebc.com/s/Montney.asp>.

The Montney Water Project is a collaborative effort by Geoscience BC in partnership with seven companies active in the Montney Play, with support from the Science and Community Environmental Knowledge (SCEK) Fund, B.C. Ministry of Energy, Mines and Natural Gas, Ministry of Environment, Ministry of Health and the Northern Health Authority; and contributions from the Kiskatinaw River Watershed Project being undertaken at the University of Northern British Columbia in partnership with the City of Dawson Creek.

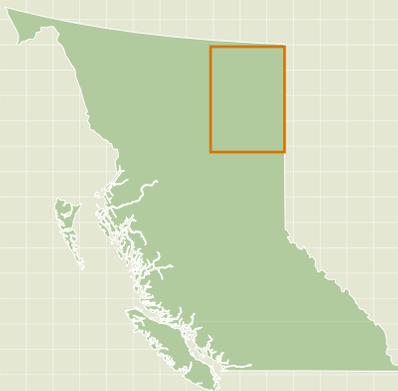


Photo by F. Hirshfield.



Photo by F. Hirshfield.



Photo by P. Angiel

## Creation of a Northeast BC Regional Seismographic Network

Recently, geoscientists have applied their knowledge of rock mechanics and geophysics to develop tight gas reserves through multi-stage, high volume hydraulic fracturing completions of horizontal wells and monitoring these completions with microseismic geophone arrays.

Along with the routine micro-seismicity created by hydraulic fracturing, 250 low magnitude seismic events were triggered by fluid injection during hydraulic fracturing in northeast British Columbia between April 2009 and December 2011. The BC Oil and Gas Commission released a report on these events in August 2012, which noted that over 8000 high volume hydraulic fracturing completions have been performed in all of northeastern BC with no associated seismicity. None of these events caused any injury, property damage or was found to pose any risk to public safety or the environment.

Geoscience BC, the BC Oil and Gas Commission, Natural Resources Canada and the Canadian Association of Petroleum Producers have partnered to launch a five-year \$1 million collaborative geoscience program to study seismicity in northeast British Columbia. Geoscience BC and the Canadian Association of Petroleum Producers (through the Science and Community Environmental Knowledge fund) will equally share the program costs, and the BC Oil and Gas Commission and Natural Resources Canada will provide in-kind technical support.

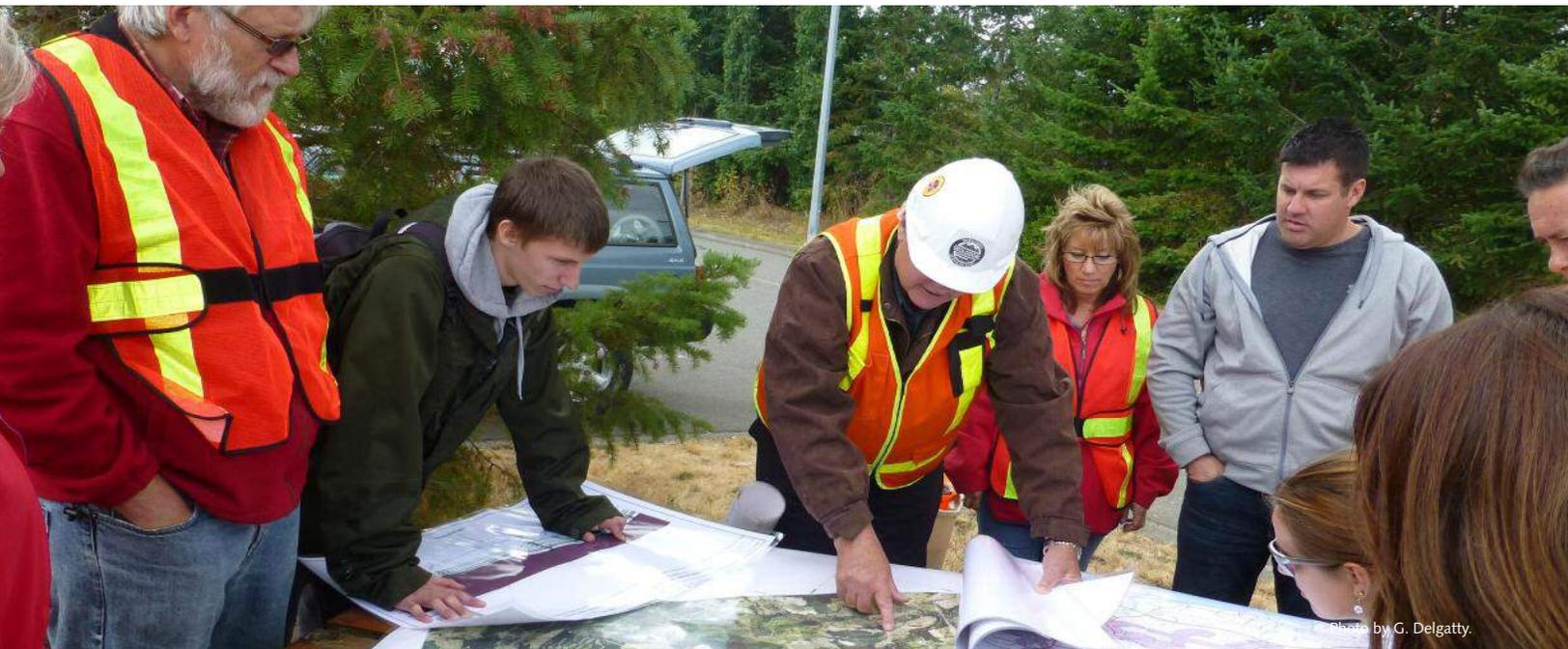
The program partners will install a state-of-the-art network to collect seismic data in northeast British Columbia. The seismic array network will include six new stations, which will complement two existing Canadian National Seismograph Network stations. Nanometrics Inc. will install the new stations in early 2013. Once the array has been calibrated, real-time seismic data will be provided to researchers for ongoing analysis and interpretation. The state-of-the-art stations will provide the necessary data needed to further understand the relationship between multistage hydraulic fracturing and induced low magnitude events and ultimately aid in the responsible development of unconventional gas resources.



- New seismic stations
- Canadian National Seismograph Network stations
- Horn River Basin
- Provincial border
- Parks

**Did you know?**  
 BC has approximately  
**34% of North America's  
 unconventional gas  
 reserves – this estimate  
 does not include the newly  
 discovered massive  
 reserves in the Liard Basin.**

*(Kuustraa and Stevens, 2009)*



## Geoscience BC Workshops in 2012

Geoscience BC sponsored four workshops in 2012, two in conjunction with local mineral exploration conferences and two as part of the Northern Vancouver Island Exploration Geoscience Project (see pages 6 and 7). The following is a summary of each of the workshops. For more information on these or other Geoscience BC workshops, go to [www.geosciencebc.com/s/workshops.asp](http://www.geosciencebc.com/s/workshops.asp).

### **Exploration Undercover: Making Effective Use of Public Geoscience Data**

(Kamloops Exploration Group (KEG) Conference short course, April 2nd, Kamloops BC)

Geoscience BC was pleased to present a one-day version of our Exploration Undercover workshop at this year's KEG conference in Kamloops, BC. The KEG short course included a series of technical presentations on geology, geochemistry and geophysics, with a focus on the Geoscience BC QUEST project area, data sets, and porphyry deposits.

Talks concentrated on what geochemical and geophysical data sets are publicly available, how to access them, and ideas on how to apply these data sets to exploration under cover. The afternoon also included a directed case study example of targeting, using some of Geoscience BC's data sets. Over 50 people attended the workshop.

Presenters included Peter Kowalczyk (Geoscience BC consultant), Thomas Bissig (MDRU), Wayne Jackaman (Noble Exploration Services), Fred Blaine (ioGlobal), Nigel Phillips (Mira) and Dianne Mitchinson (Mira). All presentations can be downloaded from Geoscience BC's website.

### **Did you know?**

QUEST Project data was the main focus in a workshop titled "Exploring undercover in a greenfield setting; the Quesnel Terrain in east central BC". The workshop, led by K. Witherly (Condor Consulting), was held at the 2012 PDAC conference and was sponsored by Mineral Exploration Conferences (DMEC).



Photo by C. Sluggett



Photo by G. Delgatty.



Photo by L. Anglin

**Mining – What’s It All About?**

(August 28-29, Campbell River BC;  
October 27-28, Port Hardy BC)

“Mining – What’s It All About?” was presented twice in 2012 as part of the Northern Vancouver Island Exploration Geoscience Project. The short course was presented and sponsored in collaboration with Island Coastal Economic Trust and British Columbia Institute of Technology (BCIT). For more information on Northern Vancouver Island Exploration Geoscience Project activities, go to pages 6 and 7.

The workshop was designed to be interactive and give First Nations communities a look into modern geoscience, mineral exploration and mining. Both workshops were attended by local First Nations and community members, but also attracted people from outside the project area, with a combined 44 people registering for the two courses.

Dr. Jim Morin, an engaging BCIT instructor and member of the Metis community, presented the short course. The first day of the course was spent in the classroom, with presentations and discussions that provide basic information about geoscience, exploration mineral deposits, mines, the mining cycle and selected specific First Nations issues related to mining. The second day involved an interesting field trip to local geological interest and exploration sites, including the proposed Raven Underground Coal Project (Campbell River fieldtrip) and Orca Sand & Gravel (Port Hardy fieldtrip).



Photo by C. Delgatty

**Exploration Geochemistry: Principles, Strategies and Tools**  
(Minerals South Conference short course, November 6, Nelson BC)

Geoscience BC coordinated and sponsored an exploration geochemistry short course at the 2012 Minerals South Conference, in partnership with the Chamber of Mines of Eastern BC.

The one-day course, which was led by Dave Heberlein (Heberlein Geoconsulting) and Fred Blaine (ioGlobal), covered topics such as primary dispersion, the secondary environment, geochemical survey design, data validation and interpretation, and seeing through cover.

The course was well attended (almost 40 participants) and well received.



Photo by C. Delgatty

# 2012 Geoscience BC Scholarship Winners

In May 2012 Geoscience BC awarded seven scholarships of \$5000 each to graduate students working on BC-based projects directly relevant to mineral or oil and gas exploration in the province.

Each year the applicants are evaluated on their project's technical merit and ability to attract exploration investment to BC, and their academic qualifications and work experience. Preference is given to applicants whose projects were deemed to have the greatest potential benefit to BC exploration activities, and whose research and career interests are primarily directed towards the exploration sector.

For more information on the Geoscience BC graduate scholarship, including past winners, their respective projects, and posters and theses derived from their work, please visit [www.geosciencebc.com/s/scholarships.asp](http://www.geosciencebc.com/s/scholarships.asp)



**Piotr Jan Angiel**  
PhD student, University of Western Ontario

*"Allostratigraphy, Sedimentology and Paleogeography of the Cretaceous Upper Fort St. John Group (Upper Albian-Lower Cenomanian) in northeastern British Columbia"*

Piotr's project is concerned with high-resolution allostratigraphy, tectonic controls and paleogeography of the Cretaceous Upper Fort St. John Group in the proximal foredeep of the Western Canada Foreland Basin, northeast BC. The objective of the project is to understand lateral changes in rock type, and to relate these changes to variations in the rate of basin subsidence, sediment supply, and sea-level change.

The study encompasses the 'Fish Scales Sandstone', which is a very organic-rich unit with the potential to source hydrocarbons and host shale gas. The nearshore sandstone facies are also being studied, as they are presently being exploited as shallow subsurface sources of water for injection into deeper hydrocarbon-producing horizons. Not all sandstones produce water equally well, and this study may improve the ability to choose successful horizons to complete. This is the second year Piotr has been awarded a Geoscience BC scholarship.



**Thomas Chudy**  
PhD student, University of British Columbia

*"The petrogenesis of the Fir carbonatite system, east-central British Columbia"*

Thomas is investigating the petrogenesis of the Blue River carbonatites that are situated within the Monashee Mountains of the Omineca Belt, southeastern BC. Carbonatite-alkaline rock complexes are known to host a range of commodities and they have attracted much notice in the past four years because of the strong demand for rare earth elements. The main focus of Thomas' studies is the Fir carbonatite system, which stands out in particular for its high Tantalum content that is unmatched by any other carbonatite occurrence in the Canadian Carbonatite Belt or even worldwide, at least with respect to the consistency of grade.

The ultimate goal is to understand the mineralogical characteristics and a potential clan association of this carbonatite system in order to propose a genetic model and

improve future exploration for strategic metals. This is the second year Thomas has been awarded a Geoscience BC scholarship.



**Martyn Golding**  
PhD student, University of British Columbia

*"Biostratigraphy and correlation of the Triassic Montney and Doig formations, subsurface British Columbia"*

The Montney and Doig formations occur in the subsurface of northeastern BC and contain large reserves of natural gas, making up 37% of the total reserves for the province. They were deposited in the Western Canada Sedimentary Basin during the Lower and Middle Triassic. The basal unit of the Doig Formation, the Doig Phosphate Zone, is an important stratigraphic marker as well as a source rock for a number of reservoirs in both the Montney and Doig formations.

Martyn's project is focused on understanding the biostratigraphic framework of these formations, which will allow correlation of the hydrocarbon-producing zones of these units and also provide insight into the evolution of the Western Canada Sedimentary Basin. These outcomes will, in turn, facilitate hydrocarbon exploration in BC. Martyn's current work is a continuation of the completed Geoscience BC Project "Biostratigraphic and Sedimentological Studies of Natural Gas-Bearing Triassic Strata in the Halfway River Map Area, northeast British Columbia".



**Regitze Petersen**  
MSc student, Copenhagen University

*"A petrographic, geochemical and structural investigation of the Seel Copper Gold Porphyry Deposit"*

The Seel Deposit is a copper-gold style deposit associated with a coarse porphyritic intrusion located on the Ootsa Property, close to the operating Huckleberry Mine. The deposit is being explored by Gold Reach Resources Ltd. and is showing good size potential with promising grades.

Regitze's research project is investigating the petrography, geochemistry and structural framework of the deposit. The aim of her research is to document the structural controls and constraints on mineralization, document the alteration, ore mineralogy, and fluid chemistry, and determine the age of mineralization.



**Ewan Webster**  
PhD student, University of Calgary

*"Tectonothermal history of the southern Kootenay Arc and Purcell Anticlinorium, southeastern British Columbia"*

Ewan's project is examining aspects of metamorphism, structure, geochronology, tectonics and mineralization within a region of southeastern BC bounded by the

communities of Creston, Salmo and Nelson. This geologically complex region has a particularly wide variety of ore deposits, many of which are metamorphosed. The unusual rock compositions developed during mineralization have led to unusual metamorphic mineral assemblages that may be used as indicators to mineralization. The aim of the project is to determine the burial-heating-intrusion history of the area, which will constrain the spatial controls, character, genesis and timing of mineral deposits in this region, with implications for improved exploration strategies.

Ewan's work is part of an ongoing Geoscience BC project titled "Enhancing exploration effectiveness for polymetallic mineralization in southeastern British Columbia: a combined petrological and tectonic approach".



**Avee Ya'acoby**  
MSc student, University of British Columbia

*"The Petrology, Mineralogy, Geochemistry and Origin of the Ren Carbonatite, Monashee Complex, Southeastern British Columbia"*

Carbonatites are rare magmatic rocks that consist of more than 50% carbonate minerals and are variably enriched in rare earth elements and high field strength elements. Although their global occurrence is generally limited to continental rift-related tectonic settings, their origin is unclear.

Avee's research is exploring the Ren carbonatite occurrence in southeast British Columbia. Using field observations and laboratory techniques, Avee's research will

aim to determine the origin, ore type, mineralization and economic potential of the Ren carbonatite. This research will also aid the discovery of similar carbonatite systems elsewhere in British Columbia.



**Neda Zangeneh**  
PhD student, University of British Columbia

*"Numerical modeling of hydraulic fracturing in weak discontinuous rock mass"*

Vast resources of natural gas occur in very low permeability, fine-grained rocks, referred to as gas shales and tight sands. Successful exploitation of gas from gas shales and tight sands requires drilling horizontal boreholes and doing multiple-stage completions which induce fractures into the surrounding rock mass thereby creating enhanced permeability through larger surface areas enabling gas production.

The primary goal of Neda's research is to increase the understanding of the effect of the natural fracture network on hydraulic fracture propagation, as well as the response of the reservoir rock to in-situ and induced stresses during drilling and completions. In BC, wells costing between 3 and 10 million dollars are typical in plays currently under development such as in the Horn River Basin. Results from this project will help to optimize the design of boreholes and the fracturing program, and therefore maximize natural gas production and economic returns in northeast BC.

**Starting in 2007 Geoscience BC has provided up to ten scholarships annually to graduate students working on BC-based projects directly relevant to mineral or oil and gas exploration in the province.**

**Many of these students continue on to work in the BC exploration industry after graduation. Geoscience BC caught up with Janina Micko and Kevin Byrne, two early scholarship winners, to see what they are doing now.**

## Where Are They Now?



### **Janina Micko, 2007 and 2008 Scholarship Winner**

#### **Tell us about your Ph.D. project.**

In January 2006 I began to my studies with Prof. Richard Tosdal at the Mineral Deposit Research Unit (MDRU) at UBC on a project titled:

“The geology, geochemistry, and genesis of the Galore Creek copper-gold porphyry district, northwestern British Columbia”. This project was one of

several industry and government funded studies on alkalic copper-gold porphyry and epithermal deposits that were part of a joint research project between MDRU (UBC) and CODES (University of Tasmania).

#### **How did winning a Geoscience BC scholarship support you and your research?**

Having received the Geoscience BC scholarship twice was a great honour and enabled me to extend and intensify my work on geochemical analysis of the Central Zone deposit. Not only was I able to investigate the whole rock geochemical and sulphur-isotopic signatures of system, but also unravel the evolution of hydrothermal garnets in the vast calcic alteration zone.

#### **After finishing your degree, what did you go on to do, and where?**

After the completion of my Ph.D. in 2010 I had a number of opportunities to join the Vancouver exploration industry; however, I realized that my thirst for knowledge particularly in regards to porphyry deposits had not yet been quenched. Coincidentally, our partners at CODES in Australia had just advertised a postdoc position with one of the top porphyry people in the world, Prof. David Cooke. I started in October 2010 and since then had the opportunity to see and work on some of the giant ore deposits of the world. I also had the luck to become supervisor to a number of wonderful Ph.D. students (surprisingly all from Canada) which had me almost convinced to remain in academia forever. However, after 2 wonderful years of working hand-in-hand with outstanding researchers and industry geologists in Australia, I have recently made the decision to return to Vancouver.

#### **Where are you working now, and what kind of work are you doing?**

Since finishing my postdoc in Tasmania in 2012, I have returned to Vancouver and am currently seeking a position as geologist/geoscientist in the Vancouver exploration community.



### **Kevin Byrne, 2008 Scholarship Winner**

#### **Tell us about your M.Sc. project.**

My M.Sc. thesis at UBC was focused on the genesis of the Triassic Southwest Zone breccia-hosted alkalic porphyry copper-gold deposit in the Galore Creek District, Northwest BC. In my study I describe the Southwest Zone, focusing specifically on the sequence of emplacement of coherent and clastic rocks, veins and cement, and alteration and sulfide mineral assemblages and their paragenetic evolution. The analytical component of the study investigated spatial variations of hydrothermal biotite chemistry with respect to copper ore zones.

#### **How did winning a Geoscience BC scholarship support you and your research?**

Winning the Geoscience BC scholarship was encouraging and gave me confidence in the direction, and preliminary results, of the study. Eventually the funds were put towards isotope analyses completed at UBC and the University of Tasmania.

#### **After finishing your degree, what did you go on to do, and where?**

I went on to work for Teck Resources Ltd. in their BC Copper group. This led me to exploring and evaluating early and advanced stage porphyry copper and copper-gold projects across the province.

#### **Where are you working now, and what kind of work are you doing?**

I am still in BC and now working at the Highland Valley copper-molybdenum mine. I am part a team that is in the process of developing and discovering resources.

# New Minerals Projects in 2012

In addition to the Northern Vancouver Island Exploration Geoscience Project (pages 6 and 7) and the Collaborative Regional Seismic Program (page 11), Geoscience BC launched three new partnership projects in 2012. Early results from all three projects can be found in Geoscience BC's Summary of Activities 2012 volume (see page 23 for more information).

**Evaluation of plant exudates to assist in mineral exploration and the development of simple and cost effective field procedures and analytical methods – D. Heberlein and C. Dunn**

Plant exudates (saps, fluids transpired through leaf pores, salts and particulates on leaf surfaces that have crystallized from the plant fluids) can contain metals translocated from underlying mineralization into the saps and plant material, potentially making them a simple and cost-effective sample medium. This project is aimed at using plant exudates as part of establishing a geochemical strategy to detect blind porphyry copper-gold mineralization.

Test sites for the project lie within Gold Fields Canada Exploration and Consolidated Woodjam Copper Corp.'s Woodjam property, northeast of Williams Lake. Results from the project will be

presented at the Mineral Exploration Roundup conference in January 2013, and final results released in early 2013. The project is being undertaken in conjunction with a Mineral Deposit Research Unit (MDRU, UBC) initiative focused on detecting a geochemical signal of mineralization covered by Chilcotin basalt lavas (also based at Woodjam; see page 18).

**Characterization of Alkalic & Calcalkalic Porphyry Clusters: Woodjam District, central British Columbia – F. Bouzari, C. Hart and I. del Real; MDRU**

The Woodjam property in central BC hosts several discrete porphyry deposits, which display various styles and assemblages of mineralization and alteration. In particular, the Southeast Zone has the characteristics of a calcalkalic porphyry deposit, whereas the nearby Deerhorn deposit has the characteristics of an alkalic porphyry deposit. Therefore, this project has been developed to study the relationship between calcalkalic and alkali porphyry deposits in BC.

Work on this project commenced in 2012 and will continue throughout 2013. The project is a joint initiative between MDRU, Gold Fields Canada Exploration and Geoscience BC.

**NTS 093J (McLeod Lake) INAA Reanalysis – W. Jackaman, Noble Exploration Services Ltd.**

The McLeod Lake map area (just north of Prince George) has the potential to host many different types of economic mineral deposits. Geochemical sampling in the area was first carried out in 1986, and these samples were reanalyzed in 2006 using ICP-MS techniques. However, the samples were not included in recent INAA (instrumental neutron activation analysis) reanalysis programs, and remained the only area in BC surveyed prior to 1989 that did not include this important analytical information.

This project has now reanalyzed approximately 1150 stream sediment samples using INAA from the McLeod Lake map area. Results will be available in early 2013.

Sample collection at the Woodjam property in central BC.



Photo by T. Bissig



Photo by T. Bissig

## Did you know?

Geoscience BC is now on Twitter. Follow us at @GeoscienceBC.



Photo by A. Celis.

## Ongoing Projects in 2012

Geoscience BC had many active projects throughout the province in 2012, most of which were partnerships identified through our request for proposals process. Consultants and university researchers typically lead these projects. The following is a selection of some of the ongoing projects in 2012. For a complete listing of all Geoscience BC-supported projects, go to [www.geosciencebc.com/s/Projects.asp](http://www.geosciencebc.com/s/Projects.asp).

### Minerals Projects

#### **Documentation and Assessment of Exploration Activities Generated by Geoscience BC Data Publications – S. Reichheld**

This project is developing a framework for assessing the impact of Geoscience BC's geoscience initiatives, with a particular focus on the QUEST Project. The project is using public information such as assessment reports, mineral titles, and news releases to evaluate the impact of QUEST Project activities on mineral exploration.

#### **Enhancing Exploration Effectiveness for Polymetallic Mineralization in Southeastern BC: A Combined Petrological and Tectonic Approach – D. Pattison and E. Webster, University of Calgary**

This two-year project is aiming to better define the geological evolution of the complex area between Nelson, Salmo and Creston BC, including establishing links between mineralization and metamorphism and developing metamorphic mineral assemblage vectors to guide mineral exploration in the region. Work on this project will continue in 2013.

#### **Geochemical Models for BC Porphyry Deposits: Outcropping, Blind and Buried Examples – F. Blaine and C. Hart, Mineral Deposit Research Unit (MDRU)**

This project is compiling a comprehensive geochemical database for porphyry deposits in BC, with the goal of categorizing deposits and geochemical data based on deposit and environment

variables likely to affect geochemical distribution. This project is currently wrapping up, with a database to be published in Spring 2013, followed shortly by a final report.

**Geological Mapping, Compilation and Mineral Evaluation, Burrell Creek Map Sheet (082E/09), southern BC – T. Höy**  
Mapping in the Burrell Creek area is a continuation of mapping and compilation work completed in the Deer Park area (released in 2009). Fieldwork for the current project was completed in 2012, and the final map and data will be available in early 2013.

#### **Glacial Geologic Framework and Drift Prospecting for a Portion of the QUEST Project Area – B. Ward, Simon Fraser University**

This project is studying the Quaternary geology and glacial history in the northern QUEST Project area, much of which is covered by surficial deposits. Six terrain maps, an ice flow direction map and a till geochemical database will all be released in early 2013.

#### **Integrated Geological & Geophysical Porphyry Models: Adding Value to Geoscience BC Geophysical Data – D. Mitchinson, MDRU**

This project has integrated rock property data with the six detailed electromagnetic and magnetic surveys flown during the QUEST and QUEST-West projects. Final results will be presented at the Mineral Exploration Roundup in early 2013, with the final report to be released shortly thereafter.

### Did you know?

**Natural gas provided \$1.35 Billion of revenue to BC in 2009/2010, which amounts to almost 60% of BC's direct revenues from all resource industries.**

*(BC Natural Gas Strategy, 2012)*

### Leveraging International Earth Science Standards to Enhance Mineral Exploration Success in BC – C. Smyth, Georeference Online Ltd., and Refractions Research

This project aims to demonstrate how the incorporation of a standard set of earth science terminology will help improve the science of mineral exploration and geoscience data delivery in B.C. The final report for the project is currently being reviewed and will be released in early 2013.

### Nelson–Lardeau Regional Geochemical Survey Reanalysis, Kootenays, BC (NTS 082F and 082K) – W. Jackaman, Noble Exploration Services Ltd.

The Nelson and Lardeau regional geochemical surveys were originally conducted in 1977, and reanalyzed using instrumental neutron activation analysis (INAA) in the early 1990s. This project is reanalyzing the samples again using ICP-MS techniques, which will bring the data sets in line with Geoscience BC's other regional geochemical programs (e.g. QUEST-Northwest and Northern Vancouver Island). Results will be released in early 2013.

### PIMs: Porphyry Indicator Minerals form Alkalic Cu-Au Porphyry Deposits in BC – F. Bouzari and M.A. Celis, MDRU

A continuation of an earlier Geoscience BC-sponsored pilot project, this project is examining PIMs from the alkalic Mount Polley, Mount Milligan and Copper Mountain deposits in BC. The research will be used to determine PIMs minerals assemblages and diagnostic parameters, and establish criteria for PIMs use in BC mineral exploration. Work will be expanded to the Lorraine deposit in 2013.

### Seeing Through Chilcotin Basalts: The Geochemical Signal of What is Hidden Underneath – T. Bissig, MDRU

This project is aimed at establishing a geochemical strategy to see through basalt cover in central BC, using a variety of analytical techniques on different sample media (e.g. soils, vesicle infill material). The project is being conducted on the Woodjam property, and is working in conjunction with the plant exudate study discussed on page 17.

### SEEK Project: Stimulating Exploration in the East Kootenays – coordinated by R. Hartlaub, BCIT for Geoscience BC

This project is focused on compiling existing mineral prospect and exploration information for the mineral-rich East Kootenay region. The project is strongly supported by the East Kootenay Chamber of Mines. The highlight in 2012 was the release of a ground gravity database, which compiled data from assessment reports, previously unreleased company data and a subset of the Geological Survey of Canada database. T. Sanders undertook this compilation.

## Oil & Gas Projects

### Gravity and Magnetic Inversion Modeling: Nechako Basin, BC – Mira Geoscience Ltd.

This project has undertaken constrained 3-D inversion modeling of airborne gravity and magnetic data in the Nechako region. Final project results will be released in early 2013.

### Nature, Distribution, Thickness and Regional Structural Framework of Eocene Volcanic Centres in the Nechako Basin, South-central BC – E. Bordet and C.J.R. Hart, MDRU

This ongoing Ph.D. project is examining the Eocene geology of the Nechako Basin, with results expected to be relevant to both the oil & gas exploration industry (as the Eocene rocks cover older rocks with hydrocarbon potential) and the mineral exploration industry (as the Eocene rocks have mineral potential).

### Examining Present and Future Water Resources for the Kiskatinaw River Watershed, BC – J. Sui and J. Li, University of Northern BC

This project is studying the Kiskatinaw River watershed in northeast BC. The watershed is the primary source of water for the City of Dawson Creek, but there are also competing uses of the water by industry, and agricultural uses. This project was originally supported partly through the Montney Water Project (see page 10).

## Projects completed in 2012

The following Geoscience BC projects wrapped up in 2012. All project deliverables (posters, presentations, technical articles and final reports) are available through Geoscience BC's website.

- Biostratigraphic and Sedimentological Studies of Natural Gas-Bearing Triassic Strata in the Halfway River Map Area, northeast BC (*J. Mortensen and M. Golding*)
- Carbonate Alteration as an Indicator of Proximity to Eskay Creek-Type Deposits (*T. Monecke and T. Meuzelaar*)
- Defining the Upper Parts of an Alkalic Porphyry Cu-Au Deposit: The Evolution of the Porphyry Cu-Au Deposit at Red Chris, Northern BC (*C. Hart and J. Norris*)
- Geochemistry, Volcanology and Physical Properties of the Late Triassic Nicola Arc and its Metallogenic Implications (*T. Bissig and S. Vaca*)
- Integrated Interpretation and First Arrival Tomography of Reflection Surveys in Nechako Basin (*A. Calvert and D. Talinga*)
- Modeling and Investigation of Airborne Electromagnetic Data, and Reprocessing of Vibroseis data, from Nechako Basin, Guided by Magnetotelluric Results (*C. Farquharson, K. Welford and J. Spratt*)
- Quantification of the Gas in Place and Flow Characteristics of Tight Gas Charged Rocks and Gas Shale Potential in BC (*M. Bustin*)
- Surficial Geochemistry and Lithology of the Bulkley River Valley, Central BC (*A. Stumpf*)
- Upper Paleozoic to lowest Triassic Succession – Sukunka-Kakwa area, BC (*C. Henderson*)

# The Geoscience BC Team in 2012

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President and CEO

**Kirstie Simpson**  
VP, Minerals Research

**Carlos Salas**  
VP, Oil & Gas

**Christa Sluggett**  
Project Geologist and Communications Coordinator

**Fion Ma**  
GIS Specialist

**Rhonda Schultz**  
Accountant and Corporate Secretary

**Angel Sit**  
Office Manager and Executive Assistant

## Primary Consultants

**Derek Brown**  
Strategic West Energy Ltd.

**Andy Calvert**  
Simon Fraser University

**Fionnuala Devine**  
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**Dan Jepsen**  
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**Russell Hartlaub**  
BCIT

**Brad Hayes**  
Petrel Robertson Consulting Ltd.

**Dave Heberlein**  
Heberlein Geoconsulting

**Wayne Jackaman**  
Noble Exploration Services Ltd.

**Ben Kerr**  
Foundry Spatial Ltd.

**Garth Kirkham**  
Kirkham Geosystems Ltd.

**Peter Kowalczyk**  
PK Geophysics

**Gordon Loverin**  
T'senaglobe Communications

**David Molinski**  
OnPoint Consulting Inc.



## Technical Advisory Committees

(as of December, 2012)

Geoscience BC has two Technical Advisory Committees (TACs), a Minerals TAC and an Oil & Gas TAC. Individuals on these committees represent a range of expertise in industry, academia and government. The TACs are tasked with reviewing and recommending proposals under consideration by Geoscience BC, and setting Geoscience BC's technical priorities. The TAC's recommendations are presented to Geoscience BC's Board of Directors for final funding approval.

### Minerals Technical Advisory Committee

**Henry Awmack**

Equity Exploration Consultants Ltd.

**Tim Baker**

Eldorado Gold Corp.

**Lindsay Bottomer**

Entrée Gold Inc.

**Peter Bradshaw**

First Point Minerals Corp.

**Rob Cameron**

Bearing Resources Ltd.

**Stephen Cook**

Teck Resources Ltd.

**Andrew Davies**

Teck Resources Ltd.

**Pim van Geffen**

ioGlobal

**Craig Hart**

University of British Columbia – MDRU

**Adrian Hickin**

BC Ministry of Energy, Mines and Natural Gas - BCGS

**Jacques Houle**

Consultant

**Ward Kilby**

Cal Data Ltd.

**Garth Kirkham**

Kirkham Geosystems Ltd.

**Jeff Kyba**

BC Ministry of Energy, Mines and Natural Gas

**Jules Lajoie**

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**Bob Lane**

Plateau Minerals Corp.

**Carmel Lowe**

Natural Resources Canada

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Geoscience BC

**Christa Sluggett, Co-Chair**

Geoscience BC

**Victoria Sterritt**

Teck Resources Ltd.

**Andrew Wurst**

Gold Fields Inc.

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University of British Columbia

**Andrew Calvert**

Simon Fraser University

**Satinder Chopra**

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**Fil Ferri**

BC Ministry of Energy, Mines and Natural Gas

**Brad Hayes**

Petrel Robertson Consulting Ltd.

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**Clint Tippett**

Shell Canada Ltd.



# Geoscience BC Data and Publications 2012

All Geoscience BC data and reports can be accessed through our website at [www.geosciencebc.com/s/DataReleases.asp](http://www.geosciencebc.com/s/DataReleases.asp).

All releases of Geoscience BC reports and data are announced through our website and e-mail distribution list. If you are interested in receiving e-mails regarding these reports and other Geoscience BC news, please contact [info@geosciencebc.com](mailto:info@geosciencebc.com).

## **Geoscience BC Report 2012-01**

Geoscience BC Summary of Activities 2011 volume (contains 16 technical papers on Geoscience BC project activities in 2011, *various authors*)

## **Geoscience BC Report 2012-02**

QUEST-Northwest Block 1 Airborne Magnetic Survey, British Columbia, by *Aeroquest Airborne*

## **Geoscience BC Report 2012-03**

QUEST-Northwest Block 2 Airborne Magnetic Survey, British Columbia, by *Geo Data Solutions*

## **Geoscience BC Report 2012-04**

Results from a Pilot Airborne Electromagnetic Survey, Horn River Basin, British Columbia, by *SkyTEM Canada Inc.*

## **Geoscience BC Report 2012-05**

QUEST-Northwest Sample Reanalysis (ICP-MS), by *W. Jackaman*

## **Geoscience BC Report 2012-06**

QUEST-Northwest Sample Reanalysis (INAA), by *W. Jackaman*

## **Geoscience BC Report 2012-07**

QUEST-Northwest Regional Geochemical Data, Northwest British Columbia, by *W. Jackaman*

## **Geoscience BC Map 2012-08-1 / BC Ministry of Energy, Mines and Natural Gas, BCGS Open File 2012-04**

Dease Lake – Little Tuya River Geology, NTS 104J/08 & 07E, by *J.M. Logan, D.P. Moynihan, L.J. Diakow and B.I. van Straaten*

## **Geoscience BC Report 2012-09**

Horn River Basin Aquifer Characterization Project Phase 2: Geological Report, by *Petrel Robertson Consulting Ltd.*

## **Geoscience BC Report 2012-10 / BC Ministry of Energy, Mines and Natural Gas, BCGS Open File 2012-06**

Mesozoic Magmatism and Metallogeny of the Hotailuh Batholith, Northwestern British Columbia, by *B.I. van Straaten, J.M. Logan and L.J. Diakow*

## **Geoscience BC Report 2012-11**

Till Geochemistry and Clast Lithology Studies of the Bulkley River Valley, West-Central British Columbia, by *A.J. Stumpf*

## **Geoscience BC Report 2012-12**

Stimulating Exploration in the East Kootenays (SEEK Project): East Kootenay Gravity Database, by *T. Sanders*

## **Geoscience BC Report 2012-13**

Subsurface Structure of the Eastern Nechako Basin from Coincident Three-dimensional Tomographic Velocity and Reflection Data, by *D.A. Talinga and A.J. Calvert*

## **Geoscience BC Report 2012-14**

Modelling and Investigation of Airborne Electromagnetic Data, and Reprocessing of Vibroseis Data, from Nechako Basin, B.C., Guided by Magnetotelluric Results, by *J. Spratt, J.K. Welford, C. Farquharson and J. Craven*



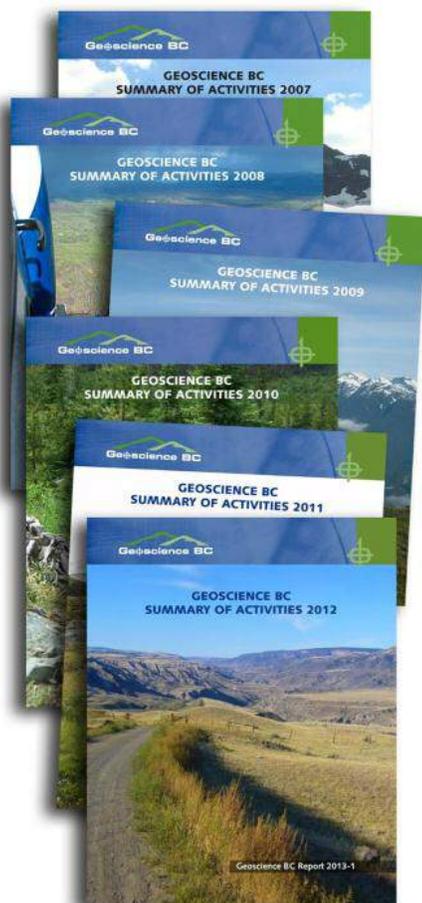
Photo by B. vanStraaten.

# Summary of Activities 2012

**Released every January at Mineral Exploration Roundup, Summary of Activities is Geoscience BC's annual scientific volume. The volume is composed of technical papers from our new, ongoing and recently completed projects.**

Geoscience BC's Summary of Activities is the sixth in the series (Geoscience BC technical papers were published in the BC Geological Survey Fieldwork volume in 2005 and 2006). Printed in full colour, and available digitally through Geoscience BC's website, Summary of Activities 2012 features 148 pages of new information on Geoscience BC-supported projects.

The 2012 volume includes papers on the Northern Vancouver Island Exploration Geoscience project, QUEST-Northwest, Horn River Basin Phase 2 and the new Seismic Monitoring project.



## Summary of Activities 2012 Articles:

Update on Geoscience BC's 2012 geophysical programs, by *K.A. Simpson, P.L. Kowalczyk and G.D. Kirkham*

Updating the British Columbia Regional Geochemical Survey database with new field survey and sample reanalysis data to support mineral exploration, by *W. Jackaman and R.E.W. Lett*

Dease Lake Geoscience Project: geochemical characteristics of Tsaybahe, Stuhini and Hazelton volcanic rocks, northwestern British Columbia, by *J.M. Logan and O. Iverson*

Re-release of the Mineral Deposit Research Unit's Iskut River area maps (1989–1993), northwestern British Columbia, by *P.D. Lewis, C.J.R. Hart and K.A. Simpson*

Porphyry indicator minerals (PIMs) from alkalic porphyry copper-gold deposits in south-central British Columbia, by *M.A. Celis, C.J.R. Hart, F. Bouzari, T. Bissig and T. Ferbey*

Use of organic media in the geochemical detection of blind porphyry copper-gold mineralization in the Woodjam property area, south-central British Columbia, by *D.R. Heberlein, C.E. Dunn and W. Macfarlane*

Geochemical techniques for detection of blind porphyry copper-gold mineralization under basalt cover, Woodjam prospect, south-central British Columbia, by *T. Bissig, D.R. Heberlein and C.E. Dunn*

Paragenesis and alteration of the Southeast Zone and Deerhorn porphyry deposits, Woodjam property, central British Columbia, by *I. del Real, C.J.R. Hart, F. Bouzari, J.L. Blackwell, A. Rainbow, R. Sherlock and T. Skinner*

Burrell Creek map area: setting of the Franklin mining camp, southeastern British Columbia, by *T. Höy*

Metamorphism and structure of the southern Kootenay Arc and Purcell Anticlinorium, southeastern British Columbia, by *E.R. Webster and D.R.M. Pattison*

The SEEK Project: Stimulating Exploration in the East Kootenays, southeastern British Columbia, by *R.P. Hartlaub*

Documentation and assessment of exploration activities generated by Geoscience BC data publications, by *S.A. Reichheld*

Creating a regional seismographic network in northeastern British Columbia to study the effect of induced seismicity from unconventional gas completions, by *C.J. Salas, D. Walker and H. Kao*

Developing a water monitoring network in the Horn River Basin, northeastern British Columbia, by *D. Murray and C.J. Salas*

Investigation of land-use change and groundwater–surface water interaction in the Kiskatinaw River watershed, northeastern British Columbia, by *G.C. Saha, S.S. Paul, J. Li, F. Hirshfield and J. Sui*

## Coming in 2013

**Geoscience BC will launch new geoscience initiatives in 2013. Here is what we've got planned so far:**

Geoscience BC's next major minerals project will be in the Interior Plateau/ Nechako Region of British Columbia. This multi-year, multi-disciplinary project aims to significantly increase the understanding of the geology and geological controls on mineralization in the region by the provision of new regional geochemical and geophysical data, and integrated geoscience products. The first project activities will be announced in early 2013. Geoscience BC is also in discussion with some First Nations in the region about looking at geothermal potential around selected communities in the project area.

Geoscience BC is also launching a program to purchase industry airborne geophysical data in key areas of the province. This program is currently focused on the Interior Plateau region, but may be extended in the future.

Geoscience BC is supporting a Petrel Robertson Consulting Ltd. project titled "Subsurface Aquifer Study to Support Liard Basin Unconventional Gas and Oil Development, Northeastern BC". This project will continue the work Petrel Robertson has undertaken in the Horn River Basin and Montney areas of northeast BC over the last few years (see pages 9-10). The project is expected to be complete in Summer 2013.

Finally, Geoscience BC is supporting an initiative proposed by the Canadian Geothermal Energy Association (CanGEA) to develop a Canadian geothermal database and a geothermal favourability map for BC. This project will be complete in late Spring 2013.



Photo by P. Angiel



*Geoscience BC is an independent, not for profit society that works to attract mineral and oil and gas investment to British Columbia through collection and marketing of geoscience data.*



Photo by E. Bordet



Geoscience BC is funded through grants from the Provincial Government of British Columbia.



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