Diamond Exploration and Research Training School

Winter 2019, Issue 2

Newsletter

In this Issue

Introduction

2018 was a busy year for the DERTS program! Along with graduating our first group of DERTS students, there were internships, workshops, conference presentations, publications, fieldtrips and more! This newsletter provides a summary of all the activities DERTS students have participated in over the past year.

In 2018 the DERTS Team published an astounding 56 manuscripts on diamond, kimberlite and mantle research! Including the discovery of a new perovskite supergroup mineral: Goldshmidtite (K,REE,Sr)(Nb,Cr)O3.

We expanded our internship collaborations in the past year to provide an even broader range of experience than before. The DERTS students were extremely satisfied with the opportunities provided by all internship hosts. Thank you for your continued support.

We look forward to working with you in the future!

Graham Pearson
DERTS Program Director

Funding provided by:

UNIVERSITY OF ALBERTA
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NSERC CRSNG

About the program

DERTS is a unique graduate studies program that brings together industry, government and academia to train students in the latest advances in volcanology, geochronology, indicator mineral analysis/ interpretation, exploration geophysics, and remote-sensing as applied to diamond deposits.

The program provides fully funded scholarships for high-performing MSc and PhD that are interested in conducting research related to diamonds and/or kimberlites at the University of Alberta or the University of British Columbia. The DERTS program includes a highly successful industrial internship component that provides on-site experience at mines, on exploration projects, in laboratories and with geological surveys. Internships average 8 weeks per year over the course of the degree. These internships provide the students with the critical experience they need to successfully secure jobs in the mining and exploration industry upon graduation.

The DERTS research team is internationally recognised, with a broad spectrum of expertise ranging from diamond mineralogy and geochemistry, kimberlite petrography and volcanology, geochronology, theoretical and lab-based experimental studies, to exploration geophysics and hyperspectral techniques for mineral exploration.

The DERTS program is in the 3rd year of a 6-year grant. The program is funded by a $1.65 million grant from NSERC CREATE, with additional support from the University of Alberta of $400,000. Funding to support the research portion of each project has exceeded $500,000 since the inception of the program. Additionally, numerous DERTS collaborators have provided funding to support DERTS events including fieldtrips, conferences and internships, to date totaling over $100,000.

For more information about the DERTS program, please visit: www.uab.ca/diamonds or contact us: DERTS@ualberta.ca

2018 Program Overview

2018 Graduates

Our first cohort of DERTS students and associates successfully defended their theses in 2018! Mandy Krebs kicked off the year by defending her PhD. in January and the defenses continued throughout the year culminating with Theetso Motsamai defending his PhD. in December. DERTS graduates have secured jobs with industry and academia or are enrolled in furthering their studies. The research projects (see below) covered a variety of topics including diamond spectroscopy, inclusions in diamonds, indicator minerals and mantle xenoliths and were based on samples from Canada, South Africa and Botswana. A total of 5 manuscripts have already been published from theses theses; details of the publications are appended to the newsletter. If you would like a copy of any of these publications or theses, please contact us at derts@ualberta.ca.

DERTS Students – Completed Theses

Garrett Harris, MSc.

Thesis: Mantle composition, age and geotherm beneath the Darby kimberlite field, west central Rae Craton

Current position: Geologist with APEX Geoscience Ltd.

Stephane Poitras, MSc.

Thesis: Kimberlite Indicator Minerals from the Central Mackenzie Valley, Northwest Territories, Canada: a Reconnaissance Geochemistry Survey

Current position: Geologist with Aurora Geosciences

Mei Yan Lai, MSc.

Thesis: Spectroscopic analysis of yellow diamonds

Current position: PhD candidate U of A

Xinchen Xia, MSc.

Thesis: Mineral inclusions in diamonds from Chidliak (Nunavut, Canada): constraining the diamond substrates

Current position: Studying in Japan

DERTS Associates – Completed Theses

Mandy Krebs, PhD.

Thesis: Impurities and defects in, and isotope compositions of, gemstones

Current position: Postdoctoral Fellow Gemological Institute of America

Janina Czas, PhD.

Thesis: The Quandry of the Sask Craton: Origin and evolution of the lithospheric mantle beneath the Sask Craton

Current position: Postdoctoral Fellow U of A

Theetso Motsamai, PhD.

Thesis: The composition of the lithospheric mantle beneath the Karowe Mine and its associated diamond sources in north-eastern Botswana

Current position: Contemplating offers from BIUST and the Botswana Geological Survey

Workshops

Kimberlite Core Logging Workshop

Bruce Kjarsgaard from the Geological Survey of Canada designed and ran a kimberlite core logging course for the DERTS program, May 9 to 15, 2018 at the University of Alberta Core Facility. The workshop included lectures covering topics ranging from kimberlite volcanology to core logging techniques and integrating core logging datasets. Guest lectures by U of A's own Dr. Stachel on volcanology and Colin Parsons of Quanta Services on drills and drilling techniques supplemented the lectures of Dr. Kjarsgaard.

The practical portion of the workshop included exercises on preliminary core logging, coarse and detailed line scans, heavy mineral scans and concluded with the completion of a full detailed core log. The University of Alberta has a broad collection of full drill holes of kimberlite core from across Canada. The core samples were supplemented by representative samples of kimberlite from the collections of Drs. Kjarsgaard, Pearson and Stachel to provide the students with exposure to a broad range of kimberlite samples from across the globe.

The students benefited from the exposure to the wide variety of kimberlite samples and cores that were available and from learning the entire core logging process. Two of our students were able to immediately use the knowledge learned at the workshop during their subsequent internships with Rio Tinto. Due to the positive feedback we received we plan to offer this workshop every 2 years so that all students in the DERTS program will have a chance to complete it.

Thank you Dr. Kjarsgaard for the excellent course that you put together, we look forward to running the workshop again!

To view more images from the workshop, please visit our Flickr gallery:

https://www.flickr.com/photos/derts_diamond_school

Students completing the practical exercises and participating in lectures during the Core Logging workshop.

Diamond Polishing Workshop

Several DERTS students participated in a day-long diamond polishing workshop at the University of Alberta. The workshop was led by Chad Snider, a locally based, certified diamond polisher. Chad taught the student how to prepare and use the scythe to polish windows on diamond samples. Small flat windows on diamond surfaces make it easier to perform analyses on whole diamonds (without breakage) and improve analytical quality.

Chad Snider showing DERTS students Mei Yan Lai, Margo Regier, Nicole Meyer and Will Siva Jothy how to polish diamonds.

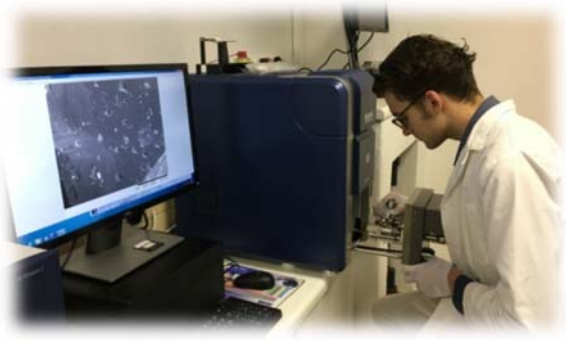
Internships

DERTS students participated in 12 internship placements with 9 DERTS partners in 2018. The interns were hosted by exploration, mining and consulting companies, laboratories, and geological surveys. The students really enjoyed all of the internship placements and the hands-on work experience that they gained. In addition to the technical experience, they also participated in supplementary on-the-job training sessions including First Aid, WHMIS, off road driving, field navigation, firearms training and field safety. The financial support provided by intern hosts to facilitate internships in 2018 exceeded $80,000. We are extremely grateful to all the internship hosts for providing a very welcoming environment for the students and to all employees for taking the time to share their expertise and for making the students feel like they were part of the team.

Rio Tinto hosted Marina Karaevangelou and David Sasse over a period of 5 months during the summer of 2018. Marina and David got to spend time out at the FALC core logging site putting to use their newly acquired core logging skills and gaining additional experience working with kimberlite core. Both Marina and David continued on with Rio subsequent to their field rotation working on additional projects in Vancouver.

Marina and David logging core at FALC.

DeBeers hosted 3 interns in 2018: Christian Veglio, Sean Bettac and William Siva-Jothy. Will was very fortunate to participate in an internship hosted in Johannesburg, South Africa. Will was able to supplement his thesis work during his internship by using the SEM to analyse a larger population of microdiamonds from Gahcho Kue. He presented the results of this study at the Yellowknife Geoscience Forum in November 2018. Christian spent the summer in the Toronto office working with databases in Microsoft Access and GIS and finished off his internship at the Victor Mine. Sean Bettac worked with the DeBeers office in Toronto on analyzing, processing and modelling geophysical data.



Will analysing samples on the SEM.

Christian got a tour of the Victor Mine where he spent some time during his internship.

Sean Bettac additionally participated in an internship with APEX Geoscience Ltd. during the summer. He was fortunate to partake in a field program that required the acquisition of a ground geophysical survey. It was his first experience visiting the Canadian Arctic! Subsequently, he worked with APEX's geophysics team to process various types of geophysical data from numerous projects from across the globe.

Sean completing a ground geophysical survey in the Arctic during his internship with APEX.

The Alberta Geological Survey hosted 2 interns in 2018. Ben Gruber and Garrett Harris spent several weeks at the survey working with manipulating geochemical data and updating databases. Ben worked on compiling and classifying whole rock geochemical data from across Alberta. Garrett was tasked with updating the kimberlite indicator mineral (KIM) microprobe data database. Both data set compilations are being prepared for publication and will be available on the AGS website.

SRC Innovation Place, Saskatoon, SK

Matthew Wudrik held a 4 month internship at the Saskatchewan Research Council (SRC) in Saskatoon. Matt worked with the teams at the Geoanalytical Laboratories and with the Microanalysis Laboratory on a variety of projects. He gained experience using multiple analytical instruments and was introduced to the processing procedures for commercial samples.

Tim McIntyre participated in a 4 month internship hosted by Anglo American during the summer of 2018. Tim spent part of his time in Vancouver planning and arranging the logistics for the summer field programs. He subsequently participated in a couple of field programs in arctic and sub-arctic regions.

Mei Yan Lai was selected from a large applicant pool to receive a prestigious research internship from the Gemological Institute of America (GIA). She spent several months working at GIA's Carlsbad Campus with Dr. Mike Breeding on HPHT (High Pressure – High Temperature) treatment of diamond.

GIA The Robert Mouawad Campus, Carlsbad, CA

Advanced Photon Source, Argonne National Laboratory, Lemont, IL

Margo Regier spent some time at the Advanced Photon Source synchrotron facility, Chicago, Il and at the University of Padua. These opportunities allowed her to access and use instrumentation not available at the University of Alberta to complete analyses on her research samples. It also provided Margo with the opportunity to experience how different laboratories operate around the globe.

Mentorship

Grade 11 student Hamdi Ali spent her summer conducting research under the mentorship of DERTS PhD candidate Margo Regier. Hamdi was part of a number of interns at the University of Alberta sponsored through Women in Scholarship, Engineering, Science, and Technology (WISEST) Summer Research Program. Hamdi conducted a study on the efficiency of sample separation and mineral recovery at the new SELFRAG Laboratory (https://www.eas.ualberta.ca/ccim/?page=selfrag). Hamdi's research returned unexpected results: samples processed through the SELFRAG can liberate diamonds and host minerals more better than traditional mechanical separation methods. Hamdi presented her findings at the Yellowknife Geoscience Forum in November 2018. Her discovery garnered significant media attention for the budding scientist.

Hamdi and Margo in the SELFRAG Lab.

You can dowload a copy of Hamdi's poster from the DERTS website (https://www.ualberta.ca/science/programs/create/diamond-exploration/news-and-events/selfrag-poster-ali-2018)

and read the full length story at https://www.ualberta.ca/science/science-news/2018/december/diamonds-detection-student-discovery

DERTS/SEG 2018 Fieldtrip

The 2018 DERTS Fieldtrip was run in conjunction with the U of A Society of Economic Geologists (SEG) Student chapter. DERTS students organized and led the fieldtrip to interior BC to visit the Wells Grey Volcanic Province and New Afton Mine. The Wells Gray Volcanics represent some of the most recent volcanic events in Canada. The focus of the trip was to understand the large scale volcanic and tectonic history of the region, and the accretionary orogenic systems that control metal mineralization along the Stikine and Quesnel terranes. During the trip the students visited well preserved exposures of cinder cones, sub-glacial volcanics, basaltic dykes and mantle xenoliths. The trip included a visit to New Gold's New Afton Mine – a Au-Ag-Cu deposit – near Kamloops, BC. The students were treated to both an underground tour and surface tour of the operation.

Clockwise from top-left:
Helmcken Falls gorge providing excellent views of volcanic ash beds in Wells Gray Provincial Park;

Searching for mantle and crustal xenoliths at Third Canyon. The xenoliths were brought to the surface via Buck Hill cinder cone;

Underground in the New Afton Mine. Fieldtrip participants left to right: Matt Hardman, Nicole Meyer, Chiara Anzolini, Margo Regier, Tyler Warchola, Natasha Barrett, Dennelle Smyth and Ben Gruber.;

Overlooking the tailings operations at New Afton Mine;

One of the many basalt-hosted spinel lherzolite xenoliths found on the trip.

Conferences

International Diamond School 2018 http://www.internationaldiamondschool.org/

DERTS students attended the 4th International Diamond School in Bressanone, Italy between January 29th and February 2nd, 2018. The Diamond School was organized and supported by the Indimedea research team (Department of Geosciences, University of Padua) along with Graham Pearson (University of Alberta), Steven Shirey (Carnegie Institution), Matteo Alvaro (University of Pavia) and Wuyi Wang (Gemological Institute of America). The GIA was the education sponsor of the conference.

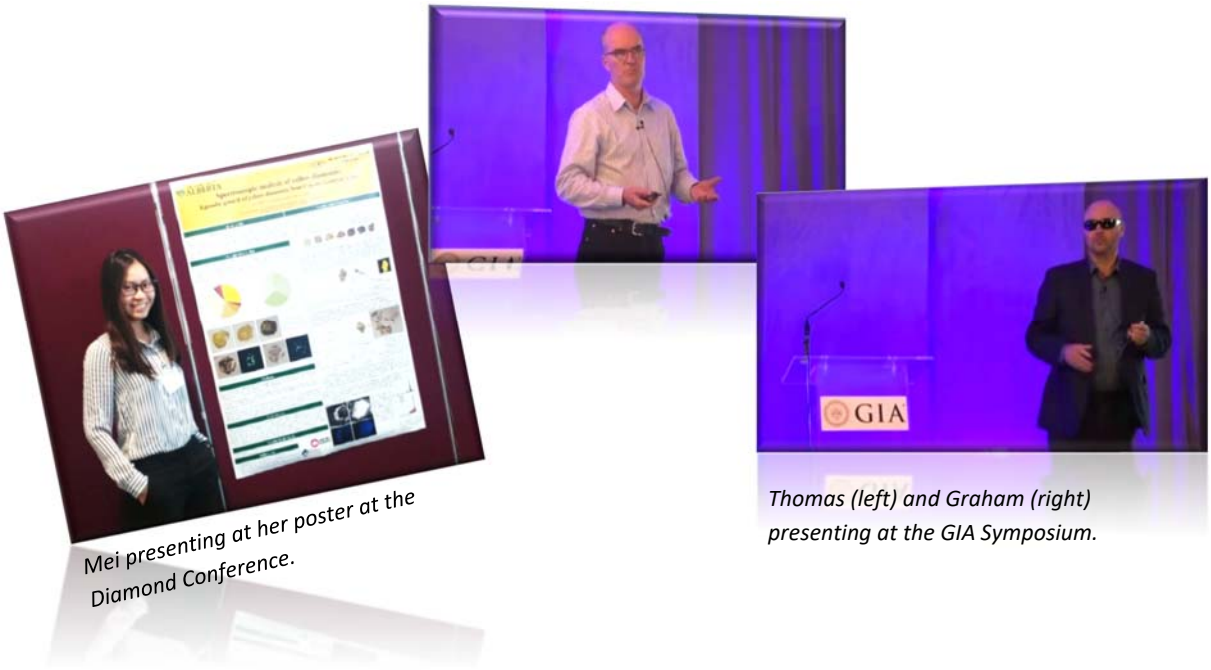
Clockwise from top left: DERTS students, faculty and collaborators at the IDS; David presenting on his research, Margo presenting on her research; Marina discussing her poster with Ulrika D'Haenens Johanssen (GIA); DERTS students attentively listening to lectures; DERTS collaborator John Armstrong (Lucara) presenting on the Karowe Mine.

The IDS included internationally acclaimed, invited speakers from across industry and academia including presentations by DERTS researchers G. Pearson and T. Stachel, and DERTS collaborators: J. Armstrong (Lucara Diamond), M. Breeding (GIA), H. Grütter (Peregrine Diamonds), J.W. Harris, B. Kjarsgaard (GSC), and W. Wang (GIA). DERTS students Marina Karaevangelou, Margo Regier and David Sasse presented on their research at the meeting. The small format of the meeting facilitated an ideal environment for discussions and networking between the students and other attendees.

The Diamond Conference and GIA Symposium

The DeBeers sponsored Diamond Conference is held annually in July at the University of Warwick, UK. The conference brings together scientists and industry professionals with a focus on the physical properties of diamonds. Mei Yan Lai presented on her research on spectroscopic analyses of yellow diamonds at this conference.

Mei additionally presented this research at the 2018 GIA Symposium in Carlsbad, USA in October. The 2018 GIA Symposium offered a unique opportunity to interact with professionals from the gem and jewelry trade. The symposium focused on gem discoveries, new treatments and their detection, and evolving technologies. Graham Pearson presented an invited Special Keynote lecture on "*Modern Advances in the Understanding of Diamond Formation* and Thomas Stachel discussed "*Diamond Precipitation from High-Density CHO Fluids*' at the Symposium.



Mei presenting at her poster at the Diamond Conference.

Thomas (left) and Graham (right) presenting at the GIA Symposium.

Yellowknife Geoscience Forum and Saskatchewan Geological Open House

Margo, Ben and Will along with WISEST intern Hamdi Ali attended the 46th Annual Yellowknife Geoscience Forum in November 2018 where they presented on their research projects. Dennelle Smyth presented her recent results on the Pikoo kimberlites at the Saskatchewan Geological Open House (December 2018).

DERTS Day 2018!

On November 5, 2018 all DERTS students and faculty gathered in Edmonton for the Annual DERTS meeting. The morning was filled with presentations and tutorial seminars from invited speakers. The day started with a presentation from the Association of Professional Engineers and Geoscientists of Alberta (APEGA) on role of professional bodies in regulation of the geoscience professions. Technical presentations by our own Matt Hardman on an Introduction to R - a statistical software suite ,and visiting speaker Dan Howell on FTIR data processing rounded out the morning session. Michael Seller from DeBeers Group joined us for the days' events. Mike's presentation on "Indicator Mineral Provence Studies Using Ilmenite" highlighted the application of geo-statistics in exploration targeting. During the afternoon the students talked, in general terms, about their internship experiences and the progress of their research projects. Overall a very informative and constructive day!

Guest speakers and DERTS students presenting at the DERTS annual meeting.

Connecting with Industry Partners

We were delighted to host numerous visiting DERTS supporters at the University of Alberta throughout the year. These visits provide the opportunity to share our recent research, gather feedback about the program, strengthen relationships and discuss future collaborations. We are always happy to guide visitors around the state-of-the-art laboratory facilities and discuss potential research projects. Additionally, these visits provide the students with a chance to interact with, and present to, industry professionals and visiting scientists in a relaxed setting. If you are interested in visiting, or are passing through Edmonton, let us know and we would be happy to arrange a tour.

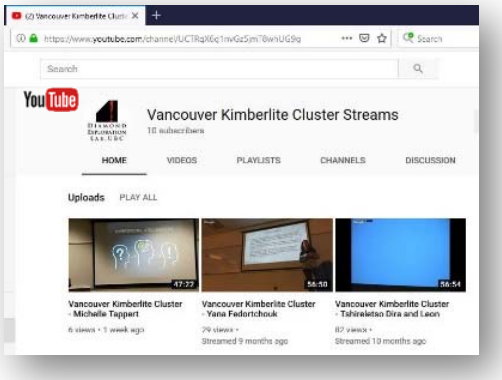
Graham Pearson and Thomas Stachel hosting laboratory tours for visiting DERTS collaborators. Students presenting on their research to visiting DERTS collaborators (top left: Ben Gruber and bottom centre: Janina Czas).

Seminar Series

Two seminar series are incorporated into the DERTS program to an opportunity for visiting industry professionals and scientists to present recent approaches/advances in exploration and evaluation techniques and cutting-edge research.

The DERTS Seminar Series is hosted at the University of Alberta in Edmonton. The series provides an opportunity for discussion and networking among industry and academic visitors and students. It additionally, provides a forum for developing collaborative research projects. Over the past year we have hosted numerous presenters including: Dr. Kjarsgaard (GSC), Dr. Guitarrari Azzone (University of São Paulo), Dr. Luguet (University of Bonn), Dr. Brey (University of Frankfurt), Ms. Timmerman (Australian National University), Dr. Kobussen (Rio Tinto), and Dr. Dan Howell (Diamond Durability Lab).

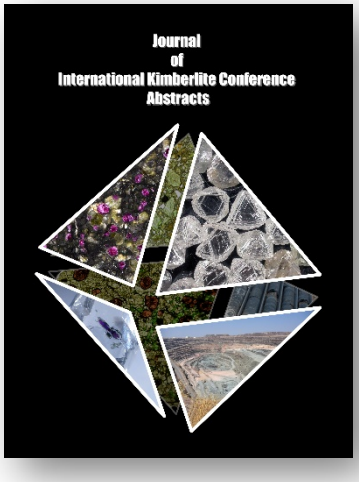
The Vancouver Kimberlite Cluster (VKC) Seminar Series is hosted by UBC and SRK Consulting, and held in downtown Vancouver, BC. The series provides an opportunity to share ideas and stories from diamond exploration, kimberlite geology, and related topics. A YouTube channel: **Vancouver Kimberlite Cluster Streams** has been set up that showcases recorded VKC seminars (with presenter consent). Check it out for any talks that you've missed:



https://www.youtube.com/channel/UCTRqX6g1nvGz5jmT8whUG9g

DERTS Publications and new journal established

The DERTS research team, including the students, did an impressive job of disseminating their research results through numerous conference presentations and publications in 2018. In total the DERTS team authored **56** manuscripts related to diamonds, kimberlites and the mantle which were published in high impact, peer-reviewed journals including the 11th International Kimberlite Conference Proceedings. DERTS students were authors on 10 of these publications. DERTS students additionally published 15 abstracts to accompany 15 presentations given at 8 different national and international conferences. A comprehensive list of publications authored by DERTS students and researchers is appended at the end of the newsletter. If you would like to receive a copy of any of these publications, please contact us: derts@ualberta.ca.



Additionally, DERTS Director Graham Pearson founded the Journal of International Kimberlite Conference Abstracts. Over the past year DERTS students Nicole Meyer and Natasha Barrett with financial support from the 11IKC and the University of Alberta Libraries, have been busy scanning and compiling metadata for hard copy extended abstract from past kimberlite conferences. These abstracts are becoming increasingly more difficult to obtain and the Journal of International Kimberlite Conference Abstracts will ensure that the abstracts are archived in digital format to be made available for posterity. The Journal is open access and all abstracts are available for download at: https://journals.library.ualberta.ca/ikcabstracts.com.

SELFRAG Laboratory Now Open

The SELFRAG System, donated by Isomass Calgary uses a high voltage pulse power fragmentation system to disaggregate samples along individual grain boundaries to produce high quality mineral separates maximizing the yield of intact grains. The SELFRAG can be used to process diamondiferous kimberlites and xenoliths, and other samples. It has proven particularly useful for maximizing the yield of perovskite grains from kimberlite for geochronology. Initial testing has resulted in better recoveries of diamond from a diamondiferous eclogite compared to traditional mechanical rock crushing processes (see poster by Ali et al, 2018): https://www.ualberta.ca/science/programs/create/diamond-exploration/news-and-events/selfrag-poster-ali-2018).

The facility is available for demo and pilot projects from industry and academia.

For more information check out the SELFRAG website at the U of A (https://www.eas.ualberta.ca/ccim/elfrag), at Isomass (http://www.isomass.com/fragmentation/) or contact Graham Pearson (gdpearso@ualberta.ca).

Our Team

The DERTS Students

Currently there are 13 graduate students enrolled in the DERTS program. Six students joined the program in 2018/2019. Additionally, 2 students participate in the DERTS program as Associates but are funded through other grants. DERTS Associates have access to all DERTS activities and events including fieldtrips, conferences, seminars and workshops. DERTS also supports one Post-doctoral fellow. Brief summaries of the student research projects are provided below. For additional information about the students, their research projects and DERTS alumni please visit our website: www.uab.ca/diamonds. DERTS students have been very successful in securing funding from numerous external sources including the Mineralogical Society of Canada, Faculty of Graduate Studies and Research U of A, Faculty of Science U of A, and the Government of Alberta to help offset the cost of conference attendance.

2018/2019 Cohort

Natasha Barrett *(U of A)*
PhD with Graham Pearson

Natasha is working on mantle xenoliths from Fiji and ophiolite peridotites from Papua New Guinea. Her research is focused on how mantle evolution in younger, sub-oceanic lithosphere relates to conditions for continent growth and stabilization, and whether this information can be used as a modern analogue to understanding the formation of stable cratons where we find diamonds.

Kelsey Bulbuc *(U of A)*
MSc with Thomas Stachel & Graham Pearson

Kelsey will complete a detailed examination of both mineral inclusions and their host diamonds from the former Snap Lake Mine. The Snap Lake kimberlite dyke is located on the southern Slave Craton. This area is poorly studied with respect to its mantle root and diamond content in comparison to the central Slave Craton. Kelsey's project is supported by the DeBeers Group.

Tim McIntyre *(U of A)*
PhD with Graham Pearson & Larry Heaman

Tim's research is focused on understanding the evolution of the lithospheric mantle underlying the North Atlantic Craton using Re-Os isotopes and PGE's in crustal hosted peridotites of West Greenland. Additionally, he is conducting a dating and tracer isotope study of Coronation Gulf kimberlites and is examining the impact of heat producing elements (K, U, and Th) in mantle xenoliths on geothermal modelling.

Internship: *Anglo American*

Brody Meyers *(U of A)* MSc with Robert Luth

Brody is studying a unique collection of melt-bearing mantle xenoliths recovered from the Chidliak kimberlites. He is trying to understand the nature of the metasomatic event that affected the mantle beneath the Chidliak kimberlite field and the effect of this event on the preservation of diamonds in the area.

Margo Regier *(U of A)* PhD with Graham Pearson & Thomas Stachel

Margo is using Raman spectroscopy, and synchrotron methods in conjunction with stable and radiogenic isotopes to trace the mantle sources and deep mantle processes recorded by super-deep diamonds from Kankan (Guinea) and Juina (Brazil).

Internships: Advanced Photo Source *and* University of Padua

Christian Veglio *(U of A)* MSc with Graham Pearson & Chris Lawley (GSC)

Christian is analyzing mantle xenoliths from the Jericho and Muskox kimberlites to assess the presence, spatial variability and mobility of gold and other precious metals in the mantle. The goal is to determine the role of the lithospheric mantle on ore deposit genesis. The project is co-funded by the Geological survey of Canada.

Internship: *DeBeers Group (Canada)*

Mei Yan Lai *(U of A)*
PhD with Thomas Stachel

After completing her MSc. on the spectroscopic analysis of yellow diamonds from Canada, Mei's PhD. research will focus on diamonds from Sierra Leone. She will complete the first systematic study of the carbon and nitrogen characteristics of the diamonds and geochemical analyses of their inclusions.

Chiara Anzolini *(U of A)*
Post Doctoral Fellow with Graham Pearson

Chiara is working on Raman spectroscopic measurements of inclusions in Type II diamonds from Brazil and southern Africa. She is also submitting, for IMA verification, detailed data on a new mineral "Nixonite": Na2Ti6O13, found in an eclogite from Nunavut. Chiara mentors graduate students and is our main group expert on Raman spectroscopy and X-ray diffraction.

2017 Cohort

Sean Bettac *(U of A)* MSc with Martyn Unsworth

Sean's research is focused on better understanding the structure of the lithosphere of the Slave Craton in the Northwest Territories using magnetotellurics (MT) to delineate regions that are favourable for diamondiferous kimberlites.
Internships: APEX Geoscience Ltd. and DeBeers Group (Canada)

Marina Karaevangelou *(UBC)* MSc with Maya Kopylova

Marina is working on diamonds from the Lace Mine (DiamondCorp). Her research will include description of the physical characteristics of the diamonds and analysis of their mineral inclusions.

Internship: Rio Tinto

David Sasse *(UBC)* MSc with Kelly Russell

David is studying the attrition of macrocrystic minerals in xenoliths as these are entrained by rising kimberlite magma. His research will broaden our understanding of kimberlite transport.

Internship: Rio Tinto

William Siva Jothy *(U of A)* MSc with Thomas Stachel/Graham Pearson

Will is working on diamonds provided by DeBeers from the recently opened Gacho Kue Mine. His study includes characterization of diamond forming fluids through nitrogen and carbon isotopes as well as analysis of the mineral inclusions.

***Internship*:** DeBeers Group (South Africa)

2016 Cohort

Ben Gruber *(U of A)*
MSc with Tom Chacko/Graham Pearson

Ben is investigating how lower crustal chemical and thermal parameters affect mantle geotherms and the diamond capacity of kimberlite pipes through the in-situ analysis of trace elements in indicator minerals. Samples for this project were provided by Diavik and Ekati.
Internships: *Alberta Geological Survey, University of Misasa*

Denelle Smyth *(U of A)*
MSc with Larry Heaman/Graham Pearson

Denelle is working on Pikoo kimberlite samples provided by North Arrow. Her study will provide the first detailed look at the character and genesis of the Pikoo Kimberlites along with age dating.
Internship: *DeBeers Canada*

Matthew Wudrick *(U of A)* MSc with Graham Pearson/Thomas Stachel

Matt is using Re-Os dating of garnet and spinel peridotite xenoliths from the Karowe Mine (Lucara Diamond) to determine the age and the chemical evolution of the lithospheric mantle in that area.
Internship: *Saskatchewan research Council*

Associates

Matthew Hardman (U of A)
PhD with Graham Pearson/ Thomas Stachel

Matthew has defined a new, robust graphical classification scheme for low-Cr crustal and mantle garnet. The classification is based on a compilation of published data and new analyses of samples that were provided by industry and academia. Matthew has immersed himself in geo-statistics and mentors all the DERTS students on the use and application of statistics with their datasets.

Nicole Meyer (U of A)
PhD with Thomas Stachel/ Graham Pearson

Nicole is working on inclusions in diamonds from the Koffiefontein Mine to provide improved inclusion-based geothermo-barometry. During her research, she has discovered a new mineral as an inclusion in diamond. The IMA approved mineral: Goldschmidtite (K,REE,Sr)(Nb,Cr)O3: is a new perovskite supergroup mineral. The samples for Nicoles study were provided by Jeff Harris and Petra Diamonds.

The Researchers

The DERTS research team is has internationally recognised expertise in a broad spectrum of geoscience fields ranging from diamond mineralogy and geochemistry, kimberlite petrography and volcanology, geochronology, theoretical and lab-based experimental studies, to exploration geophysics and hyperspectral techniques for mineral exploration. The research team includes 7 professors from the University of Alberta and 2 professors from the University of British Columbia. Please visit our website (www.uab.ca/diamonds) for additional information about research areas and projects currently run by each faculty member.

Top row: Graham Pearson, Thomas Stachel, Robert Luth, Kelly Russell
Middle row: Tom Chacko, Maya Kopylova, Larry Heaman
Bottom row: Martyn Unsworth, Benoit Rivard

The Program Coordinator

Anetta Banas M.Sc., P.Geol

Anetta coordinates the DERTS program including all workshops, fieldtrips, meetings and internships. She is the primary contact for all information related to DERTS programming and admission requirements. Anetta liases with our DERTS collaborators to ensure the success of the program. She is an alumnus of the University of Alberta where she completed her MSc thesis on the characterization of diamonds and their inclusions. She has over 10 years of experience working as a consultant to the diamond exploration industry.

Upcoming Events

2019 is shaping up to be another busy year for the DERTS program!

Exploration Round-Up, Vancouver BC, January 28-31, 2019

We will be at the Exploration Round-Up conference in Vancouver in January 2019. Come by and visit us at our booth #1526 on Wednesday and Thursday to learn more about the program and meet the DERTS students. Additionally we will be hosting a DERTS appreciation event on Monday January 28, 2019 at 5pm at Rogue Kitchen and Wetbar. Please join us if you are in Vancouver!

Fieldtrip 2019 – Guatemala April 19-30, 2019

The DERTS students are fully immersed in organizing the 2019 DERTS fieldtrip. The destination: Guatemala! Guatemala is an ideal place to study large-scale volcanic deposits, gain an understanding of volcanic processes and to examine exposures of ophiolitic mantle peridotites. The trip will provide the students with a solid understanding of volcanic deposits and processes which is essential for the identification and interpretation of small-scale samples such as those obtained from drill core on

View of Lago di Atitlan and the caldera walls of Atitlan III. (photo: SAP Guatemala Guidebook, 2005)

exploration and mining projects. As part of this trip, we have organized tours to the basaltic stratovolcano Pacaya, the national volcanological observatory (INSIVUMEH) near the andesitic Fuego stratovolcano, as well as the Lake Atitlan (Lago Di Atitlan) caldera. The tours will be led by geologist Roberto Boogher from INSIVUMEH. The fieldtrip will additionally cover Guatemalan subduction zone processes and associated epithermal deposits, as well as the socio-political factors affecting the mining industry in a developing nation. We have enlisted Professor Sergio Moran of San Carlos University to guide us through the anatomy of ancient subduction zones – obducted arc assemblages and ophiolites exposed along the Motagua suture zone and the associated mineral potential.

Industry partners/researchers are welcome to join us on this trip. If you would like additional information please contact Anetta Banas (abanas@ualberta.ca).

Introduction to Kimberlite Petrology, Terminology, Emplacement and Economics, University of Alberta, November 12 -15, 2019

We are working with Dr. Barbara Scott Smith, Scott-Smith Petrology Inc. (SSPI) to organize a Kimberlite Workshop to be held at the University of Alberta in November 2019. The workshop will include lectures and laboratory-based practicals led by Dr. Scott Smith examining the petrography and classification of kimberlites using a SSPI worldwide collection of polished slabs and thin sections (16 countries, 24 diamond mines). These learnings will be applied to the interpretation of kimberlite emplacement and economics. All DERTS Students and Associates will participate in the workshop.

Seminars

The first 2019 VKC seminar will be presented by Michael McCubbing from the Saskatchewan Research Council. On January 31, 2019 Michael will present on "Using Diamond Characterization to Refine Micro and Macro Diamond Processing and Recovery". If you are in Vancouver please join us at 6pm PST UBC Robson Square Room 400. Please check the YouTube channel if you miss the talk!

Internships

We are proactively seeking internship opportunities for our students in 2019. If you would be interested in hosting an intern in 2019 or in the future please contact us for more information.

Applications

Applications are now being accepted for September 2019 and January 2020 admission. For more information, please visit our website www.uab.ca/diamonds or contact us!

Connect with us!

www.uab.ca/diamonds

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