

University of Rochester
Earth & Environmental Science Department
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EDUCATION

- 2020 Ph. D, University of Rochester, Geosciences
2015 M.S., University of Rochester, Geological Sciences
2012 M.S., University of Rochester, Chemistry
2010 B.S., University of Delaware, Chemistry with Honors, Mathematics minor, GPA 3.618

RESEARCH EXPERIENCE

Jan-Apr 2020 **Postdoctoral Associate, University of Rochester**

Supervisor: Vasilii Petrenko

- Modeling of firm air diffusion for studies of CO mole fraction and stable isotopes.
- Characterizing in situ cosmogenic ^{14}C production at Law Dome, Antarctica
- Completing manuscript on in situ ^{14}C production at Summit, Greenland

2012 – 2020 **Graduate Research Assistant, University of Rochester**

Advisor: Vasilii Petrenko

- Planned and conducted polar field expeditions to obtain ice core and firm air samples.
- Developed ultra-clean high vacuum laboratory techniques on customized instrumentation for the extraction, purification and analysis of trace gases from ice core and firm air samples.
- Coordinated logistics and performed sample analyses for polar measurement campaigns
- Performed Numerical modeling via Monte Carlo and inverse methods in Matlab

2015 **Visiting Scientist, Australian Nuclear Science and Technology Organisation**

Sponsors: Andrew Smith & Quan Hua

- Processed CO_2 samples for radiocarbon measurement by graphitization
- Assisted with AMS measurement of ^{14}C samples

2011 – 2012 **Graduate Research Assistant, University of Rochester**

Advisor: Wolf-Udo Schröder

- Measured Fluorescence decay of plastic scintillators
- Operated and maintained radiation detectors for nuclear science applications

2009 – 2010 **Undergraduate Research Fellow, University of Delaware**

Advisor: Klaus Theopold

- Performed organometallic synthesis of β -diketiminato ligand transition metal complexes
- Learned wet chemistry and Schlenk line techniques

2008 – 2009 **Undergraduate Research Fellow, University of Delaware**

Advisor: Svilen Bobev

- Conducted solid phase crystal synthesis and X-ray diffraction analyses
- Familiarity working in an Argon glovebox and basic glassblowing techniques

INDUSTRY EXPERIENCE

2007 – 2010 **Intern, Solar Light Company**

- Prepared test samples for accelerated UV exposure testing
- Calibrated optical instrumentation for UV transmission & fluorescence measurements
- Updated data acquisition software and hardware interface for calibrations of pyranometers
- Manufactured optical instrumentation and associated electronic components

LABORATORY SKILLS

- 11+ Years - Microelectronic component assembly. Soldering, electronic wiring of PIDs, simple I/O & DAQ devices. Operating data acquisition systems
- 9+ Years - Experience with cGLP and proper PPE for analytical chemistry laboratory work. Familiarity with safety protocols for working with vacuum systems, compressed gases, flammable liquids and cryogenic liquids.
- 7+ Years - Designing, operating, troubleshooting and maintaining customized high vacuum gas manifolds for trace gas extraction and measurement. Familiarity with Swagelok and standard pipe fittings. Experience with oil, dry scroll and turbomolecular vacuum pump operation and maintenance. Experience with capacitance manometers and mass flow controllers for control and manipulation of gas flow.
- 7+ Years - Operation of CRDS for continuous measurement of H₂O, CO₂, CH₄ and CO in gas streams and GC with HgO reduction and Photometric Absorption for discreet CO measurement. Performed QA/QC on instrumentation and output data.
- 2+ Years - Working in a glovebox environment for handling of pyrophoric or highly oxidizing materials.
- 2+ Years - Operating radiation detectors (NaI, HPGc, Plastic scintillators, Gas ionization) and associated NIM and CAMAC electronic interfaces. Safety training for working with ionizing radiation.

SOFTWARE & PROGRAMMING LANGUAGE PROFICIENCIES

- Expert Microsoft Office, Igor Pro, MATLAB
- Advanced LabVIEW, C/C++, Endnote
- Basic Python, Unix Shell, Mathcad, Mathematica, GIMP, Wordpress

FIELDWORK EXPERIENCE

- 2015 **Summit Station, Greenland (7 weeks)** - Field leader for second half of the expedition. Operated field sublimation system for extraction of ice core CO₂ to be measured for ¹⁴C. Assisted with operation of large volume ice melting system for collection of gas samples to be measured for ¹⁴CH₄ and ¹⁴CO. Coordinated shipping logistics and scientific plan.
- 2014 **Summit Station, Greenland (7 weeks)** - Field leader for the second half of the expedition. Assisted with operation of 9.5" Blue Ice drill for the first time in shallow firn as well as collection of ice to 150m depth. Operated large volume ice melting system for collection of gas samples to be measured for ¹⁴CH₄ and ¹⁴CO. Coordinated shipping logistics and scientific plan.
- 2013 – 2014 **Taylor Glacier, Antarctica (8 weeks)** - Assisted with operation of 9.5" Blue ice Drill for collection of shallow ice cores. Operated large volume ice melting system for collection of gas samples to be measured for ¹⁴CH₄ and ¹⁴CO. Operated field ice core [CH₄] GC for sample reconnaissance.
- 2013 **Summit Station, Greenland (4 weeks)** - Assisted with collection of two 3" diameter ice cores to 100m depth with the Eclipse drill. Operated Firn Air sampling device to collect flasks of air from open porosity. Coordinated shipping logistics.

PUBLICATIONS

- 2020 **B. Hmiel**, V.V Petrenko, M.N. Dyonisius, C. Buizert, A.M. Smith, P.F. Place, C. Harth, R. Beaudette, Q. Hua, B. Yang, I. Vimont, S.E. Michel, J.P. Severinghaus, D. Etheridge, T. Bromley, J. Schmitt, X. Faïn, R.F. Weiss, E.J. Dlugokencky, *Preindustrial ¹⁴CH₄ indicates greater anthropogenic fossil CH₄ emissions*, *Nature*. doi.org/10.1038/s41586-020-1991-8
- 2020 M.N. Dyonisius, V.V. Petrenko, A.M. Smith, Q. Hua, B. Yang, J. Schmitt, J. Beck, B. Seth, M. Bock, **B. Hmiel**, I. Vimont, J.A. Menking, S.A. Shackleton, D. Baggenstos, T.K. Bauska, R.H. Rhodes, P. Sperlich, R. Beaudette, C. Harth, M. Kalk, E.J. Brook, H. Fischer, J.P. Severinghaus, R.F. Weiss, *Old carbon reservoirs were not important in the deglacial methane budget*, *Science* doi.org/10.1126/science.aax0504

- 2020 **B. Hmiel**, M.N. Dyonisius, V.V. Petrenko, J. Schmitt, E.J. Brook, *A new technique for the sublimation of ice cores for ^{14}C measurement.* (in preparation)
- 2020 **B. Hmiel**, M.N. Dyonisius, V.V. Petrenko, A.M. Smith, *In situ cosmogenic ^{14}C production and retention in the firn column.* (in preparation)
- 2020 M.N. Dyonisius, V.V. Petrenko, **B. Hmiel**, C. Buizert, A.M. Smith *Interpreting muonic cross sections for in situ cosmogenic ^{14}C production from ablating ice at Taylor Glacier, Antarctica.* (in preparation)
- 2019 J. Mühle, C.M. Trudinger, L.M. Western, M. Rigby, M.K. Vollmer, S. Park, A.J. Manning, D. Say, A. Ganesan, L.P. Steele, D.J. Ivy, T. Arnold, S. Li, A. Stohl, C.M. Harth, P.K. Salameh, A. McCulloch, S. O'Doherty, M.K. Park, C.O. Jo, D. Young, K.M. Stanley, P.B. Krummel, B. Mitrevski, O. Hermansen, C. Lunder, N. Evangeliou, B. Yao, J. Kim, **B. Hmiel**, C. Buizert, V.V. Petrenko, J. Arduini, M. Maione, D.M. Etheridge, E. Michalopoulou, M. Czerniak, J.P. Severinghaus, S. Reimann, P.G. Simmonds, P.J. Fraser, R.G. Prinn, R.F. Weiss. *Perfluorocyclobutane (PFC-318, c-C4F8) in the global atmosphere.* Atmospheric Chemistry and Physics, doi.org/10.5194/acp-19-10335-2019
- 2013 G.M. Darone, **B. Hmiel**, J. Zhang, S. Saha, K. Kirshenbaum, R.L. Greene, J. Paglione, S. Bobev, *Rare-earth metal gallium silicides via the gallium self-flux method. Synthesis, crystal structures, and magnetic properties of $\text{RE}(\text{Ga}_{1-x}\text{Six})_2$ ($\text{RE} = \text{Y, La-Nd, Sm, Gd-Yb, Lu}$).* Journal of Solid State Chemistry, doi.org/10.1016/j.jssc.2013.02.029
- 2012 J. Zhang, **B. Hmiel**, A.J. Antonelli, P.H. Tobash, S. Bobev, S. Saha, K. Kirshenbaum, R.L. Greene, J. Paglione, *New rare-earth metal germanides with bismuth substitution. Synthesis, structural variations, and magnetism of the $\text{RE}[\text{Bi}_x\text{Ge}_{(1-x)}]_2$ ($\text{RE} = \text{Y, Pr, Nd, Sm, Gd-Tm, Lu}$) compounds.* Journal of Solid State Chemistry, doi.org/10.1016/j.jssc.2012.07.031

SELECTED CONFERENCE PRESENTATIONS

- 2019 Development and initial results of ice core CO_2 extraction by sublimation for ^{14}C analysis, Poster Presentation. 2019 AGU Fall meeting, San Francisco, CA
- 2018 Constraining the Evolution of the Fossil Component of the Global Methane Budget Since the Pre-Industrial Using ^{14}C Measurements in Firn Air and Ice Cores. Poster Presentation. Radiocarbon 2018 Conference, Trondheim, Norway.
- 2017 Understanding the production and retention of in situ cosmogenic ^{14}C in polar firn. Invited Talk. AMS14 Conference, Ottawa, ON, Canada.
- 2016 Understanding the production and retention of in situ cosmogenic ^{14}C in polar firn. Poster Presentation. 2016 AGU Fall meeting, San Francisco, CA

TEACHING EXPERIENCE

- 2018 Teaching Assistant, 'Ice Cores and Climate Change' (1 class). Instructor: Dr. Vasilii Petrenko. Taught lecture on firn air processes. Developed assignment exploring firn air behavior with a model in Matlab.
- 2016 & 2018 Teaching Assistant & Workshop Leader, 'Introduction to Climate Change' (2 classes). Instructors: Dr. Vasilii Petrenko & Dr. Thomas Weber. Taught lecture on Glacial-Interglacial Cycles. Guided students through computational laboratory exercises and graded assignments.
- 2014 Teaching Assistant, 'Atmospheric Geochemistry' (1 class). Instructor: Vasilii Petrenko. Taught lecture on atmospheric CH_4 . Led workshop sessions and graded homework problems.
- 2012 Teaching Assistant, 'Advanced Nuclear Science and Technology Laboratory' (1 class). Instructor: Wolf-Udo Schröder. Guided students through lab experiments using various radiation detectors.
- 2011 & 2017 Undergraduate Chemistry tutor, University of Rochester Office of Minority Student Affairs (2 classes). Instructor: Dr. Benjamin Hafensteiner. Tutored students with homework problems.
- 2010 – 2011 Teaching Assistant, 'General Chemistry Laboratory I & II' (4 classes). Instructors: Dr. Douglas Turner & Dr. Thomas Krugh. Led laboratory exercises and graded laboratory reports.

2010 – 2011 Teaching Assistant & Workshop Leader, ‘*General Chemistry Lecture I & II*’ (2 classes).
Instructors: Dr. Thomas Krugh & Dr. Lewis Rothberg. Reviewed lecture material and graded homework problems.

FELLOWSHIPS & AWARDS

2014 & 2016 University of Rochester Graduate Student Association Conference Travel Award Recipient
2011 University of Rochester Chemistry Department Excellence in Teaching Award
2009 University of Delaware Summer Scholars Program Scholarship
2008 University of Delaware Plastino Scholars Fellowship

OUTREACH & SCIENCE COMMUNICATION

2017 Interview in Rochester Review Alumni Magazine “Climate Clues Frozen in Time”. Vol. 80, No. 2, Rochester NY. https://www.rochester.edu/pr/Review/V80N2/0505_icecores.html
2017 Operated the “Ask a Climate Scientist” booth at the Rochester Museum & Science Center during the Rochester Fringe Festival
2017 Operated the “Ask a Climate Scientist” booth at the Brighton Farmer’s Market
2017 Post Magazine Feature “Ancient Ice”, Rochester NY. <http://postrochester.com/ancient-ice/>
2015 NPR Radio interview “Connections: Science Roundtable” WXXI, Rochester NY.
<http://wxxinews.org/post/connections-science-roundtable-january-2015>
2015 NBC News interview “Military Unit is Lifeline for Scientists in Greenland and Antarctica”, Summit Station Greenland. <http://abcnews.go.com/Technology/video/race-understand-science-ny-air-unit-lifeline-scientists-32859726>