

MDRU 25th Anniversary

Celebrating 25 Years of Innovation and
Collaboration with the Minerals Industry

April 10–11, 2015
Vancouver Convention Centre
Vancouver, BC

25
MDRU
25 Years of Excellence 1990–2015

MDRU Foundation Members



Teck



GLENCORE

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KGHM
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Yukon Geological Survey

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Charles Greig
Kim Heberlein
Brock Riedell
Ben Whiting

MDRU FOUNDERS
Peter Bradshaw
Alastair Sinclair
John McDonald



Above: MSc student Raja Yarra conducting fieldwork for the Western Tethyan Metallogeny Project, Armenia. © A. Mišković, 2013

Cover Image: Former PhD student Bram van Straaten examines Neoproterozoic rocks hosting stratiform copper at the Coates Lake (Redstone) deposit, Mackenzie Mountains, Northwest Territories. © J. Milton, 2010



MDRU – Mineral Deposit Research Unit

About MDRU

MDRU-Mineral Deposit Research Unit is a collaborative venture between the minerals industry and The University of British Columbia (UBC), based in the Department of Earth, Ocean and Atmospheric Sciences. The unit was established in 1989 with support and financial assistance from the mining industry and the Natural Sciences and Engineering Research Council of Canada (NSERC). MDRU is an internationally recognized institution, dedicated to solving mineral exploration related problems. MDRU also prepares highly-qualified students for employment in the industry and provides professional development opportunities to industry and the greater geoscience community.

Member-Driven

We are an industry-driven applied research organization. MDRU operates from and relies on funds obtained through corporate memberships from the minerals industry, without operating funds from government. Our research efforts are driven directly through collaborations and support from our mineral industry partners.

Research Themes

MDRU has a solid track record of applied research, having completed more than 100 industry supported research projects. Currently, our projects focus on four main research themes: Gold Systems, Porphyry Copper Deposits, Regional Metallogeny, and Exploration Methods. Our Exploration Methods themes include our Exploration Geochemistry Initiative and our association with the Geophysical Inversion facility. We also have four secondary research themes: Kimberlites/Diamonds and Gemstones, Sedimentary-hosted Base Metals, Orthomagmatic Deposits, and Carbon Sequestration.

Training

Since 1991, MDRU has educated and graduated nearly 120 graduate students, and has provided a fertile research and training space for more than 40 senior researchers (Research Associates and Post-Doctoral Fellows). MDRU currently supports about 30 graduate students actively engaged in MSc and PhD thesis projects, and 10 senior researchers dedicated to leading research projects. MDRU also

contributes to graduate teaching at UBC for courses such as Exploration Methodologies and Advanced Field Methods. During our first 25 years, we have also organized and provided 85 Short Courses, many with a field component, and increasingly with offerings in international locales.

Global Reach

MDRU's original research focus was on our Cordilleran backyard in BC, Yukon and Alaska. With the increased internationalization of the industry, MDRU projects expanded to Chile, Peru, Argentina, Tanzania and Mongolia. MDRU currently has or recently had projects in Chile, Argentina, Peru, Ecuador, Colombia, Turkey, Serbia, Greece, Armenia, Iran, Cambodia, Mongolia, China and Mexico. MDRU maintains strengths in BC, Yukon and Alaska, and includes Nevada as part of our area of core expertise. There is a clear emphasis on the Pacific Rim and increasingly, the Tethyan belt. MDRU works where the industry works, meeting the demand for research and expertise.

Engagement

Engaging with MDRU can be conducted at many levels, ranging from short one-on-one research projects with a corporate sponsor and a single researcher or student, to large, multi-company, multi-country projects with numerous researchers. Many projects are done within the scope of MSc or PhD theses, or more directly with a dedicated Postdoctoral Fellow or Research Associate. Project duration can range from a short one-month proof-of-concept or scoping study, to longer multiyear thesis or embedded researcher projects. For membership or new project opportunity enquiries:

Craig Hart MDRU Director, chart@eos.ubc.ca

Monica Spisar Business Development, mspisar@eos.ubc.ca

Silver Anniversary

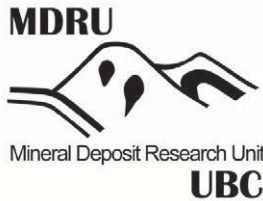
What started as a “made in BC” experiment 1989 is now a diverse, fully-developed, international research group. Join with us in 2015, as we celebrate our 25th year of operation.

MDRU Founders 1989

| | |
|-------------------|---------------|
| Peter Bradshaw | Orvana |
| John McDonald | Esso Minerals |
| Alastair Sinclair | UBC |

Developers 1989-1990

| | |
|-----------------------|-----------------------------|
| Dirk Templeman-Kluit | GSC |
| Wayne Spillsbury | Teck |
| Owen Owens | Cominco |
| Nils von Fersen | Falconbridge |
| Gerry Carlson | Gulf International Minerals |
| Ron Britten | Homestake |
| Tom Schroeter | BCMEMP |
| Ron Smyth | BCMEMP |
| William Wolfe | Cominco |
| Robert Pinsent | Placer Dome |
| Tony Ransom | Corona |
| Ted Muraro | Cominco |
| D. Yeager | Skyline |
| Fred Hewitt | Newhawk |
| Lindsay Bottomer | Prime |
| Richard Chase | UBC |
| Colin Godwin | UBC |
| Barry McBride | UBC |
| S. Carroll/D. Kennedy | Lac/Bond |
| Ed Kimura | Placer Dome |
| Harlan Meade | Westmin |
| John Hamilton | Cominco |
| Ian Patterson | Cominco |



First MDRU Board of Advisors 1990

| | |
|----------------------|----------------------------------------------------------------------------|
| Peter Bradshaw | Chairman, Orvana |
| Wayne Spillsbury | Cominco/Teck Foundation Member, Teck |
| Lindsay Bottomer | Representing Corporate and Individual Members, Prime |
| Ron Britten | Representing Corporate and Individual Members, Homestake |
| Gerry Carlson | Representing Corporate and Individual Members, Gulf International Minerals |
| William Wolfe | Representing Corporate and Individual Members, Cominco |
| Barry McBride | Dean, Faculty of Science, UBC |
| Richard Chase | Department of Geological Sciences, UBC |
| Colin Godwin | Department of Geological Sciences (Faculty rep.), UBC |
| Ron Smyth | Chief Geologist, GSB/BCMEMP, BCMEMP |
| Dirk Tempelman-Kluit | Director, GSC Cordilleran Division, GSC |
| John McDonald | Interim Director, MDRU |

MDRU Directors

| | |
|----------------|--------------|
| John McDonald | 1989-1991 |
| John Thompson | 1991-1998 |
| Ian Thomson | 1999 |
| Richard Tosdal | 1999-2008 |
| Craig Hart | 2009-present |



Our Board of Directors, 2014

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Neil Adshead
Sprott Asset Management LP
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Independent
Michael Doggett
Michael Doggett & Associates
James Franklin
Franklin Geosciences

Research Generative Group, Chair
Ron Britten
First Point Minerals Corp.

MDRU
Craig Hart
Director

MDRU’s Current Project Profile

Flagship Projects

Western Tethyan Metallogeny Project
Started May 2012, Duration 3 years
Dr. Aleksandar Miskovic - Project Manager
Project sponsors include Anglo American, Teck, Pilot Gold, Eldorado Gold, Alamos Gold, Avala Resources, AngloGold Ashanti, Alamos Gold, Dunav Resources, Dundee, First Quantum, Silver Standard, Centerra, Ecsacibasi (a private Turkish company), and NICICO (the National Iranian Copper Corporation).
Theses and sub-projects within the project include:

- Geology, metallogeny and tectonic associations of the Anatolian epithermal and porphyry-style deposits, Turkey. Fabien Rabayrol (PhD candidate), supervised by Alex Miskovic & Craig Hart
- The early-middle Eocene magmatism and related epithermal systems of the eastern Turkish Pontides. Erde Bilir (MSc candidate), Muğla University, Turkey
- Geology, alteration and mineral paragenesis of the Halılağa porphyry Cu-Au deposit, Biga Peninsula, NW Turkey. Paula Brunetti (MSc), supervised by Alex Miskovic & Craig Hart
- Metallogeny and stratigraphy of sedimentary rock-hosted Bigar Hill Gold deposit, Western Timok, Serbia. Jelena Živanović (MSc candidate), supervised by Alex Miskovic & Craig Hart
- Structural and geological controls on epithermal mineralization at the TV Tower and Kirazli projects, Çanakkale Province, NW Turkey. Graham Leroux (MSc candidate), supervised by Alex Miskovic & Craig Hart
- Geological and structural controls of gold ores of the Efemçukuru, low sulfidation epithermal deposit, SW Turkey. Kaleb Boucher (MSc candidate), supervised by Alex Miskovic & Craig Hart
- A structural framework, paragenesis, mineralization and alteration assemblages of the Shahumyan and Centralni epithermal deposits, Kapan district, southern Armenia. Raja Yarra (MSc candidate), supervised by Alex Miskovic & Craig Hart
- Magmatic associations and ages of ore deposition along the Pontides: Late Cretaceous-Middle Eocene arc-related porphyry and epithermal systems of Pontides. Ilkay Kuşcu, Muğla University, Turkey
- A structural and geophysical atlas of the Cenozoic porphyry Cu-Au and epithermal precious metal mineralization of the Western Tethyan realm. Matisa Sanchez, MDRU Post-Doctoral Fellow

- Gold distribution & deportment in the Kiseljak porphyry Cu-Au deposit, southern Serbia. Melissa Gregory, MDRU
- Geochemical and mineralogical exploration vectors for gold in lithocaps along the Western Tethyan metallogenic belt. Thomas Bissig, MDRU
- Metallogeny of Porphyry Copper and Allied Deposits of the Tethyan Urumieh-Dokhtar Magmatic Arc in Iran. Farhad Bouzari, MDRU
- Gold and rare-metal distribution, ore fluid characteristics and relative timing of granitoid emplacement and ore mineralization in two intrusion-related systems (Kavala and Xanthi) in Northeastern Greece. Vasilios Melfos and Stella Theodoridou (MSc canadidate)), Aristotle University of Thessaloniki, Greece
- Distribution of Au in telescoped porphyry-epithermal systems in northeastern Greece: a mineralogical, geochemical and microthermo-metric evaluation. Panagiotis Voudouris, University of Athens, Greece

Colombia Gold & Porphyry Project
Started 2011, Completed in 2015
Dr. Thomas Bissig - Project Manager
Sponsoring companies include AngloGold Ashanti, Anglo American, AUX (prev. Greystar), Barrick, EcoOro (prev. Ventana) and Teck.
Theses and sub-projects within the project include:

- Mesozoic and Cenozoic Magmatic Evolution of Colombia. Hildebrando Leal, MDRU Post-Doctoral Fellow
- Geology of the Angostura Gold Deposit, California-Vetas mining area, Colombia. Luis Carlos Mantilla, Universidad Industrial Santander
- Geology, Alteration, Mineralization and Hydrothermal Evolution of the La Bodega-La Mascota deposits, California-Vetas Mining District, Eastern Colombia. Alfonso Luis Rodriguez Madrid (MSc, 2014), supervised by Thomas Bissig and Craig Hart
- Hydrothermal Evolution of the Titiribi Mining District, middle Cauca Belt, Colombia. Camilo Uribe Mogollon, Universidad EAFIT, Medellin
- Characterization of Sulfide Mineralization, Alteration and Microthermometry of Related Fluid Inclusions of the La Plata Prospect, Colombia. Chelsea Raley (Hons BSc, 2012), supervised by Thomas Bissig

* denotes alternate representative

Flagship Projects, continued

- The Magmatic History and Petrochemistry of the Vetás-California Mining District: Implications for Northern Andean Tectonics & Porphyry Cu (Mo,Au) Metallogeny, Santander Massif, Colombia. Luis Mantilla Figueroa, Thomas Bissig, Craig Hart
- Garnets in Granodiorite Porphyries Related to Gold Mineralization, middle Cauca Belt, Colombia. Roger Philip Burton Stevens (BSc, 2013), supervised by Thomas Bissig
- Geological Map of the California-Vetas Mining District. Thomas Bissig, Luis C. Mantilla Figueroa, Craig Hart

Carbonate Alteration Footprints

Started 2013, Duration 3 years

Drs. Greg Dipple, Andreas Beinlich, Shaun Barker - Project Leaders

This project is supported by MAG Silver, Teck, ALS and Glencore. Sponsoring companies include AngloGold Ashanti, Anglo American, AUX (prev. Greystar), Barrick, EcoOro (prev. Ventana) and Teck.

Theses and sub-projects within the project include:

- Carbonate Isotopic Footprint of the Giant Cinco de Mayo carbonate-hosted silver system, Mexico. Andreas Beinlich
- Carbonate Isotopic Alteration Footprint of Carbonate-hosted Zn-Pb-Ag deposits, Washington State and southeastern BC. Natalie Cook (MSc candidate), supervised by Craig Hart
- Stable Isotopic Footprint of a Carbonate-hosted Porphyry System, Stockton, Utah. Craig Hart
- Isotopic Footprint of Giant Skarn-Porphyry System, Antamina, Peru. Greg Dipple
- Stable Isotope Footprint of Carbonate Alteration at the Red Lake Gold Mines, Ontario. Gruffudd Roberts (Hons BSc, 2014), supervised by Farhad Bouzari
- Preliminary stable isotope and geochemical investigation of carbonate in the Klondike district. Murray Allan, James Mortensen and Natalie Cook

CMIC (Canadian Mining Innovation Council) Copper Footprints Project

Started 2014, Duration 4 years

Dr. Robert Lee - Project Manager

- Creating a Footprint Exploration Model for the Highland Valley Porphyry District, BC. Robert Lee
- Alteration and Geochemical Footprint of the Highland Valley Porphyry Copper System, BC. Guillaume Lesage (PhD), supervised by Craig Hart
- Surficial Geochemical Response above Buried Porphyry Mineralization at Highland Valley Copper, BC. Rachel Chouinard (MSc), supervised by Peter Winterburn

MDRU Exploration Geochemistry Initiative

Started 2013, Duration 5 years

Dr. Peter Winterburn - AcmeLabs Industrial Research Chair in Exploration Geochemistry

This robust research project to significantly increase the amount of research, training and professional development in the area of surficial mineral exploration geochemistry, is a reality because of the generous support from AcmeLabs Ltd. (now Bureau Veritas).

Theses and sub-projects within the project include:

- Geochemical Mapping of Porphyry Deposits and associated Alteration through Transported Overburden. Shane Rich (MSc candidate), supervised by Peter Winterburn
- Modelling and Mapping Surface Geochemical Responses in Transported Overburden above a VMS deposit. Matthew Bodnar (MSc candidate), supervised by Peter Winterburn
- Electro-, Organic and Inorganic Geochemistry over a Buried Kimberlite. Erika Cayer (MSc candidate), supervised by Peter Winterburn
- Discovery Tools for Buried Copper Deposits in the Atacama Desert. Ally Brown (MSc candidate), supervised by Peter Winterburn & Thomas Bissig

Yukon-Alaska Metallogeny Project

Started 2014, Duration 2 years

Dr. Murray Allan - Project Manager

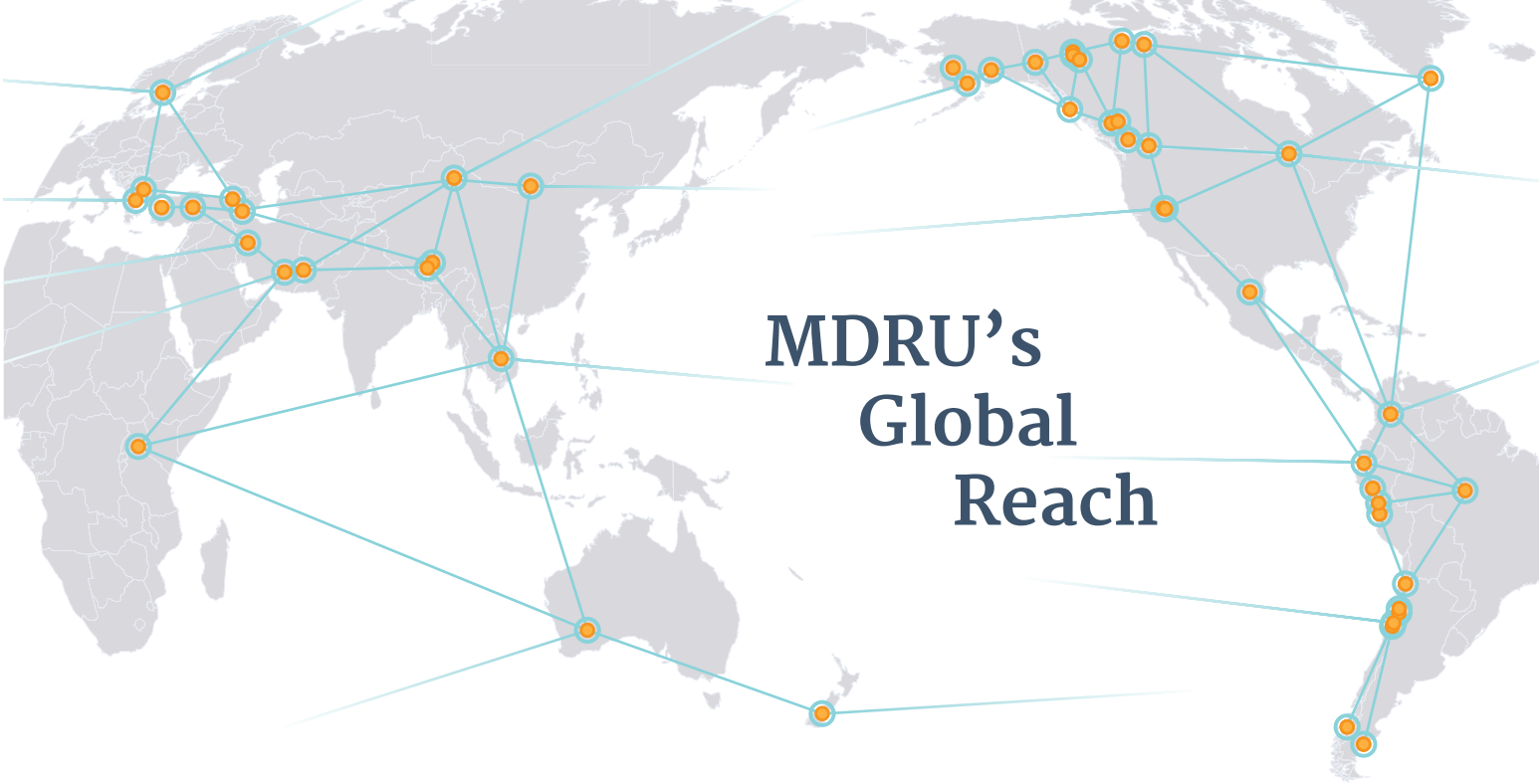
This project is sponsored by Kaminak Gold Corp., Sumac Mines Ltd. (Sumitomo Canada), Yukon Geological Survey and NSERC.

Theses and sub-projects within the project include:

- Controls on Mineralization at the Coffee Gold Deposit, Yukon. Kathryn Grodzicki (PhD candidate). Supervised by Craig Hart.



James Moors, Brucejack Lake, early 1990s



MDRU's Global Reach

One-On-One Projects, by theme

Gold Deposits

- Mineralization, Alteration & Magmatism at the Los Helados porphyry Au-Cu prospect, Maricunga belt, Chile. Augustin Guitard (MSc candidate), supervised by Thomas Bissig. Sponsored by NGex
- Mineralization, Alteration and Magmatism at the La Coipa Au-Ag Deposit, Maricunga Belt, Chile. Sergio Gamonal (MSc), supervised by Thomas Bissig. Sponsored by Kinross
- Geology of Gold Mineralization in northeastern Cambodia. Craig Richardson (MSc), supervised by Craig Hart. Sponsored by Angkor Gold Corp.
- Regional Framework, Structural Controls & Alteration Vectoring of the Quimsacocha Epithermal Gold District, Ecuador. Peter MacDonald (PhD), supervised by Craig Hart and Thomas Bissig. Sponsored by IAMGOLD and INV
- Post-mineralization weathering, denudation and subsequent burial of Carlin-type Au-mineralization at the Cortez Hills deposit, Nevada. Trent Newkirk (PhD candidate), supervised by Ken Hickey and Thomas Bissig. Sponsored by Barrick Gold

Porphyry Copper Systems

- Alteration Modelling and Targeting Approaches at the Deep Kerr Porphyry Cu-Au deposit, northwestern BC. Sandra Rossett (MSc candidate), supervised by Craig Hart. Sponsored by Seabridge Gold
- Structural controls in the KSM deposit, British Columbia. Gayle Febbo (MSc candidate), supervised by Lori Kennedy. Sponsored by Seabridge Gold
- Alteration Model for the Yalakom Porphyry Copper-Gold Deposit, BC. Enkhgerel Gerelchuluun (MSc candidate), supervised by Craig Hart.
- Geological Characteristics and Ore Controls of the Kemess East Au-Cu-Mo Porphyry Project, Toodoggone District, north-central BC. Quinn Harper (MSc candidate), supervised by Craig Hart. Sponsored by AuRico Gold Corp.
- Plutonic and alteration petrography of the Copper Mountain Deposit Host Rocks, BC. Farhad Bouzari, MDRU. Sponsored by Copper Mountain Mining Corp. and NSERC.

Regional Frameworks & Metallogeny

- Regional Controls on IOCG and related Mineralization in the Chilean Coastal Belt. Martin Marquardt (MSc candidate), supervised by Thomas Bissig. Sponsored by Minera Activa Ltda.
- Late Cretaceous Magmatic and Metallogenic Evolution, western Yukon. Witold Ciolkiewicz (PhD candidate), supervised by Craig Hart and Jim Mortensen.
- Tectonic and Metallogenic Studies of the Middle Paleozoic Sicker and Lower Buttle Lake Groups, Vancouver Island, British Columbia. Tyler Rucks (PhD candidate), supervised by Jim Mortensen. Sponsored by GeoscienceBC

Exploration Methods & Technologies

- Porphyry Indicator Minerals in BC Alkalic Porphyry Systems. Antonio Celis (MSc candidate), supervised by Farhad Bouzari and Craig Hart. Sponsored by GeoscienceBC
- Carbon and Oxygen Isotope Mapping to Recognize Alteration and Fluid Pathways in Carlin gold systems, Cortez Hills, NV. Christopher Herron (MSc candidate), supervised by Greg Dipple. Sponsored by Barrick Gold
- Reconciling Geophysical Responses and Rock Physical Properties to determine Regional Structural Geometry from Inverted Potential Fields. Nate Corcoran (MSc candidate), supervised by Murray Allan and Doug Oldenberg.
- Advanced Mineral Exploration Targeting through Focused Machine Learning. Justin Granek (PhD candidate), supervised by Eldad Haber.

Sediment-Hosted Base Metal Deposits

- Redstone Copper Sedimentary Rock- hosted Copper Deposits, North-west Territories. Jack Milton (PhD candidate), supervised by Ken Hickey. Sponsored by Western Copper Corp.
- Distinguishing Intrusion-related and syngenetic origins for the Aguilar Zn-Pb deposit, Argentina. Rob Duncan, MDRU Post-Doctoral Fellow. Sponsored by Minera Aguilar S.A.
- A new toolbox for exploring for sediment-hosted IOCG Deposits. Rob Duncan, MDRU Post-Doctoral Fellow. Sponsored by MDRU and Mitacs.

CO2 Sequestration in Mine Wastes

- Carbon Sequestration in Mine Wastes. Greg Dipple, MDRU-UBC
- Acceleration of passive carbon sequestration in ultramafic mine tailings. Anna Harrison, MDRU Post-Doctoral Fellow.
- Microbe-mineral interactions, carbonate precipitation and its role in sequestrating CO2. Ian Power, MDRU Post-Doctoral Fellow.

A History of Large* Projects (1990–2011)

Mineral Inventory Studies of Precious Metals

Researchers

Al Sinclair, M.S. Nowak, R.M. Srivastava, Peter M. Holbek, Zofia Radlowski

Graduate Students

Kay Fletcher, Tracy Delaney, June M. Ryder

Industry Sponsors

Gysample and P-RES - Computer programs to evaluate geochemical data

Al Sinclair, Zofia Radlowski, A. Bentzen

Metallogenesis of the Iskut River area (1990-1993)

James Macdonald, Art Ettlinger, Peter Lewis, Al Sinclair, Colin Godwin, John Thompson, Paul Metcalfe, Peter van der Hayden, Dipak Ghosh

Tina Roth, David Rhys, David Bridge, Roland Bartsch, Andrew Kaip, Genga Nadaraju, Bruce Miller, Lori Snyder

Full support: BP Canada, Cominco, International Corona, Granges, Homestake, Kennecott, Kenrich, Lac Minerals, Noranda, Placer Dome, Teck; Partial: Ecstall Mining, Gulf Int. Minerals, Newhawk Gold, Prime Resources, Skyline Gold, Solomon Resources

Copper-Gold Porphyry Systems of BC (1991-1994)

Colin Godwin, Kelly Russell, Cliff Stanley, Jim Lang, Dipak Ghosh

Kika Ross, Lori Snyder, Cam Delong, Guylaine Gauthier, Brian Lueck, Teresa Fraser, Kathryn Dunne

BP Resources, Corona, Kennecott, Placer Dome, Princeton Mining, Rio Algom, Teck

VMS Deposits of the Cordillera (1993-1996)

Tim Barrett, Ross Sherlock, John Thompson

Fiona Childe, Michelle Robinson, Sean McKinley, Rob Macdonald, Chris Sebert, Tina Roth

Granges, Homestake, Inco ETS, Kennecott, Lac Minerals (American Barrick in 1995), Metall Mining, Placer Dome, Teck, WMC International, Westmin Resources, TVI Pacific

Regional and System-scale Controls on the Formation of Cu and/or Au Magmatic-Hydrothermal Mineralization (1996-1999)

James Lang, John Thompson, Jim Mortensen, Kelly Russell, Tim Baker, Richard Friedman, Ian Coulson

Rob Duncan, John James, Shane Jordan, Terri Maloof, Michelle Lepitre

American Bullion Minerals, Barrick, Canamera Geological, Cyprus/Amax Mineral, Echo Bay Mines, Homestake, Kennecott, First Point, Inco, Newmont, Phelps Dodge, Placer Dome, Princeton Mining, Rio Algom Exploration, Teck, TVI Pacific, Westmin Resources, WMC International, Yukon Gold

Lithogeochemical Exploration for Metasomatic Zones Associated with Hydrothermal Mineral Deposits (1996-2000)

Cliff Stanley, Al Sinclair, Hans Madeisky, Mark Coolbaugh, (Suzanne Paradis, Russell Korsch, Barry Roser)

Hristo Stoynov

BHP

Regional Geologic Framework and Deposit-Specific Exploration Models for Intrusion-Related Gold Mineralization, Yukon & Alaska (2000-2002)

Shane Ebert, Dick Tosdal, Jim Mortensen, Steve Rowins, (Tim Baker, Nick Oliver, Mark Lindsay, Julian Stephens, Victoria Brown - all JCU), Jim Lang (consultant)

Nancy Joyce (nee MacDonald), Kathi Dilworth

AngloGold, Barramundi Gold, Barrick, Homestake, Newmont, Placer Dome, Teck, WMC

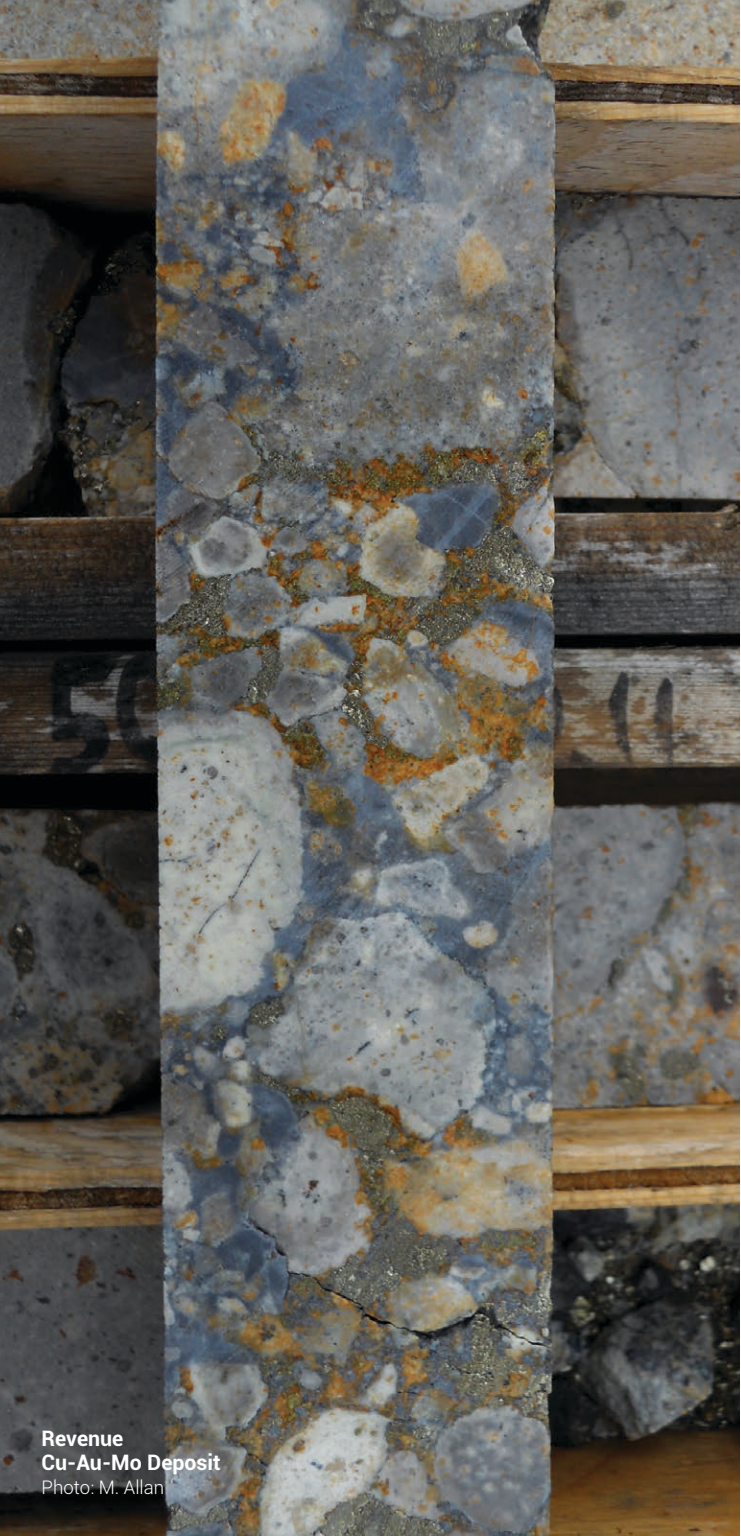
Sources and Exhausts in Polymetallic Carbonate Rock-Hosted Ore Deposits: Miocene Magmatism and Alteration in central Peru (2002-2005)

Thomas Bissig, Greg Dipple, Shane Ebert, Ken Hickey, Dick Tosdal

Abraham Escalante, Julio Jurado

Anglo American, Cia de Minas Buenaventura, Cia. Minera Antamina, BHP Billiton, Falconbridge (Noranda), Phelps Dodge, Teck Cominco

*conducted by multiple researchers



Revenue
Cu-Au-Mo Deposit
Photo: M. Allan

Integrating Geology, Physical Properties and Geophysics with 3-D Inversions (2004-2007)

Shallow- and Deep-level Alkalic Deposits: Developing an Integrated Exploration Model (2005-2008)

Carlin

Phase 1 - Paleogeographic Reconstruction (2001-2003)

Phase 2 - Mapping Thermal Anomalies (2004-2007)

Phase 3 - Footprints & Far-Field Vectors to Ore (2008-2010)

CO2 Sequestration of Mine Wastes (2008-2015)

Footprints of Lode Gold Mineralization at the Red Lake Gold Mines (2008-2010)

Footprints of Porphyry Cu Deposits: Vectors to the Hydrothermal Center using Mineral Mapping and Litho-geochemistry (2009-2011)

Western Anatolian Metallogeny (2006-2009)

Yukon Gold Project (2009-2012)

PIMS – Porphyry Indicator Minerals (2011-2015)

Researchers

Dick Tosdal, Doug Oldenburg, Greg Dipple, Kelly Russell, James Scoates, Ken Hickey, Nigel Phillips, Wilma Pretorius, Claire Chamberlain

Dick Tosdal, David Cooke (CODES), Claire Chamberlain, Cari Deyell, Jim Logan, Kirstie Simpson, Thomas Bissig

Dick Tosdal, Ken Hickey, Jim Mortensen, Ray Donelick
Ken Hickey

Ken Hickey, Greg Dipple, Shaun Barker, Graham Andrews, Ray Donelick, Peter Reiners

Greg Dipple, Ian Power, Andreas Beinlich, Paul Kenward

Farhad Bouzari, Dick Tosdal

Dick Tosdal, John Dilles (OSU), Scott Halley (Mineral Mapping Pty)

Ilkay Kuscu, Dick Tosdal

Murray Allan, Matias Sanchez, Craig Hart, Jim Mortensen, Rob Chapman

Farhad Bouzari, Craig Hart, Thomas Bissig

Graduate Students

Nick Williams, Dianne Mitchinson, Peter Lelievre, Victoria Sterritt, David Trippett, Nicolas Pizarro

Meghan Jackson, Paul Jago, Janina Micko, Frederico Henriques, Amber Henry, Kevin Byrne (CODES students - Adam Bath, Heidi Pass, Jaqueline Blackwell, Wojtek Zukowski)

Simon Haynes

Jeremy Vaughan, Ayesha Ahmed, Moira Cruikshanks

Sasha Wilson, Lyle Hanson, Anna Harrison

Elizabeth Stock

Tatiana Alva, Julia Cohen (OSU)

Witold Ciolkiewicz, Leif Bailey, David Cox, Greg McKenzie, Tim Wrighton, Nate Corcoran, Stacie Jones, Gareth Wolff

Antonio Celis

Industry Sponsors

Anglo American, AngloGold, Barrick, BHP Billiton, Xstrata (Falconbridge), Geoinformatics, CVRD INCO, Kennecott, Placer Dome, Teck Cominco, WMC

Amarc Resources, AngloGold Ashanti, Barrick, Imperial Metals, Lysander, Newcrest, Newmont, Novagold, Teck Cominco, Geoscience BC

AngloGold, Barrick, Newmont

Barrick, Newmont, Teck

Natural Sciences and Engineering Research Council of Canada (NSERC), Mitacs, Carbon Management Canada (CMC)

Barrick Gold, BHP Billiton, Imperial Metals, Teck Corporation, Freeport McMoRan, Partial support from Vale and NSERC

Barrick, Teck, Tuprag

Aldrin Resource Corp., Barrick, Full Metal Minerals, Gold Fields, Independence Gold, Kinross, Northern Freegold Resources Ltd., Rackla Metals Inc., Taku Gold Corp., Teck, Underworld Resources, NSERC, GSC

Geoscience BC

25th Anniversary Meeting Speakers



Craig Hart
MDRU Director

Craig has over 25 years of expertise in arc environments and evaluating porphyry, orogenic, epithermal and intrusion-related gold systems, and has led regional metallogenic studies in North America and Asia.



Murray Allan
MDRU Research Associate

Murray has 12 years of research and industry experience with hydrothermal ore systems, with a focus on fluid geochemistry. He currently leads the metallogenic research initiatives in the Yukon and Alaskan Cordillera.



Tim Baker
Chief Geoscientist, Eldorado Gold Corp.

Tim holds a PhD from James Cook Univ. (1996), which he followed with a postdoctoral position at MDRU and then returned to James Cook Univ.'s Economic Geology Research Unit as a senior lecturer. Tim is the recipient of the SEG Lindgren Award (2002) and has served as both Exploration Manager for Sovereign Metals, and Director of the Geological Survey of South Australia before joining Eldorado Gold in 2012.



Thomas Bissig
MDRU Research Associate

Thomas has more than 15 years experience in porphyry and epithermal metallogenesis and relationships between mineralization and landscape evolution, with a focus in the Andes, N. America and the Tethyan Belt. He holds a PhD from Queen's University (2001) and previously held a faculty position in Chile (2004-2008).



Britt Bluemel
Geochemist, REFLEX Geochemistry

Britt has been involved in applied geochemistry for the mineral exploration industry for over 5 years, first at the BCGS, then Barrick Gold. She joined REFLEX (formerly ioGlobal) after receiving her MSc from MDRU in 2013.



Farhad Bouzari
MDRU Research Associate

Farhad Bouzari has more than 15 years research experience on porphyry and gold deposits and mineralogical and geochemical techniques in exploration targeting. He is currently the principle investigator of the MDRU's PIMS (porphyry indicator minerals) and Porphyry Fertility projects and a collaborator on the Western Tethyan Metallogeny project focusing on Iran.



Peter Bradshaw
Executive Chairman and President, First Point Minerals

With over 40 years of service to the minerals industry with a focus on responsible exploration and development, Peter was a co-founder of MDRU. In 2014, he was inducted into the Canadian Mining Hall of Fame.



Sean Crowe
Canada Research Chair in Geomicrobiology, UBC

Sean is a geochemist who couples classical and molecular biological tools to geochemical techniques to study the co-evolution of life and Earth surface chemistry.



Greg Dipple
Professor, The University of British Columbia

Greg Dipple is a Professor in the Department of Earth, Ocean and Atmospheric Sciences at the University of British Columbia and has been a member of the Mineral Deposit Research Unit for more than 20 years. He studies mineral-fluid interactions at multiple crustal levels, focusing on hydrothermal systems, mineralization, and carbon sequestration.



Charlie Greig
Senior Geologist, Pretivm Resources

A UBC graduate, Charlie has over 30 years' experience in mineral exploration and mapping in the northern Cordillera and abroad. In the past several years he has mapped and helped explore Brucejack Lake gold project in eastern Iskut River area for Pretivm Exploration Ltd.



Eldad Haber
Industrial Research Chair in Computational Geophysics, UBC Geophysical Inversion Facility

Eldad's primary interest is scientific computing and its application to geophysical and medical imaging. His EM modeling and inversion research is industry-funded.



Ken Hickey
Professor, The University of British Columbia

Ken holds a PhD from James Cook Univ., and was a research fellow there (1994-2000) before joining MDRU and UBC. His primary research focus is to understand the processes involved in the genesis of mineral deposits from a multidisciplinary perspective, combining-among others- aspects of geomorphology, thermochronology, geochronology, structural geology.



Dianne Mitchinson
Senior Consultant, Mira Geoscience Ltd.

Dianne completed a PhD and Post-Doctoral research with MDRU on rock property signatures of orogenic gold and porphyry deposits to improve geophysical models. She is currently a Senior Consultant at Mira Geoscience.



Jim Mortensen
Professor, The University of British Columbia

Jim received a MASc in Geological Engineering at UBC (1979), and then a PhD at the University of California (Santa Barbara) in 1983. He taught Mineral Deposits at UBC for two years and then spent seven years as a Research Scientist at the Geological Survey of Canada in Ottawa before returning to UBC as a research professor in 1992. He has been heavily involved with MDRU on a wide range of projects for the last 23 years.



JoAnne Nelson
N. BC Manager, Senior Geologist, BC Geological Survey

JoAnne has a MSc degree from UBC and joined the BC Geological Survey in 1986, focusing on structural and stratigraphic controls on ore deposits. Of late, she has worked on Iskut, KSM, Brucejack and Bronson projects.



Shawn Ryan
RyanWood Exploration

Shawn's innovative exploration techniques grew out of prospecting days in the 1990s. He's been recognized for his role initiating "The Yukon's Second Gold Rush", and awarded for the White Gold and Coffee discoveries.



Matias Sanchez
Principal Geologist, Fault Rocks Consulting

Matias completed his MSc and PhD at The Univ. of London, then a PDF with MDRU. His specialty is integrating geology & geophysics for innovative structural maps and interpretation for exploration.



Paul Smith
UBC Paul has been with UBC since 1980, including 9 years as head EOAS head where he helped transform it into a world-class institution, and a term as UBC Vice Provost and Associate VP. A specialist in paleontology, stratigraphy and the Jurassic, he has been recognized by awards for teaching, research and administration.



John Thompson
Cornell University; Petrascience; former MDRU Director

John's career in the minerals industry includes impacts on a number of prominent mining companies and academic institutions. A former director of MDRU, John also served as Chief Geoscientist and VP at Teck Resources. He is now at Cornell University in New York.



Richard Tosdal
PicachoEx LLC; former MDRU Director

Dick's career began with a PhD from UC Santa Barbara, then the USGS and as a consultant for the mining industry. He was MDRU director from 1999-2009, and is now an internationally-renowned geological consultant.



Randy Turner
Independence Gold, President & CEO, Director

With more than 40 years in Canadian and International mineral exploration, business, and finance, Randy's career achievements include President of Trimin Resources and Silver Quest Resources Ltd., and several significant acquisitions and mergers in both the diamond and metals exploration industry.



Nick Williams
Principal Geophysicist, High Power Exploration

Nick Williams is Principal Geophysicist for High Power Exploration. He develops and applies advanced geophysical strategies for exploration, specialising in integrating geological and geophysical data and models in 3D to find buried mineral deposits under cover.



Peter Winterburn
AcmeLabs Research Chair, MDRU

Peter has over 25 years of experience in exploration geochemistry with Anglo American and Vale, specializing in exploration under cover. He joined MDRU in 2013 to establish the Exploration Geochemistry Initiative and reinvigorate geochemistry at MDRU.

Friday April 10

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| 9:45 - 10:15 | Welcome Coffee & Posters |
| 10:15-10:30 | Introductory Remarks |
| 10:30 - 10:50 | Peter Bradshaw (MDRU Co-Founder, First Point Minerals) MDRU's Initiation |
| 10:50 - 11:05 | Paul Smith (UBC) MDRU - EOAS Departmental Perspective |
| 11:05 - 11:15 | John Thompson (MDRU Past Director & Cornell University) MDRU's Early Days |
| 11:15 - 11:40 | JoAnne Nelson (BCGS) In the Footsteps of MDRU: An Iskut Exploration 2013-2014 |
| 11:40 - 12:10 | Charlie Greig (Consultant & Pretivm Resources) Latest Triassic-earliest Jurassic Tectonism in Stikinia, Iskut area, NW B.C. |
| 12:10 - 1:10 | Lunch & Speaker: Randy Turner (Independence Gold) The Great Canadian Diamond Rush |
| 1:10 - 1:40 | Tim Baker (Eldorado Gold Corp.) Intrusion-related Gold Deposits: Concepts, Controversies and Corporate Use and Abuse |
| 1:40 - 2:30 | Richard Tosdal (MDRU Past Director & PicachoEx LLC) A Footprint Approach to Exploration for Hydrothermal Ore Systems |
| 2:30 - 2:55 | Dianne Mitchinson (Mira Geoscience) Linking Geology and Geophysics with Physical Properties |
| 2:55 - 3:20 | Coffee & Posters |
| 3:20 - 3:50 | Ken Hickey (MDRU & UBC) New Perspectives on Carlin Gold Deposits & Exploration |
| 3:50 - 4:20 | Greg Dipple (MDRU & UBC) CO2 Sequestration in Mine Wastes |
| 4:20 - 4:45 | Jim Mortensen (MDRU & UBC) Geochronologic Advances in Understanding Regional Geology & Ore deposits |

Saturday April 11

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| 8:30 - 9:00 | Welcome Coffee & Posters |
| 9:00 - 9:15 | Craig Hart (MDRU) MDRU Project Strategy & Overview |
| 9:15 - 9:40 | Greg Dipple (MDRU & UBC) Identifying Ore Footprints with the MDRU Isotope Analyzer |
| 9:40 - 10:05 | Peter Winterburn (MDRU) Geochemical Exploration Through Cover |
| 10:05 - 10:30 | Farhad Bouzari (MDRU) Porphyry Indicator Minerals |
| 10:30 - 10:50 | Coffee & Posters |
| 10:50 - 11:15 | Thomas Bissig (MDRU) Advances in Andean Gold & Porphyry Metallogeny |
| 11:15 - 11:40 | Murray Allan (MDRU) Yukon-Alaska Metallogeny |
| 11:40 - 12:05 | Matias Sanchez (Fault Rocks Consulting) Geological Interpretation of Geophysical Data - An Integrated Approach |
| 12:05 - 12:30 | Craig Hart (MDRU) Creating a Structural Framework for BC's Nechako Region - No Outcrop, No Problem |
| 12:30 - 1:15 | Lunch |
| 1:15 - 1:45 | Shawn Ryan (RyanWood Exploration) From Drones to Drills |
| 1:45 - 2:10 | Britt Bluemel (REFLEX) Forward-Looking Geochemistry: from Assays to Information & Riding the Data Wave |
| 2:10 - 2:35 | Nick Williams (HPX Exploration) Forward Looking Geophysics & Inversion Applications to Exploration |
| 2:35 - 2:50 | Sean Crowe (UBC) MetaGeonomics for Mining |
| 2:50 - 3:15 | Eldad Haber (UBC) Digesting Big Data for Exploration Targeting |
| 3:15 - 3:40 | Coffee & Posters |
| 3:40 - 4:15 | John Thompson (Cornell University & Petrascience) The Future of Mineral Exploration |
| 4:15 - 4:45 | Panel Discussion |

