

CURRICULUM VITAE

BARBARA SHERWOOD LOLLAR CC, FRS, NAS, NAE, FRSC, FRCGS

PERSONAL INFORMATION

Position and Address: University Professor
Department of Earth Sciences
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Adjunct appointments: Institut de Physique du Globe de Paris (IPGP) Université Paris Cité (2022-2025)
Dept. of Chemical Engineering and Applied Chemistry University of Toronto (2016-2026)
Dept. of Chemistry University of Toronto (2017-2025)

Citizenship: Canadian
Languages: English, French

ACADEMIC QUALIFICATIONS:

1985: B.A. (Honours - Geological Sciences) **Harvard University *Summa cum laude***
1990: Ph.D. (Earth Sciences) **University of Waterloo**

EMPLOYMENT HISTORY:

2018-2023 Dr. Norman Keevil Chair in Ore Deposits Geology
2007-2021 Canada Research Chair Tier 1 in Isotopes of the Earth and Environment
2016-2020 Science Chair, Massey College University of Toronto
2001-2010 Professor, Dept. of Geology and Director, Stable Isotope Laboratory
1996-2001 Associate Professor, Dept. of Geology and Director, Stable Isotope Laboratory
1996 Awarded Tenure
1992-1996 Assistant Professor, Dept. of Geology and Director, Stable Isotope Laboratory
University of Toronto
1990-92 NSERC Postdoctoral Fellow, University of Cambridge, U.K.

h index = 70. March 25 2024 (Total citations 16296) i10 index = 184
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EXECUTIVE SUMMARY

In recognition of both her ground-breaking research and international impact in terms of professional contributions and global leadership, Sherwood Lollar has been awarded the highest distinction of the University of Toronto as a *University Professor*, and the highest civilian honour Canada can bestow, *Companion of the Order of Canada* (an honour bestowed on only 165 living Canadians). She was the recipient of the **2019 C.C. Patterson Award** for environmental chemistry, and the **2012 Eni Award in Protection of the Environment** presented for outstanding research and innovation in areas concerning the environmental impact of human activities, specifically protection and restoration of the environment. The latter award is chosen by a 24 member scientific review panel and **previous winners of the award include J. Craig Venter (2008) and Nobel Prize winner Frances Arnold (2018)** (see: <http://www.eni.com/eni-award/eng/home.shtml>). Sherwood Lollar was elected to the U.S. National Academy of Engineering (NAE) in 2021, and National Academy of Sciences (NAS) in 2022; is a Fellow of the Royal Society London (2019), Royal Society of Canada (2004), America Geophysical Union (2015), Geochemical Society and European Association of Geochemistry (2019) and Royal

Canadian Geographic Society (2019). Her most recent awards include the 2012 Geological Society of America **Geobiology and Geomicrobiology Division Award**, 2014 Helmholtz International fellowship (Germany), and Canada’s greatest prizes for research in science and engineering, the **2021 Massey Medal** from the Royal Canadian Geographical Society, **2020 Canada Council Killam Prize for Natural Sciences**, the Natural Sciences and Engineering Research Council of Canada **2019 Gerhard Herzberg Gold Medal**, the Natural Sciences and Engineering Council’s **2016 John Polanyi Award**, and the **2018 Geological Association of Canada’s Logan Medal**.

Over the past thirty years, Sherwood Lollar and colleagues’ work has expanded both fundamental science and practical applications in environmental chemistry and geochemistry with profound implications for our understanding of the Earth, the chemistry of groundwater, and extending to planetary science and astrobiology including:

- Pioneering approaches in compound specific isotope geochemistry to quantitatively evaluate chemical transformation mechanisms for remediation of organic contaminants in groundwater, and independent verification of biodegradation and chemical degradation rates – models and techniques now driving innovation in academia and commercial applications worldwide
- Discovery of longstanding processes of chemical water-rock reaction creating hydrogen- and methane-rich environments in the terrestrial subsurface – transforming understanding of global habitability, and sustainability of deep subsurface microbial communities
- Implications of her discoveries on the chemistry and habitability of groundwaters in the Earth’s deep subsurface are driving insights into mission planning for Mars, Enceladus and Europa
- Transforming understanding of the age and extent of groundwater using chemical tracers in the Earth’s deep “hidden hydrogeosphere” through discovery of deep saline fracture fluids preserved on million-and-billion-year timescales, with implications for formation of ore deposits, nuclear waste repositories, and carbon capture and storage
- Co-Director with Dr. Jack Mustard of Brown University of the new CIFAR program Earth 4D – Subsurface Science and Exploration.

Her work includes two studies highlighted on the cover of *Nature* (2002; 2009) and discoveries that have also generated public excitement worldwide – for example, with coverage in over 200 major media outlets worldwide in 2013 for the discovery of “billion year old water” (one of the **Top Ten Science Stories of 2013**) and coverage by the Economist, the BBC, CBC and US news outlets of the discovery of microbial life 2,4 km below surface on the Canadian Shield. She was recognized by her selection in 2013 by **Canadian Geographic** magazine in their **List of Top Ten Canadians** “Changing the World” along with Commander of the International Space Station Chris Hadfield and Oscar winning director and ocean explorer James Cameron.

ACADEMIC AWARDS AND HONOURS

Visiting Lecturer Cambridge University Leverhulme Centre for Life in the Universe	January 2024
American Geophysical Union Carl Sagan Lecturer	2023
RedDot Foundation “Sheroes” Award	2023
United States National Academy of Sciences (NAS) International Fellow	2022
United States National Academy of Engineering (NAE) International Fellow <i>Sherwood Lollar has been told she is the only living Canada elected as an International Fellow of both the U.S. National Academy of Sciences (NAS) and National Academy of Engineering (NAE)</i>	2021
Royal Canadian Geographic Society Massey Medal	2021
Canada Council for the Arts - Killam Prize for Natural Sciences	2020
Royal Society of Canada Willet G. Miller Medal in Earth Sciences	2020
NSERC Gerhard Herzberg Gold Medal	2019

Highest award for sustained distinguished achievement in Canadian science and engineering	
Fellow of the Royal Society London	2019
C.C. Patterson Award in Environmental Geochemistry from the Geochemical Society	2019
Fellow of the Royal Geographic Society of Canada	2019
Fellow of the Geochemical Society and the European Association of Geochemistry	2019
CIFAR Fellow and Co-Director <i>"Earth 4D – Subsurface Science and Exploration"</i>	2019-2024
Advisory Council to the Governor-General for the Order of Canada	2018-2021
Geological Association of Canada Logan Medal Highest award for sustained distinguished achievement in Canadian earth science	2018
Appointed Companion of the Order of Canada	2016
NSERC John C. Polanyi Award	2016
Royal Society of Canada Bancroft Medal	2016
Speaker of the House Recognition by Canadian Parliament at Question Period Session Feb 16. 2016	2016
Fellow , American Geophysical Union	2015
President of the Geochemical Society (2014-2015) (Vice- President for 2012-2013)	2014-2015
Canada Research Chair Tier I - Renewal Isotopes of the Earth and Environment	2014-2021
Helmholtz International Fellow Award for research excellence (20,000 Euros)	2014
Geoscience Information Society (GSIS) Mary B. Ansari Best Reference Work Award for 2014 for the <i>"Treatise on Geochemistry"</i>	2014
Top Ten Science Stories for 2013 Billion year old water Selected by Fox News, Discovery, and Geochemical News Holland, Sherwood Lollar et al. Nature 497: 367-360.	2013
Macleans Magazine List of "Top Stories to Follow in 2014"	2013
Canadian Geographic List of Top Canadians "The Changemakers" October issue	2013
Eni Award in Protection of the Environment	2012
Geological Society of America Geobiology and Geomicrobiology Division Award	2012
University Professor, University of Toronto	2010 to present

Senior Fellow, Massey College, University of Toronto		2010 to present
NSERC Accelerator Award		2013-2016
Liang et al. 2013 selected as one of Faculty of 1000 Prime		2013
Geochimica Cosmochimica acta one of Top 25 Most Highly Cited Papers		2010
Chemical Geology one of Top 10 Most Highly Cited Papers		2005-2010
SERDP Environmental Restoration Project-of-the-Year Award		2010
NSERC Accelerator Award		2008-2011
Canada Research Chair Tier I- Isotopes of the Earth and Environment		2007-2014
Science Council of Japan - Royal Society of Canada WISET Lecturer to Japan		2007
Fellow of Royal Society of Canada		2004
Canada Council Killam Research Fellowship		2004-2006
TIME Magazine - Canada Edition - Profiled as one of 25 “Leaders for the 21st Century”		2000
NSERC E.W.R. Steacie Fellowship	University of Toronto	1999-2001
Henry Darcy Distinguished Lecturer	U.S. National Groundwater Association	1998
NSERC Postdoctoral Fellowship	University of Cambridge	1990-92
Governor-General's Gold Medal for PhD	University of Waterloo	1990-91
W.B. Pearson Medal in Earth Sciences for PhD	University of Waterloo	1990-91
J.H. Stewart Reid Memorial Fellowship	University of Waterloo	1989-90
Petro-Canada Inc. Graduate Research Award	University of Waterloo	1987-89
NSERC Postgraduate Scholarship	University of Waterloo	1985-89
University of Waterloo Graduate Scholarship	University of Waterloo	1985-86

PROFESSIONAL LEADERSHIP AND ACTIVITIES

Work on EDI and Best Practice in recognition of Scientific Excellence

I have continued many roles that contribute to the advancement of EDI. Globally EDI efforts have reached a critical turning point – where the work in rewriting mission statements and institutional values – must now be translated into operational best practice in order to have the hoped for change in the day-to-day lives of all, and in order to ensure systemic change. All of my roles fall into the latter category i.e. working with institutions to develop the best practice steps to operationalize EDI missions and values in specific best practice guidelines and practices to ensure practical impact. Ten years ago, as President of the Geochemical Society, along with

the President of the European Association of Geochemistry, we wrote the first Best Practice Guide for the societies' operations (including awarding of prizes and fellowships) – *Steps to achieving the Full Diversity of Excellence*. Later as a member of the American Geophysical Union Honors and Recognition Committee (charged with oversight for that organizations committee work on honors, prizes and fellowships), and for Canada's National Sciences and Engineering Research Council (equivalent of the US NSF), we used the GS/EAG document as the founding base for what is now the much larger and more comprehensive AGU Leading Practices document, now referenced and modeled by other professional organizations throughout the world. As a Member of the Advisory Board for the Order of Canada we were the first Board to introduce Conflict of Interest and Ethics Policy for that body.

In the past year specifically, based on that experience and passion for the large task of transforming the operational landscape on EDI, I worked in similar roles as a Member **National Killam Program Advisory Board** for the **Killam Trust** (body overseeing the Killam Prizes, and Dorothy Killam Fellowships), and as a member of the **CIFAR REDIAC** Committee engaged in similar work as CIFAR introduces programmatic best practice for EDI for the first time. My roles on the Fellows Nominations Canvassing Committee for the **National Academy of Engineering**, and on the Fellows selection committee for Earth Sciences for the **Royal Society London**, and on the **Eni Prize Commission**, were additional roles advancing best practice and diversity in our discipline in steps we all hope will help redefine the landscape within which our younger colleagues (both faculty, postdocs and students) will build their careers. I also was interviewed for and participated in Dr. Alison Paprica's new book by University of Toronto Press "*Research Project Management and Leadership: A Handbook for Everyone*".

RedDot Foundation "Sheroes" Award - One of 29 women scientists working on water and environmental sustainability selected by the Red Dot Foundation in partnership with the Office of the Principal Scientific Adviser of Canada, the Government of India and The Consulate General of Canada in Mumbai. Awarded at United Nations, New York, March 2023.

Sheroes Mentoring of Computer Science engineer Samara Pires in Mumbai.

Sherwood Lollar, B. A Personal Perspective on Exploration as a lifelong passion. **Invited. Celebrating Women in Energy and Water Research**. Penn State. State College PA Sept. 19, 2022.

Member Canadian Institute for Advanced Research **CIFAR REDIAC Committee** (Research Equity, Diversity and Inclusion Ambassadors Community (2022-2023)

Member **National Killam Program Advisory Board** for Killam Trust and National Research Council of Canada (2021-2024) (charged with best practice operationalization advice in redesign of Killam Fellowships and Prizes for the advancement of the diversity of excellence)

Invited Speaker NWMO Indigenous Knowledge and Western Science Round Table Nov. 2021.

Graduate Student Mentoring and STEM Activities and Outreach related to volunteer role as Science Chair at Massey College where I mentor graduate students in outreach and organization of public events (approximately 25 postdoctoral fellows and graduate students annually

Science@Massey Co-Organizer of 5th Annual Franklin Forum on Science, Public Policy and Society on "Managing Major Career Transitions in Science and Engineering" Massey College, University of Toronto. March 4 2021

Sherwood Lollar, B. The Diversity of Excellence - Beyond "weight-lifting for girls". **Keynote** Gairdner/L'Oreal-UNESCO Diversity Forum Toronto ON. Sept. 30, 2019.

Geochemical Society and European Association of Geochemistry – as President of GS worked in collaboration with EAG President to write and establish the first Best Practice Guidance for Accelerating the Diversity of Excellence and application of best practice in prize, fellowships and committee work (2014-2015).

American Geophysical Union Honors and Recognition Committee Working Group - using the GS/EAG protocols as a base, worked with the other members of the working group to write the **Leading Practice Guidelines for AGU Honors and Recognition Program** for all AGU Prize and Fellowships Selection Committees (2018-2019). Adopted October 2019 by AGU Board.

As Director, Division of Earth Ocean and Atmospheric Sciences, **Royal Society of Canada**, drafted the base document for development of the first Best Practice Guidelines document for prize and fellowships for RSC (2017-2019).

Royal Society of Canada Gender Equity Committee 2013-2018

Work on Research Program Peer Review Panels, Prize Committees and Academic Organizations

Chair of NSERC's 2024 Joint Prizes Selection Committee for the four of NSERC's top prizes: Gerhard Herzberg Canada Gold Medal for Science and Engineering, Brockhouse Canada Prize for Interdisciplinary Research in Science and Engineering, NSERC John C. Polanyi Award, and NSERC Donna Strickland Prize for Societal Impact of Natural Sciences and Engineering Research.

Member U.S. **National Academy of Engineering** International Special Nominating Committee (2023-2024)

Member **NASA Jet Propulsion Lab** Mars Sample Return Planning Sample Safety Assessment Tiger team (2023-2024)

Member of the **Eni Scientific Prize Commission 2013-2024** (see: <http://www.eni.com/eni-award/eng/home.shtml>)

Reviewer Universities Canada Global Excellence Initiative **2023-2024**

Member U.S. **National Academy of Engineering** Section 11 Nominations Committee (Earth Resources Engineering) 2021-2024

Member **The Royal Society London** Sectional Committee 5: Earth and Environmental Sciences (2020-2023)

Member U.S. **National Academy Sciences Decadal Survey** on Planetary Sciences and Astrobiology Steering Committee (2020-2022)

Member United States **National Academy of Sciences Space Studies Board** (2016-2022) 3 consecutive terms

Scientific Advisory Committee – **International Continental Drilling Program** (2020-2021)

Scientific Advisory Committee - **Helmholtz Centre Potsdam**, (GFZ) German Research Centre for Geosciences (2020-2022)

Member **American Geophysical Union** Honors and Recognition Committee (2018-2022)

Member **Advisory Council for the Institute for Earth and Space Exploration**, Western University (2020-2023)

Chair, **United States National Academies** Committee for the Astrobiology Strategy for Search for Life in the Universe (2017-2018)

Director, Division of Earth Ocean and Atmospheric Sciences, **Royal Society of Canada** (2017-2019)

Board of Directors (SNOLAB) **Sudbury Neutrino Laboratory** (2018-2019)

Member of Fellows Selection Committee, **Royal Society of Canada** (2018-2020)

Member International Review Panel on **Helmholtz Centre for Geosciences** GFZ Potsdam (2018)

Member **American Geophysical Union Fellows Selection Committee** for Biogeosciences (2017-2018)

Canadian Institute for Advanced Research (CIFAR) Presidents' Research Advisory Council (2016-2018)

Chair, NSERC Panel for E.W.R. Steacie Memorial Fellowships 2016, and 2018

Mentor and Reviewer. IDEAS Lab workshop jointly sponsored by NASA Astrobiology and NSF. Cambridge MD Sept. 2016.

Technical Advisor for the United Nations **International Atomic Energy Agency** Water Resources Program (2016) Impacts of hydraulic fracturing on groundwaters identified using geochemical and isotopic tracers. Vienna. Austria.

Board Member (2014-2021) **Zuckerberg Institute for Water Research**, Sede Boqer, Israel - dedicated to interdisciplinary research in water and resource development of the Middle East though sustained supply of usable water for all countries of the region who share the regional and trans-boundary water resources of this drylands region.

Geological Society of America Nominations Committee (2016)

International Advisory Board Member **Earth-Life Science Institute Origins Network at the Tokyo Institute of Technology**

External Review Committee Origins Institute McMaster University 2015

Technical reviewer: Mars 2020 Organic Contamination Panel (2014) report of the Mars Exploration Program Analysis group (MEPAG)

Member Search committee for Vice-President Research Grants and Scholarships for NSERC (2013) Canada's national Natural Sciences and Engineering Research Council (the national funding agency for research and scholarships in science and engineering).

U.S. National Academy of Sciences Space Studies Board Committee on Astrobiology and Planetary Sciences (2012-2015)

Space Exploration Planetary Consultation Committee (PCC) for **Canadian Space Agency** (2012)

Executive Committee - Sloan Foundation - Carnegie Institution of Washington **Deep Carbon Observatory** (2011-2013)

NASA/ESA Joint Science Working Group (JSWG) 2018 Joint Rover Mission to identify and prioritize scientific objectives for 2018 Joint Mars Rover Mission. (David Beaty NASA Mars Program Office -JPL and Gerhard Kminek, ESA-ESTEC) Co-chairs. (2011-2012)

NASA Mars Exploration Program Advisory Group (MEPAG) E2E-iSAG committee to identify and prioritize scientific objectives for 2018 Mars Rover Mission. Scott McLennan (Stonybrook, NY) and Mark Sephton, (Imperial College, UK) Co-chairs. (2010-2011)

Geochemical Society – The V.M. Goldschmidt Career Award Selection Committee 2010-2012

Advisory Board and Visiting Scientist for European Union Marie Curie Training Network -“CSI: Environment” 2010-2014.

NSERC Strategic Program Sub-Topic Focus Group Chair 2010

NASA Mid-Range Rover Science Analysis Group (MRR-SAG 2009) working under MEPAG (Mars Exploration Program Science Group) to identify and prioritize scientific objectives for 2018-2020 next generation Mars Rover

Canadian Space Agency (CSA) Mars Sample Return Analogue Mission Definition Team 2009

Ontario Science Centre Weston Youth Innovation Award Prize Committee 2009-2013

Royal Society of Canada - Committee for Selection of New Fellows 2008-2010

Geochemical Society - Organic Geochemical Division Treibs Award Selection Committee 2008-2011

Ontario Science Centre Board of Trustees 2007-2014; Chair of Long-term Experience Committee (2008-2010; 2012-2014)

Council of Canadian Academic Expert Panel on Groundwater 2007-2008

Executive Program Committee Co-Chair - **Goldschmidt 2008** Vancouver, BC July 2008

Natural Sciences and Engineering Council of Canada (NSERC) Council 2003-2010

NSERC Executive Committee 2005-2006 and 2007-2010
NSERC Committee on Research Grants and Scholarships 2006-2010 (Chair 2008-2010)
NSERC Chair of Committee on Research Integrity (2008-2010)
Canadian Space Agency - Space Exploration Advisory Committee 2006-2009
 Partnership Group for Science and Engineering (Royal Society of Canada) 2006-2007
 Communications Committee correspondent-at-large for *Bacon and Eggheads* Lecture Series for Parliament
CAMIRO (Canadian Mining Industry Research Organization) Geochemistry Expert Committee 2006-2009
U.S. National Academies of Science Committee on the Origin and Evolution of Life (2005-2012)
 Canadian Water Network Expert Panel Review - Jan. 2007
U.S. Strategic Environmental Research and Development Program (SERDP)/ Environmental Security Technology Certification Program (ESTCP) and the US EPA Summit on Future Research Directions on Biogeochemical Processes in the Degradation of Chlorinated Solvents. San Antonio TX April 2007
Chair, NSERC Prize Committee - Herzberg Gold Medal 2005
Chair, NSERC Prize Committee - Brockhouse Prize 2005
NASA Astrobiology Review Panel for NAI Cooperative Agreement Notice (CAN-4) Sub-Panel Chair 2005
International Atomic Energy Agency panelist (one of 5) on White Paper for the use of Compound Specific Isotope Analysis (CSIA) October 2005 (jointly published with U.S. Environmental Protection Agency)
U.S. Strategic Environmental Research and Development Program (SERDP)/ Environmental Security Technology Certification Program (ESTCP) Workshop on Molecular Biological Tools Charlottesville VA Aug. 2005
Board of Directors - Centre for Environmental Science and Technology - University of Notre Dame 2003-2006
International Geochemical Society C.C. Patterson Medal Selection Committee 2002-2004
 Nomination Committee for Henry Darcy Distinguished Lecture Series for 1999-2002
Selection Committee for Geological Society of America Meinzer Award 1999-2001
 Nominations Committee for the Organic Geochemistry Division
 The Geochemical Society 1997-2000 (Chair for 1999); 2004-2006
 IsoTrace Accelerator Mass Spectrometry Laboratory - University of Toronto
 Executive Committee - Board of Directors 1995-2002
 Natural Sciences and Engineering Council of Canada (NSERC) Review Panel for NSERC Strategic Partnerships Program 1997-1999
 Natural Sciences and Engineering Council of Canada (NSERC) Review Panel for NSERC Multi-Facilities Access Program 1999
 U.S. Department of Energy Stocktaking Panel - Natural Accelerated Bioremediation Research - Virginia Beach, VA - 1999
 Organizing Committee for Geological Society of America Annual Meeting 1998 - Toronto
 External Scientific Review 1995 - Environmental Protection Agency
 National Exposure Research Laboratory - Ecosystems Research Division - Internal Grants Program
 Scientific Review Panel 1994 - U.S. DOE - Subsurface Science Program Deep Microbiology and Microbial Ecology Subprogram

Public Consultation and Technology Transfer

Science@Massey Co-Organizer of Spring Lunches Guest Speakers: Dr. Jennifer McKelvie, Deputy Mayor Toronto; Dr. Sarah Hirschorn, Director of Research, Nuclear waste Management Organization; Dr. Silvia Mancini, GeoSyntec Principal. *Widening Science Horizons - Science Leadership beyond academia.* Massey College, University of Toronto. April 2, 2024

NRCan Energy Efficiency and Technology Sector (EETS) (Geologic Survey of Canada). Hydrogen Value Chain and Impact on Fuel Sector - potential within GSC to lead a research plan. Calgary AB. April 5 2024. Participants include Fuel Sector CanmetMINING, CanmetENERGY, and CanmetMATERIAL. The OERD (NRCan energy research fund body) and Policy advisors. Virtual

Objectives

- *Gain insights into the historical and current understanding of Natural Hydrogen in Canada, driven by Canada's leading experts including Barbara Sherwood Lollar University of Toronto.*
- *Receive an introduction to the GSC's new GeoEnergy program, designed to shed light on the pivotal role of Hydrogen - an emerging energy frontier - will play in shaping our future energy landscape towards achieving Net Zero emissions by 2050.*
- *Explore the integration and synergies between GSC programs and various NRCan sectors and branches to inform future H₂ research initiatives.*

Simply Science. National podcast from NRCan Geologic Survey of Canada) and CIFAR joint hosted Impact Workshop “Is natural hydrogen the solution?”. **Speakers Omid Haeri-Ardakani (GSC) and B. Sherwood Lollar (University of Toronto).**
https://soundcloud.com/nrcan/is-natural-hydrogen-the-solution?si=c9cc9e993c1c457099b2b01fd4877afb&utm_source=clipboard&utm_medium=text&utm_campaign=social_sharing

NRCan Energy Efficiency and Technology Sector (EETS) (Geologic Survey of Canada) and CIFAR joint hosted Impact Workshop “State of natural/geological hydrogen research in Canada – action plan”. **Lead Organizers Omid Haeri-Ardakani (GSC) and B. Sherwood Lollar (University of Toronto).** Calgary AB. Jan 11-12 2024. International representatives of industry, academia and government at the core of the native hydrogen exploration sector. In person.

Sherwood Lollar, B. Naturally-occurring hydrogen accumulations – contribution to the Green Energy transition. **Invited** Virtual Lecture. CSIRO Cutting Edge Science Symposium: “Natural Hydrogen: A New Sustainable Geo-source of Energy for Australia” Nov. 2023

Sherwood Lollar, B. Naturally-occurring hydrogen accumulations – a Canadian perspective. **Invited** Panelist Cleantech and Climate Impact Symposium. MARS Discovery District Centre University of Toronto. Nov. 2023

Sherwood Lollar, B. Naturally-occurring hydrogen accumulations – contribution to the Green Energy transition. **Invited** Virtual Lecture. Canadian Hydrogen Fuel Cell Association. June 9 2023

Sherwood Lollar, B. Native hydrogen as transition energy source? Promise and pitfalls. **Invited** Virtual Lecture. U.S. Department of Energy ARPA-e program. June 14 2023

Science@Massey Co-Organizer of 8th Annual Franklin Forum on Science, Public Policy and Society on “Origins” Massey College, University of Toronto. Nov. 2023. Panelists and Speakers Nita Sahai (U. Akron); Joel Ong, (York University), C. Stankewich, (U Toronto); H. Sapers (York University)

Science@Massey Co-Organizer of Spring Lunches Guest Speaker: Matt Glandfield “Curling - a whole different view on the science of rocks and frozen water” Massey College, University of Toronto. April 5, 2023

Science@Massey Co-Organizer of Spring Lunches Guest Speaker: Rt Hon. Julie Payette Resident Senior Fellow “Living and working 400km above the surface of the Earth: an astronaut perspective” Massey College, University of Toronto. March 22, 2023

Science@Massey Co-Organizer of Spring Lunches Guest Speaker: Hannah Hoag Southam Journalism Fellow “What can you do with a science degree? A lunchtime chat about careers in science communication and journalism” Massey College, University of Toronto. March 1, 2023

Science@Massey Co-Organizer of 7th Annual Franklin Forum on Science, Public Policy and Society on “Space, Science and Society” Massey College, University of Toronto. Sept. 2022

CIFAR Symposium on Misinformation: Understanding the Context and being part of the solution. (Co-Organizer and Session Chair) April 18-19, 2023. Toronto ON.

Exploration of Deep Subsurface Resources in Fracture Waters of the Precambrian Continents – Internal Seminar to **PetroBras.** Virtual. Oct 2022

Science@Massey Co-Organizer of 6th Annual Franklin Forum on Science, Public Policy and Society on “Legacy and Inspiration of Dr. Ursula Franklin on the centenary for her birth” Massey College, University of Toronto. Sept. 2021

Science@Massey Co-Organizer of 5th Annual Franklin Forum on Science, Public Policy and Society on “Career Transitions and Next Steps on the Journey: Insights and Lessons Learned on the Path for ward from Graduate Studies” Massey College, University of Toronto. March 2021

National Academies of Sciences 2020 Decadal Survey on Planetary Sciences and Astrobiology Steering Committee – Briefing on the NAS Astrobiology Strategy for the Search for Life in the Universe report commissioned by NASA (B. Sherwood Lollar, Chair). Oct. 30 2020.

Philips, E., Ojeda, A.S., Mancini, S.A. (GeoSyntec), and Sherwood Lollar, B. Unravelling sources and *in situ* processes of contaminant remediation using multi-element CSIA. Free webinar to 80 consulting practitioners from **GeoSyntec Incorporated**. April 9 2020.

Science@Massey Co-Organizer of 4th Annual Franklin Forum on Science, Public Policy and Society on “Trust in Science and Engineering/ Trust in Scientists and Engineers - Issues of Data-driven decision making, policy issues and data sharing” Massey College, University of Toronto. March 4 2020

National Academies of Sciences Astro2020 Decadal Survey Sub-Committee on Exoplanets, Astrobiology and the Solar System – Briefing on the NAS Astrobiology Strategy for the Search for Life in the Universe report commissioned by NASA (B. Sherwood Lollar, Chair). Oct 22 2019.

National Academies of Sciences Astro2020 Decadal Survey Steering Committee – Briefing on the NAS Astrobiology Strategy for the Search for Life in the Universe report commissioned by NASA (B. Sherwood Lollar, Chair). Sept. 5 2019.

CIFAR Celebration of Global Call for Ideas. “The critical role of long time horizons in research discovery”. Invited Talk. May 22 2019. Toronto ON.

Fall 2018 Led Presentations and Q&A for 2019 United States National Academies of Sciences Space Studies Board “An Astrobiology Strategy for the Search for Life in the Universe for NASA to:

NASA Associate Administrator and Deputy Associate Administrator for Research Science Mission Directorate

NASA Chief Scientist and Deputy Chief Scientist

United States Senate Commerce, Science and Transportation Subcommittee on Space, Science and Competitiveness

House Science, Space and Technology Subcommittee on Space

House Appropriations Committee, Commerce Subcommittee Jurisdiction

NASA Astrophysics Advisory Committee

National Academies Divisional Advisory Committee (DEPSCOM)

Science@Massey Co-Organizer of 3rd Annual Franklin Forum on Science, Public Policy and Society on “Confronting Climate Change Challenges – what can we do?” Massey College, University of Toronto. Feb 6 2019

Eni FEEM International Workshop on Global Change Impacts on Climate and Water. University of Palermo, Italy. June 2018

Science@Massey Co-Organizer of Panel “Can Canada embrace a renewable energy future”. Massey College, University of Toronto. March 19 2018

Science@Massey Co-Organizer of 2nd Annual Franklin Forum on Science, Public Policy and Society on “Artificial Intelligence”. Massey College, University of Toronto. Feb 7 2018

Science@Massey Co-Organizer of Public Lecture “Gravitational waves - new frontiers” Massey College, University of Toronto. November 14 2017

GeoSyntec Consultants (S. Mancini, C. Cheyne and M. Davidson) and University of Toronto sponsored workshop on Commercialization readiness of compound specific isotope analysis. Audience including academic and commercial laboratories, consultants, corporate representatives from DuPont and Chemours, and Ontario Ministry of Environment and Climate Change. Guelph, ON Canada Sept. 7 2017.

Working Group meeting – University of Toronto, Helmholtz Institute (UFZ Leipzig) and DuPont Corporate Remediation – extending compound specific hydrogen isotope analysis to chlorinated contaminants at DuPont and Chemours sites internationally.

Toronto, ON Canada. Sept. 2017.

T. Gilevska, B. Sherwood Lollar, A. Horst, G. Lacrampe-Couloume, E.J. Lutz, S.W. Norcross, S.A. Morgan, K.A. West. High resolution compound specific isotope analysis contributions to conceptual site model development at the Deatailed Study Area, Chambers Work Site. **University-Industry Consortium on Field-focused Groundwater Contamination Research**. University of Guelph, Guelph ON. June 2017.

Organizing committee member of the National Academies of Sciences Engineering Medicine – America’s Future in Civil Space – A symposium organized by the Aeronautics and Space and Engineering Board and the Space Studies Board. National Academies Keck Centre, Washington, DC. May 2017

J. McIntosh, B. Sherwood Lollar, M.J. Hendry – **International Atomic Energy Agency (IAEA)** Expert Panel on Identifying the occurrence, origin and migration of fugitive gases using Environmental Isotopes. Vienna, Austria. November 2016

T. Gilevska, B. Sherwood Lollar, A. Horst, E. Passeport, G. Lacrampe-Couloume. Insights from high resolution CSIA for chlorinated aromatics. Scientific Advisory Board **DuPont Corporate Remediation Centre**. Philadelphia, PA. Jan. 2017.

Authored Wiki page on Compound Specific Isotope Analysis invited by United States Strategic Environmental Research and Development Program (SERDP)/ Environmental Security Technology Certification Program (ESTCP).

Participant Roundtable in Global Science Excellence for the Federal Innovation Agenda. Invitee of Minister of Science and Minister of Innovation. Aug. 2016 Saskatoon SK.

B. Sherwood Lollar and S. Mancini. Integrating compound specific isotope analysis into conceptual site model development- Contributions to costs savings and risk reduction. Free webinar to 80 consulting practitioners from **GeoSyntec Incorporated**. Aug. 10 2016.

B. Sherwood Lollar. Presentations on deep subsurface research opportunities to City of Timmins Economic Development Corporation and Glencore. May 11 and July 11 2016.

B. Sherwood Lollar, T. Gilevska, A. Horst, E. Passeport, G. Lacrampe-Couloume. Insights from high resolution CSIA profiles. **University-Industry Consortium on Field-focused Groundwater Remediation Research**. June 13-15 2016.

B. Sherwood Lollar – Presentation of Compound Specific Isotope Analysis of chlorinated aromatics and CFCs at Chambers Works, DE. Scientific Advisory Board **DuPont Corporate Remediation Centre**. Wilmington DE. March 2016.

M.J. Hendry, B. Sherwood Lollar Organizers – **International Atomic Energy Agency (IAEA)** Expert Panel on Identifying the occurrence, origin and migration of fugitive gases and fluids from Shale Gas development and Carbon Capture and Sequestration using Environmental Isotopes. Vienna, Austria. March 2016

B. Sherwood Lollar – Science on the Hill Event. **Research presentation/discussion on Parliament Hill** with MPs, Senators, Speaker of the House, Minister K. Duncan, Prime Minister J. Trudeau. Feb. 16 2016

B. Sherwood Lollar – Integration of CSIA for chlorinated aromatic hydrocarbons, CF and CFCs at field sites - **GeoSyntec Consultants Ltd**. Guelph Ontario. Sept. 2015

B. Sherwood Lollar – New lines of research in environmental remediation at contaminated field sites – **SiRem Ltd**. Guelph Ontario. March 2015

B. Sherwood Lollar and E. Passeport – Novel determining of rates of bioremediation for chlorinated aromatic hydrocarbons and CFCs – **Dupont Remediation Research Center**, Wilmington DE. Nov. 2014

S.A. Mancini, E. Passeport, B. Sherwood Lollar Application of CSIA to understand sources and Biodegradation of Chlorobenzenes- Consortium on Goundwater Remediation. Denver, CO. Oct. 2014

B. Xu, B.E. Sleep, B. Sherwood Lollar- Modelling Isotope Fractionation Induced by Aqueous Phase Diffusion- SYNRRGS 2014 and 3rd Integrate Annual Meeting on Innovative Technology Combination for Groundwater Remediation. Toronto, ON. Sept. 2014

S. Mancini and B. Sherwood Lollar – Presentation on CSIA – **Ontario Ministry of Environment** October 2013.

B. Sherwood Lollar – Plenary. Challenges in Water reuse, recycling and remediation. Water-Energy Nexus – Industry Research Forum. **Eni Research Institute** Milan Italy. March 2013

On the Water Front: the Science of Canadian water research. NSERC Scientific Poster session for **Federal MP and Senators**. **Centre Block. Capital Hill** Ottawa. Oct 2012.

Sherwood Lollar, B. Compound Specific Isotope Analysis of Organic Contaminants in Water. **Eni Research Institute** Novara, Italy. June 2012.

Member External Advisory Committee Alberta – Canada Collaboratory in Cleaner Oil Sands Development (2011-2012)

B. Sherwood Lollar – Guest Speaker at DuPont Forum: Breaking the carbon-fluorine bond. DuPont Environmental Education Center. Wilmington DE. April 23-25, 2012.

B. Sherwood Lollar and T. Buscheck (Chevron) Co-Chairs and Organizers - Special session on **Compound Specific Isotope Investigations at Contaminated Field Sites**. Battelle International Symposium on Bioremediation and Sustainable Environmental Technologies, Reno, NV. June 2011.

B. Sherwood Lollar. Panelist. **Biogeochemical Transformation Processes**. Battelle International Symposium on Bioremediation and Sustainable Environmental Technologies, Reno, NV. June 2011.

B. Sherwood Lollar. **Extending the reach for monitoring microbial activity with CSIA**. REMTEC Remediation Technology Transfer Workshop. Keynote. Chicago. May 2011.

B. Sherwood Lollar. **CSIA for Forensic Investigations: Potential, Practicalities and Pitfalls**. Presentation to ENVIRON Corporation. Mississauga ON. April 2011

B. Sherwood Lollar. **Lessons from the Earth on Carbon Capture and Storage**. Presentation to CIBC Wood Gundy. April 2011. Toronto ON

Groundwater Resources Association Conference on Environmental Forensics. Presentation S. Mancini (Golder Associates), B. Sherwood Lollar and G. Lacrampe-Couloume (University of Toronto). Differentiating multiple sources of organic contaminants using compound specific carbon and hydrogen isotope analysis. April 2011. California.

B. Sherwood Lollar. **Emerging Research in Astrobiology in Canada**. Council of Ontario Universities. Canada Research Chairs 10th Year Anniversary Symposium. Toronto ON. Nov. 2010

Natural Sciences and Engineering Research Council of Canada “Maximizing Opportunities” Increasing Women’s Participation in Science and Engineering – A Summit. Ottawa ON. Nov. 2010

B. Sherwood Lollar and P. Philp. Compound Specific Isotope Analysis for Forensic Investigations and Environmental Clean-up. **United States Environmental Protection Agency (EPA) Technology Innovation and Field Services Division "Contaminated Site Clean-up Information" Web-based Internet Seminar**. October 2010.

B. Sherwood Lollar. **Isotopic constraints on chlorobenzene biodegradation and remediation at contaminated field sites**. **Presentation** to Chambers Works Science Advisory Board. DuPont. Wilmington DE. March 2010.

B. Sherwood Lollar. Compound Specific Analysis for Forensic Investigations: Potential, Practicalities and Pitfalls. Invited Presentation.

United States Air Force Restoration and Technology Transfer Workshop on Groundwater Contamination. San Antonio TX. April 2010.

Minister of Natural Resources Honourable L. Raitt Invited Round Table on **Clean Energy Research and Development - Fossil Fuels**. Invited Panelist for discussion. Nov. 6, 2009. Calgary AB.

Canada Research Chairs Secretariat and University of Western Ontario Invitational Meeting and Round Table - **Canada's Energy Future**. Invited Panelist and Speaker on Long-term Viability/Sustainability of Conventional Energy Sources - Carbon Capture and Storage Options - October 20, 2009 - Ottawa ON.

Munk Centre of International Studies at the University of Toronto - Program on Water Issues - **Burying Carbon Dioxide in Underground Saline Aquifers: Political Folly or Climate Change Fix?** Invited Panelist for discussion. Sept. 23, 2009. Toronto ON.

Public Policy Forum - **Science Day in Canada** - Invited Panelist for discussion on release of the Science, Technology and innovation Council (STIC) of Canada report on the State of Science, Technology and innovation in Canada. May 27, 2009. Ottawa ON.

B. Sherwood Lollar and X. Liang - "Potential Role of Compound Specific Isotope Analysis (CSIA) and Other Tools in Measuring *In Situ* Biogeochemical Transformation". **In Situ Biogeochemical Transformation Workshop U.S.E.P.A.** Environmental Protection Agency Workshop. Dallas Texas. Nov. 2009.

M. Davidson (GeoSyntec International), D. Major (GeoSyntec International), B. Sherwood Lollar (U. of Toronto) and E.A. Edwards (U. of Toronto). Webinar for General Electric on "Compound Specific Isotope Analysis: A primer for applications to contaminant remediation". Sept. 2009.

B. Sherwood Lollar, and S. Hirschorn. "Compound Specific Isotope Analysis: A primer for applications to contaminant remediation". One day workshop for GeoSyntec Consultants Inc. and Sirem Ltd. Toronto Ontario. June 2006.

B. Sherwood Lollar and C.M. Aelion "Tools/Techniques for Chlorinated Solvent Sites". Half day workshop at Battelle 8th International In Situ and On Site Bioremediation Symposium Baltimore, MD. June 2005.

B. Sherwood Lollar. "Use of stable isotopes to evaluate contaminant degradation". One day workshop for Central New York Association of Professional Geologists Symposium on Isotopic Geochemistry. Skeneatales NY. April 2005.

B. Sherwood Lollar, R. Meckenstock, T. Schmidt, J. Wilson and D. Hunkeler. Applications of Compound Specific Isotope Analysis (CSIA) to contaminant biodegradation. Workshop and white paper development for IAEA International Atomic Energy Agency and U.S. Environmental Protection Agency. Vienna Austria. October 2005.

B. Sherwood Lollar. "Use of Compound Specific Stable Isotope Techniques for Quantification of Biodegradation Rates". UNESCO Workshop on Transport and Fate of Diffuse Organic Contaminants in Catchments. GSF-Research Centre for Environment and Health, Munich Germany. Dec. 2004

B. Sherwood Lollar. "Stable Isotope Forensics: Promise and Pitfalls". Golder Associates Inc. Symposium on Innovative Strategies for Management of Contaminated Sites. Toronto, ON. Nov. 2004.

Activities as Editor

Scientific Advisory Board **Applied Geochemistry** (2022-2025)

International Editorial Board **Origins of Life and Evolution of Biospheres** (April 2015 to April 2018)

Editor-in-Chief **Chemical Geology** (Jan 2010 to Jan. 2013) - One of the top most highly cited disciplinary journals in field of isotope geochemistry.

Editorial Board **Earth Planetary Science Letters** (2011 to 2023)

Member of Advisory Board for **ELEMENTS: International Magazine of Mineralogy, Geochemistry and Petrology**. (2010-2016)

Volume Editor for **Volume 9: Environmental Geochemistry** of 10 volume series *Treatise in Geochemistry* by Elsevier Scientific Publishing. Published 2003. Second Edition 2013.

Editors-in-Chief - Dr. H.D. Holland (Harvard University) and Dr. K. Turekian (Yale University)

May 2005 paperback Edition of *Treatise on Geochemistry Volume 9: Environmental Geochemistry* published and over 1200 copies sold. Revised second edition of web version work completed April 2006.

Editor of Special Volume 30 in **Organic Geochemistry**

"Compound-Specific Isotope Analysis: Tracing Organic Contaminant Sources and Processes in Geochemical Systems" October 1999.

Associate Editor (1998-2003) **Ground Water** - Scientific Journal with one of largest circulations of any of the hydrogeology, hydrogeochemistry journals. Subscription circulation of over 19,000, 20% of which is outside North America.

Visiting Scientist

2012 University of Stockholm, Sweden

2012 Institut de Physique du Globe de Paris (IPGP) Université Paris Cité, France

2014 Helmholtz Institute Leipzig, Germany (3 months)

2019 Institut de Physique du Globe de Paris (IPGP) Université Paris Cité, France

RESEARCH GRANTS AND FUNDING

Held as Principal Investigator

	TOTAL AMOUNT	DATE/DURATION
Canadian Institute for Advanced Research (CIFAR) Catalyst Program Title: Integration of a chemical and engineering perspective to extend homogeneous porous media models of reactive transport to deep crystalline fracture rock geologic systems relevant to the energy transition PI: B. Sherwood Lollar Co-I: C.J. Ballentine (Oxford)	\$13,900	2022-2023
NWMO (Nuclear Waste Management Organization) Research Grant Title: Assessment of biogeochemical processes in the deep subsurface – translating from case studies to low permeability sites relevant to a deep geological repository for used nuclear fuel PI: B. Sherwood Lollar	\$600,000	2020-2025
Canadian Institute for Advanced Research (CIFAR) Catalyst Program Title: Radioactive decay as source of energy and nutrients for extraterrestrial life PI: B. Sherwood Lollar Co-I: C.J. Ballentine (Oxford)	\$35,000	2021-2022
Musee National D'Histoire Naturelle IMPMC National Ion Microprobe Facility, Paris, France Title: Mineralogic controls on S and C mobilization and cycling in deep subsurface samples PI: B. Sherwood Lollar Co-I: B. Menez (Univ. Paris IPGP)	Instrument time (completed)	2022
Canadian Institute for Advanced Research (CIFAR) Catalyst Program Title: Radioactive decay as source of energy and nutrients for extraterrestrial life PI: B. Sherwood Lollar Co-I: C.J. Ballentine (Oxford)	\$35,000	2021-2022

Canadian Institute for Advanced Research (CIFAR) Catalyst Program	\$35,000	2021-2022
Title: Isotopic Abiosignatures: A critical gap in radiolysis-driven habitability		
PI: B. Sherwood Lollar Co-I: B. Menez (Univ. Paris IPGP); J.F. Mustard (Brown)		
Canadian Institute for Advanced Research (CIFAR) Catalyst Program	\$9,000	2021-2022
Title: Novel opportunity to test mineralogic controls on subsurface S and C cycles		
PI: B. Sherwood Lollar Co-I: B. Menez (Univ. Paris IPGP)		
Canadian Institute for Advanced Research (CIFAR) Catalyst Program	\$5,000	2021-2022
Title: Energetic estimates for biomass potential under the ice of Ocean Worlds		
PIs: H. Graham, B. Sherwood Lollar		
NFREF New Frontiers in Research Fund - Exploration	\$250,000	2021-2023
Title: Radiogenic energy for the subsurface biosphere		
Integration of hydrogeochemistry and astroparticle physics		
PI: B. Sherwood Lollar Co-I: N. Smith (SNOLAB)		
Canadian Institute for Advanced Research (CIFAR) Catalyst Program	\$15,000	2020-2021
Title: Novel radiogenic physical-chemical reactions define in the deep subsurface		
PI: B. Sherwood Lollar Co-I: C.J. Ballentine (Oxford); N. Smith (SNOLAB); Warr (Toronto)		
Production Agriscience Canada Co.	\$80,000	2020-2023
Title: Integration of modelling and experimental program to develop H-CSIA		
to determine processes and biodegradation rates for chlorinated aromatic hydrocarbons at field sites		
PI: B. Sherwood Lollar		
NSERC Gerhard Herzberg Gold Medal Award	\$530,000	2019-2023
Title: Controls on distribution and preservation of		
Habitability from water-rock reactions in the Earth's deep crust		
PI: B. Sherwood Lollar		
Canadian Institute for Advanced Research (CIFAR)		
Global Call for Ideas Program	~\$3.5 million	2019-2024
Title: Earth 4D - Subsurface Science and Exploration		
Co-Directors PI: B. Sherwood Lollar and J.F. Mustard (Brown)		
NSERC Discovery Grant	\$470,000	2018-2023
Title: Follow the water: Controls on distribution and preservation of		
Habitability from water-rock reactions in the Earth's deep crust		
PI: B. Sherwood Lollar		
Canadian Institute for Advanced Research (CIFAR)	\$50,000	2017
Title: Earth 3D - International Workshop on Subsurface Science and Exploration		
PI: B. Sherwood Lollar		
Co-PIs: N. Smith (SNOLab), C.J. Ballentine (Oxford) and V. Orphan (Caltech)		
TOTAL SA Oil & Gas	\$750,000	2018-2020
Title: Hydrogen/Helium generation through water/rock interactions in the Neoproterozoic		
sedimentary basin of Sao Francisco, State of Minas Gerais, Brazil		
Co-PIs: C.J. Ballentine (Oxford) and B. Sherwood Lollar (Toronto)		
E.I. DuPont Canada Company	\$228,837	2016-2021
Research Grant		

Title: Integration of modelling and experimental program to develop hydrogen isotope CSIA to determine processes and biodegradation rates for chlorinated aromatic hydrocarbons in field sites.

PI: B. Sherwood Lollar

NWMO (Nuclear Waste Management Organization) Research Grant \$600,000 2016-2020

Title: Assessment of biogeochemical processes in the deep subsurface- Case studies relevant to a deep geological repository for used nuclear fuel.

PI: B. Sherwood Lollar

NSERC John C. Polanyi Award \$250,000 2016-2020

SERDP \$20,534 2016-2020

Title: Abiotic Transformation of Chloroethenes in low permeability formations

PI: B. D. Freedman (Clemson University)

Co-PI: B. Sherwood Lollar

NSERC Collaborative Research Development Grant \$237,350 2015-2017

Title: Optimization of sampling, detection and characterization of subsurface microbial life in systems with low permeability and low biomass-sedimentary and crystalline settings. (Industry partner: Nuclear Waste Management Organization)

PI: B. Sherwood Lollar (Toronto)

Co-PI: G.F. Slater (McMaster), J. McKelvie (NWMO), P. Keech (NWMO), S. Hirchorn (NWMO)

* match to industry partner funding below

Chemours Canada \$295,000 USD 2015-2019

Title: Determination of rates of degradation of halogenated hydrocarbons (chlorinated benzenes and CFCs) via an integrated field and experimental program

PI: B. Sherwood Lollar (Toronto)

Co-PI: E. Passeport (Civ Eng U Toronto)

Deep Life Directorate of Sloan Foundation Deep Carbon Observatory \$15,680 USD 2015

Title: Temporal suite of microbiology samples from ancient Canadian Shield fracture fluids

PI: B. Sherwood Lollar (Toronto)

Co-PIs: T.C. Onstott (Princeton) and T. Kieft (NMT)

***Nuclear Waste Management Organization Research Grant** \$185,000 2014-2017

Title: Microbiological and Geochemical investigation of fluids and core from the Grimsel Underground Research Laboratory

PI: B. Sherwood Lollar (Toronto) and G.F. Slater (McMaster)

Co-PI: G.F. Slater (McMaster), J. McKelvie (NWMO), P. Keech (NWMO), S. Hirchorn (NWMO)

NSERC Collaborative Research Development Grant \$248,853 2014-2017

Title: Use of stable isotopes to evaluate in situ attenuation of aromatics and chlorinated aromatics in anaerobic and aerobic field locations: Laboratory and field studies (Industry Partner DuPont Canada see * below)

PI: B. Sherwood Lollar (Toronto)

NSERC Discovery Grant \$490,000 (\$98,000 pa) 2013-2017

Title: Isotopic and geochemical tracers of fracture fluids in Precambrian cratons: Time capsules for the deep biosphere

PI: B. Sherwood Lollar

Sloan Foundation Deep Carbon Observatory Title: Field Investigations in Deep Carbon PI: B. Sherwood Lollar (Toronto)	\$50,000 USD	2014-2016
NSERC Accelerator Award Title: Isotopic and geochemical tracers of fracture fluids in Precambrian cratons: Time capsules for the deep biosphere PI: B. Sherwood Lollar	\$120,000	2013-2015
Cenovus Energy Title: Characterization of Gases from Mississippian to Surface Western Canadian Sedimentary Basin PI: B. Sherwood Lollar	\$150,000	2012-2014
DuPont Canada Research Grant* Title: CSIA to determine conceptual model and evaluate potential for bioremediation of chlorinated aromatic hydrocarbons PI: B. Sherwood Lollar	\$424,000	2011-2017
Canadian Space Agency Title: Constraints on Trace Gas and Reduced Gas Flux from Analog Environments PI: B. Sherwood Lollar	\$69,800	2012-2013
NWMO (Nuclear Waste Management Organization) Research Grant Title: Characterization of Subsurface Biogeochemical Processes relevant to a Deep Geologic Repository PI: B. Sherwood Lollar Co-PIs: G.F. Slater (McMaster) and D. Moser (Desert Research Institute)	\$420,000	2011-2014
NWMO (Nuclear Waste Management Organization) Research Grant Title: State of Science: Far-field Microbiological Considerations relevant to a Deep Geological Repository for used nuclear fuel PI: B. Sherwood Lollar	\$75,000	2009-2010
GeoSyntec Ltd. Title: Investigations for potential for in situ biodegradation at a contaminated field sites using CSIA PI: B. Sherwood Lollar	\$7,200	2010-2011
NSERC Strategic Grant Title: Investigation of CSIA as an Innovative Quantitative Tool for Performance Assessment of Groundwater Remediation at Contaminated Sites PI: B. Sherwood Lollar Co-PIs: E. Edwards (Chem. Eng) and B. Sleep (Civ Eng) S. Desrocher (ENVIRON Canada Inc.) and S. Dworatzek (SiREM Inc.) Industry Partner Matching funds: ENVIRON Canada Inc. SiRem Ltd.	\$450,000 \$10,000 \$18,000	2009-2012 2009-2011 2009-2011
NSERC Discovery Accelerator Grant Title: H ₂ and CH ₄ from Precambrian Shield Rocks and Microbiological Sinks for Gases produced by Water-Rock Interactions: Energy for the Deep Biosphere	\$120,000	2008-2011
NSERC Discovery Grant	\$257,750	2008-2013

Title: H ₂ and CH ₄ from Precambrian Shield Rocks and Microbiological Sinks for Gases produced by Water-Rock Interactions: Energy for the Deep Biosphere	(\$51,550 pa)	
NSERC Special Research Opportunities Grant	\$350,000	2006-2008
Title: Tracers in the Deep: Testing for chemoautotrophic microbial communities in the Precambrian Shield deep subsurface		
PI: B. Sherwood Lollar		
Co-PIs: G.F. Slater (McMaster), E. Edwards (Chem-Eng, Toronto)		
GeoSyntec Consultants International Ltd. Research Grant	\$21,000	2007-2008
Title: Use of stable carbon isotope analysis to evaluate in situ biodegradation of chlorobenzenes		
PI: B. Sherwood Lollar		
Co-PI: E.A. Edwards (Univ. of Toronto)		
NSERC CRD Grant	\$26,000	2007-2008
Title: Application of stable isotope analysis as a quantitative tracer of bioremediation of aromatic hydrocarbons in heterogeneous aquifers		
Co-investigator: E.A. Edwards (Univ. of Toronto)		
Industry partner: NOVA Chemicals (see below)		
NOVA Chemicals Research Grant	\$36,720	2006-2008
Title: Use of stable carbon and hydrogen isotope analysis to evaluate the performance of biostimulation of benzene		
PI: B. Sherwood Lollar		
NSERC Research Tools and Instruments	\$39,515	2006
Title: Purge and Trap Concentrator for detection of hydrogen and oxygen compound specific isotope analysis		
Co-PIs: M. Simpson (UTSC), A. Simpson (UTSC), Edwards (Chem-Eng)		
Canadian Space Agency Analogue Site Studies	\$39,750	2006-2008
Title: Deep crustal fluids in the Canadian Shield: analogs for deep subsurface habitats on Mars		
Co-PIs: G.F. Slater (McMaster); E. Edwards (Toronto)		
NSERC Research Tools and Instruments	\$129,422	2005
Title: Dedicated nuclear magnetic resonance probe for the detection of site-specific natural isotopic fractionation (SNIF)		
Co-PIs: M. Simpson (UTSC), A. Simpson (UTSC)		
NSERC Collaborative Research Development Grant	\$52,000	2005-2007
Title: Use of Stable Isotopes to Evaluate the Performance of Nanoparticulate Iron in Remediation of Chlorinated Hydrocarbon Contamination: Field and Laboratory Studies		
*Matching funds to Golder Associates Ltd. Grant		
*Golder Associates Ltd. Research Grant	\$30,000	2005-2007
Title: Use of Stable Isotopes to Evaluate the Performance of Nanoparticulate Iron in Remediation of Chlorinated Hydrocarbon Contamination: Field and Laboratory Studies		
Canadian Space Agency Advanced Studies	\$350,000	2003-2008
Title: Biosustainable Energy and Nutrient Cycles in the		

Deep Subsurface of Earth and Mars

PI: B. Sherwood Lollar

NSERC Discovery Grant Title: Hydrocarbons in transition zones in dynamic field settings includes \$10,000 Northern Supplement for 2006-2008	\$262,750	2003-2008
FNX Mining Inc. Title: Investigation of isotopic analysis of fluid inclusions	\$17,000	2003-2005
GeoSyntec Consultants International - Boston, MA Title: MTBE biodegradation investigated through the use of stable carbon isotopes	\$11,520	2003-2004
GeoSyntec Consultants International - Boston, MA Title: Environmental isotopes as tracers of contaminant degradation - VC	\$16,000	2002-2003
NSERC Collaborative Research Development Grant Title: Applications of stable carbon isotopes to monitoring intrinsic bioremediation of aromatic hydrocarbons Co-investigators: B. Sleep (Civ. Eng. U. of Toronto) E. Edwards (Chem. Eng. U of Toronto)	\$ 50,660	2001-2003
American Association of Petroleum Geologists Grants-in-Aid of Field Research Support to J. Gray	\$2,000	2002-2003
NSERC Strategic Grant Title: Environmental Isotope as Tracers of Contaminant Degradation - Integration of an Innovative New Technology, Compound Specific Hydrogen Isotope Analysis Co-investigators: B. Sleep (Civ. Eng. - U. of Toronto) E. Edwards (Chem. Eng. - U of Toronto) S. Mabury (Chemistry - U. of Toronto) * Grants indicated * below are the industry matching funds for this Strategic Project	\$459,150	2001-2005
Geosyntec Consultants International Ltd. *Industry research matching funds for NSERC Strategic Project 2001-2005	\$ 24,000	2001-2005
United Technologies Corporation *Industry research matching funds for NSERC Strategic Project 2001-2005	\$ 18,000	2001-2003
Environmental Science and Technology Alliance Canada Title: Use of carbon isotope signatures as tracers of intrinsic remediation of aromatic hydrocarbons Co-investigators: B. Sleep (Civ. Eng. U. of Toronto) E. Edwards (Chem. Eng. U of Toronto)	\$111,460	2000-2002
Applied Groundwater Research Ltd. *Industry research matching funds for NSERC Strategic Project 2001-2005	\$ 5,000	2001-2002

Envirometal Inc. *Industry research matching funds for NSERC Strategic Project 2001-2005	\$ 12,000	2001-2002
TAUW Research and Development Department The Netherlands Title: Application of isotope analysis for soil pollution research	\$31,000	2000-2001
NSERC Individual Research Grant Title: Isotopic constraints on the source, transport and transformation of natural and contaminated compounds in shallow and deep groundwaters	\$160,000	1999-2003
NSERC EWR Steacie Fellowship Supplement Title: New developments in hydrogen isotope geochemistry applied to shallow and deep groundwater systems	\$193,900	1999-2001
NSERC Major Equipment Grant Title: Gas Chromatograph Isotope Ratio Mass Spectrometer (GC/C/IRMS) for continuous flow high sensitivity analysis of H and N isotopes PI: B. Sherwood Lollar Co-investigators: B. Sleep (Civ. Eng. U. of Toronto) E. Edwards (Chem. Eng. U of Toronto) S. Mabury (Chemistry, U. of Toronto) J. Brenan (Geology, U. of Toronto) J. Stix (Geologie, U. of Montreal) D. Muir (Canadian Centre for Inland Waters) R. Therrien (Geologie, Laval)	\$257,015	1999-2000
NSERC Equipment Grant Title: Gas Chromatograph for low level H ₂ compositional analysis	\$34,456	1999-2000
Imperial Oil University Research Grant Title: Stable Carbon Isotopes: Tracers of Intrinsic Bioremediation of Aromatic Hydrocarbons	\$30,200	1998-2001
NSERC Strategic Grant - University Industry Partnerships Title: Tracing Organic Contaminants in Groundwater - A New Environmental Methodology using Compound Specific Isotope Analysis Co-investigator: B. Sleep (Civil Engineering, Univ. of Toronto) * Grants indicated * below are the industry matching funds for the 1997-2000 Strategic Project	\$290,000	1997-2000
NSERC Industrially Oriented Research Grant Title: Natural hydrocarbon gas concentrations in near-surface groundwaters Industrial Partner: Imperial Oil Ltd.	\$8,000	1998-99
RTDF Consortium on Groundwater Contamination Title: Isotopic constraints on chlorinated hydrocarbon contamination at Dover Air Force Base, USA.	\$18,000	1998-99
*United Technologies Research Grant Title: Collaborative research on fractionation associated with degradation of toluene in field settings	\$13,000	1997-98

*General Electric Research Grant	\$36,000	1997-99
Title: Collaborative research on fractionation associated with degradation of TCE Co-investigator: J. Spivack (General Electric Research Division, Schenectady, NY)		
NSERC Operating Grant	\$118,800	1995-99
Title: Inorganic/organic controls on production and flux of carbon gases from deep and shallow groundwaters and wetlands - Isotopic and geochemical characterization.		
*Centre for Groundwater Research - U. of Waterloo	\$50,000	1995-99
Solvents-in-Groundwater Research Funding Title: Evaluation of GC-IRMS techniques to identify multi-sources of organic contaminants in groundwater systems		
Imperial Oil University Research Grants	\$28,000	1995-98
Title: Natural hydrocarbon gas concentrations in near-surface groundwaters Implications for assessment of contamination due to gas migration and leakage		
Ontario-Quebec Academic Exchange Program	\$ 3,700	1997-98
Title: Environmental implications of methane gas and brine occurrences in mines on the Canadian Shield. Co-Investigator: J. Guha, Dept. des Sciences de la Terre, Univ. du Quebec á Chicoutimi.		
NSERC Equipment Grant	\$42,334	1994-95
Title: Automated Multiport Manifold for Mass Spectrometer Co-investigators: F.G. Ferris (Geology, Toronto); D. Wedin; R. Jefferies and J. Coleman (Botany, Toronto); J. Gerits (Geography, Toronto); N. Roulet (Geography, McGill); J. Stix (Geologie, Montreal), R. Knowles (Microbiology, McGill).		
Falconbridge Ltd. Research Grant	\$30,000	1994-96
Title: Occurrences of explosive gas and saline groundwater in Kidd Creek Mine, Timmins, Ont.		
American Association of Petroleum Geologists	\$2,000	1995-96
Grants-in-Aid of Field Research Support to S. Taylor Title: Natural hydrocarbon gas concentrations in near-surface groundwaters Implications for assessment of contamination due to gas migration and leakage		
Ontario-Quebec Academic Exchange Program	\$ 2,420	1995-96
Title: Environmental implications of methane gas and brine occurrences in mines on the Canadian Shield. Co-Investigator: J. Guha, Dept. des Sciences de la Terre, Univ. du Quebec á Chicoutimi.		
Research Contract		
Atmospheric Environment Service	\$10,000	1994-95
Title: Geochemical controls on production mechanism and isotopic signature of CH ₄ from low boreal wetlands.		
NSERC Operating Grant	\$71,220	1992-95
Title: Geochemical and isotopic controls on the origin and migration of gases in the hydrogeological environment		
Ontario Geoscience Research Grant	\$56,000	1992-94
Ministry of Northern Development and Mines Title: The role of N ₂ and H ₂ in inorganic methanogenesis in the crystalline rocks of the Canadian Shield		
AES/NSERC Science Subvention Program	\$10,000	1993-94
Atmospheric Environment Service - Environment Canada Title: CH ₄ inputs to the atmosphere from bogs in the Great Lakes Basin		

Possible geochemical controls on production mechanisms and isotopic signature

Research Agreements Program \$6000 1992-93

Energy Mines and Resources

Title: Migration and mixing of helium within the Southwest Ontario Sedimentary Basin

Implications for hydrocarbon gas reservoirs

Co-Investigators: S.M. Weise (Institut fuer Hydrologie, Munich, Germany);

S.K. Frappe (Univ. of Waterloo); J.F. Barker (Univ. of Waterloo)

Connaught Phase I New Staff Grant \$10,000 1992-93

Connaught New Staff Matching Grant \$11,000 1993-95

University of Toronto

Title: Environmental applications of GC-IRMS - Production and transport

of carbon-bearing compounds in the hydrological environment

Operating Grant \$35,000 1992-93

University of Toronto

Equipment Grant - Stable Isotope Laboratory \$400,000 1992-93

University of Toronto

As co-investigator:

Canadian Institute for Advanced Research (CIFAR) Catalyst Program \$40,000 2024-2025

Title: Radiotrophism, a novel dark-biosphere energy-yielding metabolism?

PI: J. Goordial (U. Guelph); Co-I: S. D'Hondt (URI); B. Sherwood Lollar (UT); V. Orphan (CalTech) and A. Casadevall (John Hopkins)

Canadian Institute for Advanced Research (CIFAR) Catalyst Program \$50,000 2024-2025

Title: Modelling Exploration of Prebiotic Chemistry and Microbial Energetics

focused on Subsurface Earth and Other Solid Worlds

PI: N. Sahai (U. Akron); Co-I: B. Sherwood Lollar and J. Hua (USTC)

Keck Institute for Space Studies \$40,000 USD 2023-2024

Title: The Biology of Biosignature Detection

PIs: S. Perl (NASA-JPL), C. Cockell (U. Edinburgh); W. Fischer (CalTech)

Co-PI: B. Sherwood Lollar and 20 others

Canadian Institute for Advanced Research (CIFAR) Catalyst Program \$27,250 2022-2023

Title: Climate Change and Earthquakes: exploring links among the amplification

of precipitation extremes, deep groundwater and seismicity

PI: R. Taylor (UCL) and M. Manga (Berkeley) Co-Is: B. Sherwood Lollar

T. Goudge (Texas-Austin); J. McDonnell (USask); J. McIntosh (UArizona); C.J. Ballentine (Oxford)

Canadian Institute for Advanced Research (CIFAR) Catalyst Program \$19,730 2022-2023

Title: Developing an analytical method for the stabilization and quantification

of sulfur redox intermediates in subsurface brines

PI: Victoria Orphan (Caltech) Co-I: B. Sherwood Lollar

Canadian Institute for Advanced Research (CIFAR) Catalyst Program \$19,365 2020-2021

Title: Bayesian methods for 'ancient' fluid dating

PI: C.J. Ballentine (Oxford); Co-PI: B. Sherwood Lollar

Canadian Institute for Advanced Research (CIFAR)		
Catalyst Program	\$15,000	2020-2021
Title: What would a rocky planet based on chemosynthesis have looked like?		
PI: M. B. Menez (University of Paris IGP) Co-PIs: B. Sherwood Lollar; H. Graham (NASA Goddard)		
Canadian Institute for Advanced Research (CIFAR)		
Catalyst Program	\$23,499	2020-2021
Title: Sudbury mines project development		
PI: M. Osburn (Northwestern University) Co-PIs: B. Sherwood Lollar; V. Orphan (Cal Tech); N. Smith (Laurentian)		
Canadian Institute for Advanced Research (CIFAR)		
Catalyst Program	\$15,000	2020-2022
Title: Evolution of WATER on Earth and Mars over Planetary TIME-scales		
PI: J. McIntosh (Arizona)		
Co-I: B. Sherwood Lollar (Toronto), J.F. Mustard (Brown), C.J. Ballentine (Oxford); V. Stamenkovic (NASA – JPL)		
NFoLD NASA Astrobiology Team Grant		Unfunded foreign collaborator
Title: Agnostic Biosignatures for Extant Life		
PI: S.S. Johnson (Georgetown); H. Graham (NASA Goddard Space Flight Centre)		
Co-Is: E. Anslyn & T.A. Ellington (U Texas Austin); P. Conrad & A. Steele (Carnegie)		
L. Cronin (Glasgow); J. Elsila, P. Mahaffy (NASA Goddard Space Flight Centre)		
C. House (Penn State); P. Girguis (Harvard); M.R. Rwebangira (Howard)		
C. Kempes & E. Libby (Santa Fe Institute); J. Nadeau (Portland State)		
B. Sherwood Lollar (Unfunded Foreign Co-investigator)		
NSERC Collaborative Research and Development	\$315,104	2019-2021
Title: Field testing of novel technologies for restoring challenging contaminated sites		
PI: J. Gerhard (UWO)		
Co-PIs: C.E. Robinson and J. Herrera (UWO)		
B. Sleep, E.A. Edwards and B. Sherwood Lollar (Toronto)		
P. Weber (RMC)		
Sloan Foundation Deep Carbon Observatory	\$1,200,000 USD	2015-2017
Title: Reduced Carbon in Earth:		
III. Origins, Forms, Quantities and Movement		
PI: E. Young (UCLA) and I. Danielle (Lyons)		
Subteam PI: B. Sherwood Lollar (Toronto)		
Keck Institute for Space Studies	\$40,000 USD	2015-2016
Title: Methane on Mars Study Program		
PIs: Y.Yung (CalTech), P. Chen (Jet Propulsion Labs), K. Nealson (USC)		
Co-PI: B. Sherwood Lollar and 19 others		
Sloan Foundation Deep Carbon Observatory	\$1,200,000	2013-2015
Title: Reduced Carbon in Earth's Crust and Mantle:		
II. Deep Energy and Reduced Gas Flux		
PI: D. Cole and I. Danielle		
Subteam PI: B. Sherwood Lollar (Toronto) and C.J. Ballentine (Oxford)		
NSERC CREATE Grant		
Title: Remediation Education Network (RENEW)	\$1,650,000	2014-2020
PI: B. Sleep		

Co-PIs: E. Acosta (Toronto), E. Edwards (Toronto), J. Gerhard (Western),
 J. Herrera (Western), D. O'Carroll (Western), C. Robinson (Western),
 N. Thomson (Waterloo), K. Mumford (Queen's), K. Novakowski (Queen's)
 Collaborator: B. Sherwood Lollar (Toronto)

Sloan Foundation Deep Carbon Observatory \$1,500,000 2011-2013
 Title: Reduced Carbon in Earth's Crust and Mantle: (BSL portion \$320,000)
 I. Abiogenic versus Biogenic Origins
 PI: D. Cole and C.J. Ballentine
 Subteam PI: B. Sherwood Lollar (Toronto)
 Co-PIs: E. van Heerden (Univ. of Free State, SA); T.C. Onstott (Princeton); M. Itavaara (VTT, Finland)

NSERC CREATE Grant 2011-2016
 Title: Multidisciplinary Applied Geochemistry Network (MAGNET)
 PI: D. Weis (Univ. of British Columbia)
 Co-PIs: S. J. Barnes (Univ. du Quebec), B. Bergquist (Univ. of Toronto), I. Clark (Univ. of Ottawa),
 R. Francois (Univ. of British Columbia), C. Hillaire-Marcel (UQAM), B. Sherwood Lollar (Univ. of Toronto)
 J. Stix (Univ. of McGill)

NSERC Networks of Centers for Excellence \$5 million 2010-2013
 Title: Carbon Management Canada BSL portion \$209,800 over 3 years
 PI: S. Larter (U. Calgary)
 Co-PI: B. Mayer (Calgary), J. Grace (UBC), B. Rostron (Alberta), J. Shaw (Alberta), G. Dipple (UBC)
 D. Lawton (Calgary), J. Meadowcraft (Calgary), B. Sherwood Lollar (Toronto), C. Mims (Toronto)

National Science Foundation \$700,000 2010-2012
 Title: Collaborative Research ETBC – Deep Crustal Biosphere BSL portion: \$57,576 over three years
 Microbial Cycling of Carbon
 PI: T.C. Onstott (Princeton)
 Co-PIs: T. Kieft (NMT); B. Sherwood Lollar (Toronto); G.F. Slater (McMaster); K. Hinrichs (Bremen)

CFI Leaders Opportunity Fund \$218,143
Canadian Foundation for Innovation

Title: Biozone: A Modern Collaborative Bioengineering Research Facility
 PI: E. Edwards (Chem. Eng.)
 Co-PIs: E. Masters and R. Mahadevan (Chem Eng)
 Co-Investigators: B. Sherwood Lollar, B. Sleep, M. Shoichet and others

NSERC CREATE Program \$1.6 million 2009-2014
Canadian Astrobiology Training Program
 PI: L. Whyte (McGill)
 Co-investigators: B. Sherwood Lollar (Toronto)
 N. Banerjee, G. Osinski (UWO)
 R. Pudritz, G. Slater (McMaster)
 W. Pollard, H. Vali, J. Nadeau, B. Wing (McGill)
 E. Cloutis (Winnipeg)
 Collaborators: NASA Ames, NASA JPL, Canadian Space Agency,
 MDA Space Missions, MPA Communications

Canadian Space Agency Canadian Analogue Research Network \$50,000 2010-2011
CARN 08-01 BSL portion: \$5000
 Title: Life in Ice: The detection of microbial activity at Mars analogue sites (cold
 Saline springs, permafrost/ground ice in the high Arctic
 PI: L. Whyte (McGill)

Co-investigators: B. Sherwood Lollar (Toronto)
T.C. Onstott (Princeton)

Genome Canada and Ontario Genomics Institute \$10 million 2009-2018
BEEM: Bioproducts and Enzymes from Environmental Metagenomics BSL unfunded collaborator
PI: E.A. Edwards (Dept of Chemical Engineering Toronto) and D.W. Major (GeoSyntec Inc).
Co-pi: B. Sherwood Lollar and others

Canadian Space Agency Canadian Analogue Research Network \$30,000 2007-2008
CARN 07-01 BSL portion: \$2000
Title: Life in Ice: The detection of microbial activity via in situ measurements of CH₄ and CO₂:
High Arctic field testing of a Cavity Ring Down Spectrometer (CRDS) for future use on the Martian surface
PI: L. Whyte (McGill)
Co-investigators: B. Sherwood Lollar (Toronto)
T.C. Onstott (Princeton)

Canadian Space Agency Canadian Analogue Research Network \$20,000 2007-2008
CARN 07-02 BSL portion: \$2000
Title: Planetary protection - The survivability of Earth microbes from Canadian High Arctic
Mars analogue sites under Martian environmental conditions
PI: L. Whyte (McGill)
Co-investigators: B. Sherwood Lollar (Toronto) T.C. Onstott (Princeton)

U.S. Strategic Environmental Research and Development Program
Title: Elucidation of the mechanisms and environmental relevance of cis-DCE and VC biodegradation \$1,250,000 2007-2011
(BSL portion \$35,000 per year)
PI: E. Cox(GeoSyntec)
Co-PIs: C. Aziz (GoeSyntec), J. Gossett (Cornell), J. Spain (Georgia Tech)
E.A. Edwards (Toronto), B. Sherwood Lollar (Toronto)

NASA ASTID (Astrobiology Science and Technology Development And Mission Concept Studies) \$1.5 million USD 2008-2011
BSL unfunded collaborator
Title: A CRDS for isotopic measurement of Martian CH₄
PI: T.C. Onstott, Dept. of Geosciences, Princeton University
Co-investigators: K.K. Lehmann (U. of Virginia)
P. Mahaffy (Mars Science Lab PI - NASA Goddard Space Flight Center)
H. Riris, I. Kate, J. Burris (all of NASA Goddard Space Flight Center)
Collaborator: B. Sherwood Lollar (Toronto)

NASA Astrobiology Institute (NAI) - DDF Fund \$253,075 USD 2007-2008
(no direct funds to BSL as major portion of funds for mounting a Mars Simulator workshop)
Title: Mars Environmental Simulator Studies of Forward Contamination and Biogeochemical Processes
PI: T.C. Onstott (Princeton)
L.M. Pratt, D. Bish, A. Schimmelmann (Indiana Univ.)
S.M. Pfiffner (Tennessee)
B. Sherwood Lollar (Toronto)
T.C. Hazen (Lawrence Berkeley National Lab;)R. Mancinelli, L. Rothschild (SETI); J. Bishop (NASA Ames); P. Todd (SHOT Inc.)
P. Kounaves (Tufts); K. Zacny (Honeybee Robotics); P. Mahaffy (NASA MSL PI); A. Schuerger (U of Florida); J. Bada (UCSD); L. Becker (UCSB); C. Omelon, W. Pollard (McGill)

NASA Astrobiology Research Institute (NAI) \$5,000,000 USD 2003-2008
(BSL portion after overhead approximately \$60,000 Canadian per year)
Detection of Biosustainable Energy and Nutrient Cycles in the Deep Subsurface of Earth and Mars
PI: L. Pratt (Chemistry, Indiana U.)

Co-PI's: T.C. Onstott (Princeton), [B. Sherwood Lollar](#) (Toronto)
 J.K. Fredrickson (PNNL); S. Pfiffner (U. Tennessee);
 T. Phelps (ORNL); F. Brockman (PNNL); T. Hazen (LBNL);
 S. Clifford (Lunar Planetary Institute)

NSERC Research Tools and Instruments	\$86,204	2006
Title: Microarray Equipment to detect differential gene expression in biodegrading microbial communities		
PI: Edwards (Chem-Eng) Co-PIs: Sherwood Lollar (Geology), M. Simpson (UTSC)		
Canadian Space Agency Analogue Site Studies	\$20,000	2006
Title: High Arctic Springs as Mars analogue sites		
PI: L. Whyte (McGill)		
Co-PIs: W. Pollard (McGill); N. Perreault (McGill); B. Sherwood Lollar (Toronto); D. Andersen (SETI)		
NSERC Research Tools & Instruments - Category I	\$72,995	2003
Title: Application of Quantitative Molecular Techniques in Subsurface Bioremediation		
PI: E. Edwards (Chemical Engineering and Applied Chemistry)		
Co-PIs: B. Sherwood Lollar (Geology); B. Sleep (Civil)		
NSERC Collaborative Research Development Grant	\$266,244	2000-2003
Title: Biogeochemical Mechanisms for Chlorinated Ethane Transformation in Groundwater		
PI: E. Edwards (Chem. Eng. U of Toronto)		
Co-investigators: B. Sherwood Lollar (Geology - U. of Toronto) B. Sleep (Civ. Eng. U. of Toronto)		
Canadian Chlorine Coordinating Council	\$75,000	1999-2001
Title: Source Identification of Chloroacetic Acids (CAA) in the Environment by GC-C-IRMS		
PI: S.A. Mabury (Chemistry, University of Toronto)		
B. Sherwood Lollar (Geology, University of Toronto)		
D.Muir (CCIW, Environment Canada)		
National Science Foundation	\$1,275,000	1999-2003
Title: South African Ultradeep Mines - Long Term Sites for Interdisciplinary Studies (LSLIS) into the Extreme Environment of the Deep Subsurface		
PI: T.C. Onstott, Dept. of Geosciences, Princeton University		
Co-investigators: D. Balkwill (FSU); D. Boone (PSU); Brockman (PNNL); J.K. Fredrickson (PNNL); Kieft (NMIT); Pfiffner (UTenn); T.Phelps (ORNL); L. Pratt (IU); B. Sherwood Lollar (Toronto); G. Southam (NAU); M. Stute (Lamont-Doherty); G. Wallfaardt (Univ. Stellenbosch); D. White (UTenn)		
National Geographic Society	\$17,707	1998-99
Title: A Window into the Extreme Environment of Deep Subsurface Microbial Communities: The Witwatersrand Deep Microbiology Project		
PI: T.C. Onstott, Dept. of Geosciences, Princeton University		
Co-investigators: J.K. Fredrickson (PNNL); K. Pedersen (Goteborg Univ.); B. Sherwood Lollar		

U.S. Dept of Energy - Office of Energy Research	\$200,000	1995-1998
Title: Combined Noble Gas and Stable Isotope Constraints on Nitrogen Gas Source within Sedimentary Basins		
PI: C.J. Ballentine, Dept. of Geological Sciences, Univ. of Michigan		
Co-investigators: <u>B. Sherwood Lollar</u> ; A.N. Halliday, Dept. of Geological Sciences, Univ. of Michigan		
 Special University Linkage Consolidation Program	 \$750,000	 1996-2001
AUCC-CIDA		
Title: Geo-environment and its impact on socio-economic development -		
Guizhou Province, in alliance with the Pearl River Delta, P.R. of China		
PI: J. Guha (Univ. du Quebec a Chicoutimi)		
 Faculty of Arts and Sciences - One Time Only Funds	 \$10,000	 1992-93
Field Gas Chromatograph for Environmental Geosciences Teaching Initiative		
Co:investigator: F.G. Ferris (Univ. of Toronto)		
 NSERC Equipment Grant	 \$90,301	 1991-92
Title: Phase contrast-fluorescence microscope, spectrophotometer, and anaerobic		
chamber needed to undertake microbial geochemistry research		
PI: F.G. Ferris (Univ. of Toronto)		

PEER REVIEWED SCHOLARLY PUBLICATIONS

All co-authors who are students, postdoctoral fellows or research associates directly under Sherwood Lollar's supervision take first-authorship for their work and are noted *in italics* in the publication list below. **Sherwood Lollar's name is underlined where she is first, or senior author, as different disciplines have different assumptions concerning where the senior author's name should be listed (i.e. second, or last).** Journals are selected for breadth of readership, the quality of the submission and review process and impact. The majority of publications are in journals such as *Science*, the *Nature family*, and in disciplinary journals such as *Geochimica Cosmochimica acta*, *Chemical Geology*, *Organic Chemistry*, *Applied and Environmental Microbiology*, and *Environmental Science and Technology* that have among the highest rated impact factors in geochemistry.

224. *Flude, S., Warr O., Magalhães, N., Bordmann, V. Fleury, J.-M., Reis, H., Trindade, R., Hillegonds, D., Toledo, R., Piat, B., Holdship, P., Wyatt, S., Sherwood Lollar, B., and Ballentine, C.J.* Generation, migration and accumulation of crystalline basement derived H₂ in the sedimentary sequences of the São Francisco Basin, Brazil – implications for H₂ exploration. In prep for **Applied Geochemistry**.
223. *Phillips, E., De Vera, J., Bulka, O., Kummel, S., Picott, K., Edwards, E.A., Nijenhuis, I., Gehre, M. and Sherwood Lollar, B.* Carbon and chlorine isotope effects produced by biotransformation of chlorinated ethanes. (in prep).
222. *Tarnas, J., Warr, O., Stamenkovic, V., Mustard, J.F., and Sherwood Lollar, B.* Quantification of abiotic and microbial methane production rates in the Precambrian crust. **Geochimica Cosmochimica acta** (in prep).
221. Ballentine, C.J., Sherwood Lollar, B., Karolyte, R., Cheng, A., Gluyas, J. and Daly, M. Global natural hydrogen accumulation and resource potential. **Nature Reviews Earth and Environment** (invited submission in prep).
220. Byrne, P.K., Dawson, H.G., Klimczak, C., Regensburger, P.V., Vance, S.D., Daswani, M.M., Hemingway, D.J., Foley, B.J., Elder, C.M., Green, A.P., German, C.R., Sherwood Lollar, B., and Randolph-Flagg, N. Europa's modern-day seafloor is likely mechanically strong and geologically inert. **Nature** (in prep).
219. Gluyas, J., Humphreys, M., Karolyte, R., Sherwood Lollar, B., and Ballentine, C.J. Exploring for hydrogen, helium and lithium: is it as easy as 1, 2, 3? **Geological Society of London Resources** (subm)
218. *Chen, W., Nunez Garcia, A., Phillips, E., De Vera, J., Passeur, E., M O'Carroll, D., Sleep, B. and Sherwood Lollar, B.* Quantifying

remediation of chlorinated volatile compounds by sulfidated nano zerovalent iron treatment using numerical modelling and CSIA. **Water Research** (subm).

217. Ford, S., Slater, G., Engel, K., Brady, A. Warr, O., Lollar, G.S., Neufeld, J. and Sherwood Lollar, B. Deep saline fracture waters harbour an indigenous microbial community dominated by *Candidatus Frackibacter* **Nature Communications** (subm).
216. Mueller E.P., Panehal, J., Song, M., Hansen, C., Warr, O., Boettger, J., Heuer, V., Bach, W., Hinrichs, K.-U., Riler, J.M., Orphan, V., Sherwood Lollar, B. and Sessions A.L. Isotopic evidence of acetate cycling in the Precambrian continental subsurface. **Nature Geoscience**. (submitted)
215. Labidi, J., McCollom, T.M., Giunta, T., Sherwood Lollar, B., Leavitt, W. and Young E.D. Clumped isotope signatures of abiotic methane: the role of combinatorial isotope effects. **Journal of Geophysical Research – Solid Earth**. (in revision for editor based on reviews)
214. Horita, J., Watson, D.B., Toyoda, S., Brooks, S.C., Warr, O., Sherwood Lollar, B., Conrad, M.E. and Yoshida, N. Coupled Hydrogeochemical-Microbial Processes at an Acid, Radionuclide-Contaminated Site with Implications for Bioremediation and Life under Extreme Conditions. **Geochimica Cosmochimica acta** (submitted).
213. Philips, E., Picott, K., Kummel, S., Bulka, O., Edwards, E.A., Wang, P.H., Gehre, M., Nijenhuis, I., and Sherwood Lollar, B. Sources of variability in CF biotransformation by *Dehalobacter restrictus*. **Microbiology** (submitted).
212. Higgins, P.M., Chen, W., Glein, C.R., Cockell, C.S. and Sherwood Lollar, B. (2024) Quantifying uncertainty in sustainable biomass and production of biotic carbon from Enceladus' notional methanogenic biosphere. **Journal of Geophysical Research: Planets**: 129, e2023JE008166. <https://doi.org/10.1029/2023JE008166>
211. Song, M., Telling, J., Warr, O., and Sherwood Lollar, B. (2024) Hydrogeological controls on microbial activity and habitability in the Precambrian continental crust. **Geobiology** 2024;22:e12592. <http://doi.org/10.1111/gbi.12592>.
210. Sherwood Lollar, B., Warr, O., Higgins, P.M. (2024) The Hidden Hydrogeosphere – An expanded vision of the planetary water cycle. **Annual Reviews of Earth and Planetary Sciences** 52:15.1-15.24. <https://doi.org/10.1146/annurev-earth-040722-102252>.
209. Nissan, D., Walters, C.C., Chacon, M., Kieft, T., Rodgers, R., Sherwood Lollar, B., Warr, O., Castillo, J., Perl, S., Cason, E., Freifeld, B., and Onstott, T.C. (2023) Radiolytically reworked Archean organic matter in a habitable deep ancient high-temperature brine. **Nature Comm.** (2023)14:6163. <https://doi.org/10.1038/s41467-023-41900-8>
208. Ferguson, G., McIntosh, J., Warr, O. and Sherwood Lollar, B. (2023) The low permeability of the Earth's Precambrian crust. **Communications Earth and Environment** 4, article #:323 <https://www.nature.com/articles/s43247-023-00968-2#Ack1>.
207. Liu, J., Harris, R.L., Ash, J.L., Ferry, J.G., Labidi, J., Krause, S.J.E., Prakash, D., Sherwood Lollar, B., Treude, T., Warr, O., and Young, E.D. (2023) Reversibility control methane clumped isotope signature from anaerobic methane oxidation. **Science Advances** 348:165-186.
206. Nissan, D., Kieft, T., Drake, H., Warr, O., Sherwood Lollar, B., Ogasawara, H., Perl, S., Freifeld, B., Castillo, J., Whitehouse, M., Kooijman, E. and Onstott, T.C. (2023) Hydrogeochemical and isotopic signatures elucidate deep subsurface hypersaline brine formation through radiolysis driven water-rock interaction. **Geochimica Cosmochimica acta** 340:65-84.
205. Cheng, A., Sherwood Lollar, B., Gluyas, J. and Ballentine, C.J. (2023) Primary N₂-He gas field formation in intracratonic sedimentary basins. **Nature** 615:94-99. [Doi.org/10.1038/s41586-022-05659-0](https://doi.org/10.1038/s41586-022-05659-0).
204. Warr, O., Song, M., and Sherwood Lollar, B. (2023) Advanced Monte Carlo modelling to quantify in situ hydrogen and associated

- element production in the deep subsurface. Special Volume **Frontiers in Earth Science**. Doi.org/10.3389/feart.2023.1150740.
203. Warr, O., Smith, N., and Sherwood Lollar, B. (2023) Hydrogeochronology: resetting the time-stamp for subsurface groundwaters. **Geochimica Cosmochimica acta** 348:221-238.
202. Taguchi, K., Gilbert, A., Sherwood Lollar, B., *Giunta, T.*, Boreham, C.J., Liu, Q., Horita, J. and Ueno, Y. (2023) Low ¹³C-¹³C abundance in abiotic ethane. **Nature Communications** 13(5790).
201. Soares, A., Edwards, A., An, D., Bagnoud, A., Bradley, J., Barnhart, E., Bomberg, M., Budwill, K., Caffrey, S.M., Fields, M., Gralnick, J., Kadnikov, V., Momper, L., Osburn, M., Mu, A., Moreau, J.W., Moser, D., Purkamo, L., Rassner, S.M., Sheik, C.S., Sherwood Lollar, B., Toner, B.M., Voordouw, G., Wouters, K., and Mitchell, A.C. (2023) A global perspective on microbial diversity in the terrestrial deep subsurface. **Microbiology** 169:001172. Doi: 10.1099/mic.0.001172.
200. Warr, O. Ballentine, C.J., Onstott, T.C., Nisson, D.M., Kieft, T.L., Hillegonds, D.J. and Sherwood Lollar, B. (2022) ⁸⁶Kr excess and other noble gases identify a billion-year old radiogenically-rich groundwater system. **Nature Communications** 13(1):3768-3768 DOI: [10.1038/s41467-022-31412-2](https://doi.org/10.1038/s41467-022-31412-2)
199. *De Vera, J., Chen, W., Philips. E., Gilevska, T., Morgan, S., Norcross, S., West, K., E.-E. Mack, and Sherwood Lollar, B.* (2022) Compound specific isotope analysis (CSIA) evaluation of degradation of chlorinated benzenes (CBs) and benzene in a contaminated aquifer. **Journal of Contaminant Hydrogeology** 250:104051 <https://doi.org/10.1016/j.jconhyd.2022.104051>
198. *Phillips, E., Bulka, O., Picott, K., Kümmel, S., Edwards, E.A., Nijenhuis, I., Gehre, M., Dworatzek, S., Webb, J., and Sherwood Lollar, B.* (2022) Investigation of Active Site Amino Acid Influence on Carbon and Chlorine Isotope Fractionation during Reductive Dechlorination. **FEMS Microbiology Ecology** 98(8):1-12 <https://doi.org/10.1093/femsec/fiac072>.
197. *Karolyte, R., Warr, O., van Heerden, E., Flude, S., de Lange, F., Webb, S., Ballentine, C.J., Sherwood Lollar, B.* (2022) The role of porosity in H₂/He production ratios in fracture fluids from the Witwatersrand Basin, South Africa. **Chemical Geology** 595:120788. doi.org/10.1016/j.chemgeo.2022.120788
196. Case, N.T., *Song, M., Fulford, A.H., Graham, H.V., Orphan, V.J., Stajich, J.E., Casadevall, A., Mustard, J., Heitman, J., Sherwood Lollar, B., and Cowen, L.E.* (2022) Exploring Space via Astromycology: A report on the CIFAR Programs Earth 4D and Fungal Kingdom Inaugural Joint Meeting. **Astrobiology** 22(6) 2022 <https://doi.org/10.1089/ast.2021.0186>
195. *Li, L., Wei, S., Sherwood Lollar, B., Wing, B., Bui, T.H., Ono, S., Lau, M.C.Y., Onstott, T.C., Kieft, T.L., Borgonie, G., Linage-Alvarez, B., Kuloyo, O., van Heerden, E.* (2022) In situ oxidation of sulfide minerals supports widespread sulfate reducing bacteria in the deep subsurface of the Witwatersrand Basin (South Africa): insights from multiple sulfur and oxygen isotopes. **Earth Planetary and Science Letters** 577:177247. <https://doi.org/10.1016/j.epsl.2021.117247>.
194. *Li, L., Li, K., Guinta, T., Warr, O., Labidi, J.* and Sherwood Lollar, B. (2021) N₂ in deep subsurface fracture fluids of the Canadian Shield: Source and possible recycling processes. **Chemical Geology** 585: 120571. <https://doi.org/10.1016/j.chemgeo.2021.120571>.
193. *Gilevska, T. Ojeda, A.S., Kueimmel, S., Gehre, M., Seger, E., West, K.A., Morgan, S.A., Mack, E.-E., and Sherwood Lollar, B.* (2021) Multi-element evidence for monochlorobenzene and benzene degradation under anaerobic conditions in contaminated sediments. **Water Research** 207-117809. <https://doi.org/10.1016/j.waterres.2021.117809>. Selected as highlighted article in **Nature Reviews Earth and Environment**. <https://www.nature.com/articles/s43017-021-00248-7>
192. Chou, L., Mahaffy, P., Trainer, M., Eigenbrode, J., Arevalo, R., Brinckerhoff, W., Getty, S., Grefenstette, N., Da Poian, V., Fricke, G.M., Kempes, C., Marlow, J., Sherwood Lollar, B., Graham, H and Stewart Johnson, S., (2021) Planetary mass spectrometry for agnostic life detection in the solar system. **Front. Astron. Space Sci.** Oct. 7 2021. <https://doi.org/10.3389/fspas.2021.755100>
191. *Sanz-Robinson, J., Warr, O., Hanley, J., and Sherwood Lollar, B.* (2021) Advances in techniques for carbon isotope signatures of CH₄ and hydrocarbons in trapped paleofluids. **Rapid Comms. in Mass Spectrometry** 2021;35:e9170.

<https://doi.org/10.1002/rcm.9170>.

190. Cheng, A., Sherwood Lollar, B., Warr, O., Ferguson, G., Idiz, E., Mundle, S.O.C., Barry, P.H., Byrne, D.J., Mabry, J. and Ballentine C.J. (2021) Determining the role of diffusion and sedimentary basin architecture and basement flux in ^4He groundwater distribution and residence time. **Earth Planetary and Science Letters** 574:117175. <https://doi.org/10.1016/j.epsl.2021.117175>.
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Environmental Geochemistry Vol. 9 (Vol. editor B. Sherwood Lollar) Treatise on Geochemistry (eds. H.D. Holland and K.K. Turekian), Elsevier, Oxford (2003). This work won the Geoscience Information Society (GSIS) Mary B. Ansari Best Reference Work Award for 2003. This Volume edited by Sherwood Lollar was one of the two highest selling volumes in this award winning series. The *Treatise on Geochemistry* presents a comprehensive, integrated summary of the present state of the field for a full range of disciplines and topics in geochemistry. All chapters are peer reviewed and contributed by the leading experts in the field of research. K. Turekian (Yale University) and H.D. Holland (Harvard University) were the executive editors of the series. Volume editors are Andrew Davis, Rick Carlson, Roberta Rudnick, Ralph Keeling, Tim Drever, Harry Elderfield, Fred MacKenzie, Bill Schlesinger and Barbara Sherwood Lollar. Paperback edition of Volume 9 published in May 2005 sold to date over 1400 copies. **Second Edition more than 50% updated and revised was published in 2014 and was recently awarded the Geoscience Information Society (GSIS) Mary B. Ansari Best Reference Work Award for 2014** at the Geological Society of America Annual Meeting (Oct. 2014).

PEER-REVIEWED REPORTS

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NON-PEER-REVIEWED REPORTS

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PAPERS PRESENTED AT MEETINGS AND SYMPOSIA (Invited talks listed separately below)

- Warr, E., Song, M., Higgins, P.M. and Sherwood Lollar, B. Integrating Monte Carlo into noble gas production models; it's time to stop rolling the dice. Goldschmidt Conference, Chicago, IL. Aug. 2024
- Heard, A.W., Warr, O. and Sherwood Lollar, B. Isotope tracing of iron cycling in a crustal deep fracture-hosted hydrogeosphere. Goldschmidt Conference, Chicago, IL. Aug. 2024
- Ford, S.E., Engel, K., Warr, O., Lollar, G.S., Brady, A., Neufeld, J.D., Sherwood Lollar, B. and Slater, G.F. Deep terrestrial saline fluids harbor an indigenous microbial community dominated by *Candidatus* Frackibacter. Goldschmidt Conference, Chicago, IL. Aug. 2024
- Byrne, P.K., Dawson, H.G., Klimczak, C., Regensburger, P.V., Vance, S.D., Daswani, M.M., Hemingway, D.J., Foley, B.J., Elder, C.M., Green, A.P., German, C.R., Sherwood Lollar, B., and Randolph-Flagg, N. Europa's modern-day seafloor is likely mechanically strong and geologically inert. COSPAR Scientific Assembly. Busan, South Korea. July 2024
- Higgins, P.M., Chen, W., Glein, C.R., Cockell, C.S. and Sherwood Lollar, B. Ratios of abiotic to biotic carbon inform on the scale, productivity, behavior, and detectability of notional ocean world biosphere. AbSciCon Conference. Brown University. Providence RI. May 2024.
- Byrne, P.K., Dawson, H.G., Klimczak, C., Regensburger, P.V., Vance, S.D., Daswani, M.M., Hemingway, D.J., Foley, B.J., Elder, C.M., Green, A.P., German, C.R., Sherwood Lollar, B. Little to no geological activity likely on the seafloor of Europa. AbSciCon Conference. Brown University. Providence RI. May 2024.
- Price, R.E., Erauso, G., Labidi, J., Sherwood Lollar, B., Quéméneur, M., Poatec, A., Popall, R., Monnin, C., Wehrmann, L., Hoehler, T., and Young, E. Abiotic and microbial methane from the Prony Bay Hydrothermal Field, New Caledonia. AbSciCon Conference. Brown University. Providence RI. May 2024.
- Higgins, P.M., Chen, W., Glein, C.R., Cockell, C.S. and Sherwood Lollar, B. Uncertainty in habitability and sustainable biomass for a hypothetical methanogenic biosphere on Enceladus. American Geophysical Union Annual Meeting. San Francisco CO. Dec. 2023.
- Song, M., Warr, O., Telling, J., and Sherwood Lollar, B. Hydrogeological controls on microbial activity in continental crust. TRUMF Vancouver BC. Sept. 2023.
- Chen, W. Nunez Garcia, A., Phillips, E., De Vera, J., Passeport, E., M O'Carroll, D. and Sherwood Lollar, B. Resolution of DNAPL dissolution on $\delta^{13}\text{C}$ values by a numerical modelling approach demonstrates effectiveness of sulfidated nano zerovalent iron for remediation of contaminated field sites. ASCITA Conference. Ottawa ON. July 2023
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- Chartrand, M.,* Waller, A., Edwards, E.A., *Lacrampe-Couloume, G.,* Finneran, K.T., Mattes, T.E., Gossett, J.M., and B. Sherwood Lollar. Applications of stable carbon isotopes to monitor vinyl chloride of degradation. Fourth International Battelle Conference on Remediation of Chlorinated and Recalcitrant Compounds. Monterey, CA. May 2004.
- Hirschorn, S.K., Edwards, E.A., *Lacrampe-Couloume, G.,* Major, D.W., MacKinnon, L. and B. Sherwood Lollar. Assessing enhanced in situ anaerobic biodegradation of 1,2-dichloroethane using stable carbon isotopes. Fourth International Battelle Conference on Remediation of Chlorinated and Recalcitrant Compounds. Monterey, CA. May 2004.
- McKelvie, J.R.,* *Lacrampe-Couloume, G.,* Beller, H., Lindstrom, J., Finneran, K.T. and B. Sherwood Lollar. Biogeochemical and isotopic monitoring of gasoline constituent biodegradation. Fourth International Battelle Conference on Remediation of Chlorinated and Recalcitrant Compounds. Monterey, CA. May 2004.
- Morrill, P.,* Seepersad, D., *Lacrampe-Couloume, G.,* Kaiguo, M., Edwards, E., Sleep, B., McMaster, M., Major, D.W. and B. Sherwood Lollar. Biologically enhanced dissolution of tetrachloroethene: A stable carbon isotope investigation. Fourth International Battelle Conference on Remediation of Chlorinated and Recalcitrant Compounds. Monterey, CA. May 2004.
- Davidson, M.M., Onstott, T.C., Pratt, L.M., Boice, E.A., Southam, G., Wanger, G., Sherwood Lollar, B., Lippmann, J. and W Seymour. Microbial diversity associated with geochemical changes in a deep subsurface aquifer. American Geophysical Union Fall Meeting. San Francisco CA. Dec. 2003.
- Ballentine, C.J., Sherwood Lollar, B., Marty, B. and M. Cassidy. CO₂ well gases, noble gases and the origin of volatiles in the earth's mantle. American Geophysical Union Fall Meeting. San Francisco CA. Dec. 2003.
- Morrill, P.,* Seepersad, D., *Lacrampe-Couloume, G.,* Edwards, E., Sleep, B., McMaster, M. and B. Sherwood Lollar. Stable carbon isotope investigation of biologically enhanced dissolution of tetrachloroethene near a DNAPL source zone. Geological Society of America Annual Meeting. Seattle, WA. Oct. 2003
- Slater, G.F., J. Lippman, C. Reddy, *J. Ward, G. Lacrampe-Couloume,* L.-H. Lin, J. Hall, T.C. Onstott and B. Sherwood Lollar. Radiocarbon distribution in DIC and CH₄ in South African gold mines – evidence for current methanogenesis? Annual Radiocarbon Meeting. New Zealand Oct. 2003

- Hirschorn, S., Mancini, S., Dinglasan, J., Edwards, E., Lacrampe-Couloume, G., and B. Sherwood Lollar. Variability in stable carbon isotope fractionation during biodegradation of 1, 2-Dichloroethane. Seventh International Battelle Symposium on In Situ and On-Site Bioremediation. Orlando, FL. June 2003.
- Mancini, S., Ulrich, A., Lacrampe-Couloume, G., Sleep, B., Edwards, E. and B. Sherwood Lollar. Carbon and hydrogen isotopic fractionation as a technique to monitor anaerobic bioremediation of benzene. Seventh International Battelle Symposium on In Situ and On-Site Bioremediation. Orlando, FL. June 2003.
- Moser, D.P., Gihring, T.M., Fredrickson, J.K., Brockman, F.J., Onstott, T.C., Hall, J., Lin, L.-H., Davidson, M., Balkwill, D.L., Drake, G.R., Trimarco, E., Pfiffner, A., Welty, A.H., Southam, G., Lengke, M., Wanger, G., Tipple, B., Sherwood Lollar, B., *Ward, J.* Changes over a 2.5 km vertical flow path in a deep hydrological downwelling zone. American Society for Microbiology Annual Meeting. Washington D.C. May 2003.
- Slater, G.F., Sherwood Lollar, B., Brown, S. and S. Lesage. Insights into dechlorination of PCE and TCE by vitamin B12 from carbon isotope fractionation. European Geophysical Union/American Geophysical Union Joint Spring meeting. Nice FR. April 2003.
- Ward, J., Slater, G., Lacrampe-Couloume, G., Lin, L., Onstott, T.C. and B. Sherwood Lollar. Hydrocarbon gas and microbial geochemistry in the deep subsurface of the Witwatersrand Basin, South Africa. American Geophysical Union Fall Meeting. San Francisco CA. Dec. 6-10, 2002.
- Morrill, P., Lacrampe-Couloume, G., Sleep, B., Edwards, E., McMaster, M., Major, D. and B. Sherwood Lollar. Stable carbon isotope evidence and quantification of reductive dechlorination of chlorinated ethenes at Kelly AFB, Texas. American Geophysical Union Fall Meeting. San Francisco CA. Dec. 6-10, 2002.
- Lacrampe-Couloume, G., Ward, J., Mancini, S. and B. Sherwood Lollar. Compound specific hydrogen isotope analysis: New insights into hydrocarbon reaction mechanisms and biodegradation. CSCOP-TSOP Meeting "Emerging Concepts in Organic Petrology and Geochemistry". Banff, AB. Sept. 2002
- Sherwood Lollar, B., Ward, J., Slater, G., Lacrampe-Couloume, G., Hall, J., Lin, L., Moser, D. and Onstott, T.C. Hydrogen and hydrocarbon gases in crystalline rocks: Implications for the deep biosphere. Special Session on "The Deep Biosphere - Microbial Communities in Deeply Buried Media" 12th Annual V. M. Goldschmidt Conference, Davos, Switzerland, August 18-23, 2002.
- Lin, L.-H., Onstott, T.C., Lippmann, J., Ward, J., Hall, J. and B. Sherwood Lollar, B. Radiolytic H₂ in the continental crust: A potential energy source for microbial metabolism in deep biosphere. Special Session on "The Deep Biosphere - Microbial Communities in Deeply Buried Media" 12th Annual V. M. Goldschmidt Conference, Davos, Switzerland, August 18-23, 2002.
- VanStone, N., Focht, R., Mabury, S., and B. Sherwood Lollar. Isotopic analysis: A new tool for evaluating abiotic degradation on Fe⁰. Third International Battelle Conference on Remediation of Chlorinated and Recalcitrant Compounds. Monterey, CA. May 2002.
- P. Morrill, G. Lacrampe-Couloume, E. Edwards, B. Sleep, B., M. McMaster, D. Major and B. Sherwood Lollar.
Verification of biodegradation of chlorinated ethenes using stable carbon isotopes. Third International Battelle Conference on Remediation of Chlorinated and Recalcitrant Compounds. Monterey, CA. May 2002.
- Seepersad, D., Duhamel, M., Cheung, P., Mo, K., Morrill, P., Sherwood Lollar, B., Sleep, B., Edwards, E., Hood, E., Major, D. and M. McMaster. Comparison of 2D Model Aquifers: Chlorinated DNAPL Bioremediation. Third International Battelle Conference on Remediation of Chlorinated and Recalcitrant Compounds. Monterey, CA. May 2002.
- Seepersad, D., Duhamel, M., Cheung, P., Mo, K., Morrill, P., Sherwood Lollar, B., Sleep, B., Edwards, E., Hood, E., Major, D. and P. Dennis. Comparison of three PCE dechlorination enrichments under anaerobic conditions. Third International Battelle Conference on Remediation of Chlorinated and Recalcitrant Compounds. Monterey, CA. May 2002.

- Ward J.A.M., Slater, G.F., Lacrampe-Couloume, G., Hall, J., Moser, D., Lin, L.H., Lippmann, J., Davidson, M., Onstott, T.C., and Sherwood Lollar, B. Hydrocarbon Gases in Hydrogeologically Isolated Fractures in Au Mines of the Witwatersrand Basin, South Africa: Potential Substrates for Deep Subsurface Microorganisms. American Geophysical Union Fall Meeting. Dec. 2001, San Francisco, CA.
- VanStone, N., Focht, R., Mabury, S., and B. Sherwood Lollar. Carbon isotopic enrichment: A toll for monitoring degradation of chlorinated ethylenes on iron PRB's and mineralization by microbial consortia. American Geophysical Union Fall Meeting. Dec. 2001, San Francisco, CA.
- Sherwood Lollar, B., Morrill, P., Slater, G.F., Lacrampe-Couloume, G., Edwards, E., Sleep, B., McMaster, M. and Major, D. Stable carbon isotope evidence for biodegradation of chlorinated hydrocarbons: Field corroboration of laboratory results. 20th International Meeting on Organic Geochemistry. Sept.10-14, 2001, Nancy, France.
- VanStone, N., Focht, R., Mabury, S., and B. Sherwood Lollar. Carbon isotopic enrichment of chlorinated ethenes during abiotic reduction on Fe⁰: A new tool for evaluating the efficiency of iron permeable reactive barriers. CRESTech Annual Networking Conference. Sept. 2001, Toronto, ON.
- Ward, J.A.M, Slater, G.F., Lacrampe-Couloume, G., and Sherwood Lollar, B. New information on hydrocarbon reaction mechanisms based on recent developments in compound specific hydrogen isotope analysis. 20th International Meeting on Organic Geochemistry. Sept.10-14, 2001, Nancy, France.
- VanStone, N., Focht, R., Mabury, S., and B. Sherwood Lollar. Carbon isotopic enrichment of chlorinated ethylenes during abiotic reduction on Fe⁰: Pathways of reaction. American Chemical Society Meeting. Aug. 26-30, 2001, Chicago IL.
- Morrill, P., Lacrampe-Couloume, G., and Sherwood Lollar, B. Purge and trap analytical technique developed to lower the detection limit of GC/C/IRMS headspace analysis for chlorinated solvents in aqueous solutions. Canadian Continuous Flow Users Meeting. Calgary, AB Aug. 12-15, 2001.
- VanStone, N., Focht, R., Mabury, S., and B. Sherwood Lollar. Carbon isotope enrichment of chlorinated solvents during abiotic reduction of Fe⁰: A new tool for evaluating the degradation efficiency of iron walls. First International Conference on Oxidation and Reduction Technologies for In Situ Treatment of Soil and Groundwater. June 26-29, 2001. Niagara Falls, NY.
- Jonker, H.R., van Breukelen, B., Meijer, H.A., Mancini, S., Sherwood Lollar, B., Volkering, F. and J. Groen. Identification and quantification of benzene/ethylbenzene degradation in a strongly reduced aquifer by combined compound specific analyses and groundwater dating. Fourth International Symposium on Applied Isotope Geochemistry (AIG IV). June 25-29, 2001. Pacific Grove, CA.
- Ballentine, C.J. and Sherwood Lollar, B. Nitrogen and helium in natural gases: Identifying the risk factors from a noble gas study of the Hugoton Panhandle Giant gas field. American Association of Petroleum Geologists Annual Meeting. June 2001, Denver CO
- Gray, J.R., Lacrampe-Couloume, G., Sherwood Lollar, B., Scow, K.M., MacKay, D., Wilson, R. and Gandhi, D. Carbon and hydrogen isotopic fractionation - A new assessment tool for biodegradation of MTBE. 6th International Symposium on In Situ and On-Site Bioremediation. June 4-7, 2001, San Diego CA.
- Volkering, F., Jonker, H., van Breukelen, B., Groen, J., Meijer, H.A.J., Sherwood Lollar, B. and Kramers, J.D. Isotope analysis: A promising tool in soil pollution research. 6th International Symposium on In Situ and On-Site Bioremediation. June 4-7, 2001, San Diego CA.
- Van Breukelen, B.M., Jonker, H., Mancini, S., Volkering, F., Meijer, H.A.J., Sherwood Lollar, B. and Groen, J. Evaluating anaerobic natural attenuation of benzene/ethylbenzene using natural isotopes. 6th International Symposium on In Situ and On-Site Bioremediation. June 4-7, 2001, San Diego CA.

- Morrill, P.L., Slater, G.F., Lacrampe-Couloume, G., Sleep, B., Edwards, E., Sherwood Lollar, B., McMaster, M. and Major, D. Isotopic evidence of reductive dechlorination, a field demonstration of bioaugmentation, Kelly AFB. 6th International Symposium on In Situ and On-Site Bioremediation. June 4-7, 2001, San Diego CA.
- Mancini, S.A., Stelfox, A.C., Ward, J.A.M., Ahad, J., Lacrampe-Couloume, G., Sleep, B., Edwards, E. and Sherwood Lollar B. Stable carbon and hydrogen isotope fractionation during anaerobic degradation of aromatic hydrocarbons. 6th International Symposium on In Situ and On-Site Bioremediation. June 4-7, 2001, San Diego CA.
- Graves, D., Hecox, G.R., Kirschenmann, K. and Sherwood Lollar, B. In situ vinyl chloride biodegradation revealed through carbon isotope composition. 6th International Symposium on In Situ and On-Site Bioremediation. June 4-7, 2001, San Diego CA.
- Onstott, T.C., Moser, D.P., DeFlaun, M., Pratt, L.M., and Sherwood Lollar, B. Geohydrological and biogeochemical subsurface environments within the Witwatersrand Basin, South Africa. ASM Annual Meeting. May 2001. Orlando FL.
- Sherwood Lollar, B., Lacrampe-Couloume, G., Ward, J.A. and Slater, G.F. Compound specific hydrogen isotope analysis: New insights into geochemical and biogeochemical reaction mechanisms. American Chemical Society Annual Meeting. April 1-5, 2001, San Diego CA.
- Lacrampe-Couloume, G., Ward, J.A.M, Mancini, S., Slater, G.F., Edwards, E. and Sherwood Lollar, B. Hydrogen and carbon isotope fractionation during anaerobic biodegradation of BTEX: Potential for field verification of bioremediation. Biotechnological Remediation of Water Pollution by Acid Inorganic and Aromatic Chlorinated Compounds. March 21-23, 2001. Leipzig, Germany.
- Slater, G.F., Sherwood Lollar, B., Sleep, B. and Edwards, E. Variation in stable carbon isotopic fractionation during reductive dechlorination of PCE. Geological Society of America Annual Meeting, Nov. 12-16, 2000, Reno, NV.
- Ward, J.A.M., Ahad, J.M.E., Lacrampe-Couloume, G., Slater, G.F., Edwards, E.A. and Sherwood Lollar, B. Hydrogen isotope fractionation during methanogenic degradation of toluene: Potential for direct verification of bioremediation. Geological Society of America Annual Meeting, Nov. 12-16, 2000, Reno, NV.
- Westgate, T. and Sherwood Lollar, B. Evidence for abiogenic synthesis of C1-C4 hydrocarbons in crystalline rock environments. Geological Society of America Annual Meeting, Nov. 12-16, 2000, Reno, NV.
- Wong, C.S., Mabury, S.A., Sherwood Lollar, B., Lacrampe-Couloume, G., Muir, D.C.G. Isotopic analysis of haloacetic acids using gas chromatography/combustion/isotope ratio mass spectrometry (GC/C/IRMS). Society of Environmental Toxicology and Chemistry 21st Annual Meeting, Nov.12-16 2000, Nashville, TN.
- Ward, J.A.M., Ahad, J.M.E., Lacrampe-Couloume, G., Slater, G.F., Edwards, E.A. and Sherwood Lollar, B. Hydrogen isotope fractionation during methanogenic degradation of toluene: Potential for direct verification of bioremediation. Goldschmidt 2000 - International Conference for Geochemistry. Oxford, UK, Sept. 2000.
- Slater, G.F., B. Sherwood Lollar, R. Allen-King and S. O'Hannesin. Carbon isotopic fractionation by zero-valent iron: Influence of surface pre-treatment. Goldschmidt 2000 - International Conference for Geochemistry. Oxford, UK, Sept. 2000.
- Wong, C.S., Mabury, S.A., Sherwood Lollar, B., Lacrampe-Couloume, G., and Muir, D. Stable isotope as a marker of environmental sources and processes of haloacetic acids. International Symposium on Haloacetic Acids and Shortchain Halocarbons: Sources and Fate in the Environment. Toronto, Ont. Aug. 27-29. 2000.
- Slater, G.F., B. Sherwood Lollar, Edwards, E., Sleep, B., Witt, M, Klecka, G.M., Harkness, M., Spivack, J. Carbon isotopic fractionation of chlorinated ethenes during biodegradation: Field applications. Second International Battelle Conference on Remediation of Chlorinated and Recalcitrant Compounds. Monterey, CA. May 2000.
- Slater, G.F., B. Sherwood Lollar, Edwards, E., Sleep, B. Stable isotope tracers of intrinsic biodegradation. Second International Battelle Conference on Remediation of Chlorinated and Recalcitrant Compounds. Monterey, CA. May 2000.

- Ahad, J., Sherwood Lollar, B., Edwards, E., Slater, G.F. and Sleep, B. Carbon isotopic fractionation during anaerobic biodegradation of BTEX: Implications for intrinsic bioremediation. Geological Society of America Annual Meeting. Denver, CO, Oct. 1999.
- Slater, G.F., Sherwood Lollar, B., Sleep, B., Edwards, E., and Lee, R.W. Isotopic Characterization of the Subsurface Fate of Chlorinated Ethenes. Geological Society of America Annual Meeting. Denver, CO, Oct. 1999.
- Ahad, J.M.E., Sherwood Lollar, B., Edwards, E.A., Slater, G.F. and Sleep, B.E. (1999) Monitoring the biodegradation of toluene using stable carbon isotopes: Implications for contaminated site assessment. 14th International Symposium on Environmental Biogeochemistry. Sept. 26-30, 1999. Deerhurst, Ontario, Canada.
- Slater, G.F., Sherwood Lollar, B., Edwards, E., Sleep, B.E. and Brown, A. (1999) Isotopic fractionation during reductive dechlorination by several microbial consortia. 14th International Symposium on Environmental Biogeochemistry. Sept. 26-30, 1999. Deerhurst, Ontario, Canada.
- Onstott, T.C., Moser, D.P., Sherwood Lollar, B., Slater, G.F., Deflaun, M.F., Hoek, J., and Pratt, L.M. (1999) The Witwatersrand Deep Microbiology Project: Groundwater geochemistry and potential biogeochemical processes. International Society for Subsurface Microbiology. Aug. 22-27, 1999. Vail, Colorado.
- Moser, D.P., Onstott, T.C., Pfiffner, S., White, D.C., Peacock, A., Phelps, T., Deflaun, M.F., Hoek, J., Ghiorse, W.C., Colwell, F., Kieft, T., Reysenbach, A.-L., Fredrickson, J.K., Southam, G., Kotelnikova, S., Omar, G., Slater, G.F., Pratt, L.M., Boone, D., Pedersen, K. and Sherwood Lollar, B. (1999). The Witwatersrand Deep Microbiology Project: A Window Into The Extreme Environment Of Deep Subsurface Microbial Communities. International Society for Subsurface Microbiology. Aug. 22-27, 1999. Vail, Colorado.
- Sherwood Lollar, B. and Ballentine, C.J. (1999) Nitrogen in the Hugoton/Panhandle Gas Field: Understanding its Origin and Isotopic Character by Combining Stable and Noble Gas Isotopes. American Association of Petroleum Geologists Hedburg Research Conference "Natural Gas Formation and Occurrence" June 6-11, 1999 Durango, Colorado.
- Ballentine, C.J. and Sherwood Lollar, B. The origin of helium associated nitrogen in mid-continent U.S. natural gases: The Hugoton/Panhandle Giant gas field. Geological Society of America Annual Meeting. Toronto. (Oct. 1998)
- Westgate, T. and Sherwood Lollar, B. Carbon isotopic and compositional evidence for inorganic synthesis of hydrocarbon gases. American Geophysical Union Spring Meeting, Boston, MA (May 1998).
- Slater, G.F., Dempster, H.D., Sherwood Lollar, B., Spivack, J., Brennan, M. and MacKenzie, P. (1998) Isotopic tracers of degradation of dissolved chlorinated solvents. First International Battelle Conference on Remediation of Chlorinated and Recalcitrant Compounds. Monterey, CA (May 1998).
- Sherwood Lollar, B., Ballentine, C., and O'Nions, R.K. (1998) Non-hydrocarbon gases in sedimentary systems - Evidence for mantle-derived CO₂ in the Pannonian Basin based on stable isotope signatures and C/He ratios. American Chemical Society Spring Meeting. Dallas, Tx. (March 1998).
- Ballentine, C., Sherwood Lollar, B., and Halliday, A. (1998) Non-hydrocarbon gases in sedimentary systems - Nitrogen gas sources in sedimentary basins of the western U.S. American Chemical Society Spring Meeting. Dallas, Tx. (March 1998).
- Taylor, S., Sherwood Lollar, B., Wassenaar, L. and J.M. Hendry. Bacterial hydrocarbon production in shallow bedrock aquifers and surficial till aquitards, Saskatchewan, Canada. Geological Society of America Annual Meeting. Salt Lake City (Oct. 1997).
- Slater, G.F., Dempster, H., Sherwood Lollar, B., Spivack, J., Brennan, M. and P. Mackenzie. Isotopic investigation of TCE degradation using GC/C/IRMS coupled with headspace analysis. Geological Society of America Annual Meeting. Salt Lake City (Oct. 1997).
- Ferris, F.G., Gerits, J.P., Sherwood Lollar, B., Schultze-Lam, S. Carbonate and silicate mineral deposition in a saline-alkaline lake microbial mat. XIII International Symposium on Environmental Biogeochemistry, Monopoli (Bari) Italy. (Sept. 1997).

Slater, G. F., Dempster, H. and Sherwood Lollar, B. Technical developments in applications of GC/C/IRMS to ¹³C analysis of low level dissolved chlorinated compounds. University of Waterloo Continuous Flow Isotopic Analysis (CFIRMS) Workshop, Waterloo (Aug. 1997).

INVITED LECTURES AND KEYNOTES

Sherwood Lollar, B. Natural hydrogen – towards developing a coherent Canadian natural strategy. Invited Presentation for the **Geologic Survey of Canada**. April 5, 2024. Virtual

Sherwood Lollar, B. Deep water cycle and evolving climate impacts. CIFAR Water and Climate Workshop. **UC Berkeley**, CA. March 2023.

Presentation to NASA – ESA Joint Mars Exploration Committee. “The abiotic/biotic filter step for Mars Sample return”. On behalf of the **NASA Jet Propulsion Lab** Mars Sample Return Planning Sample Safety Assessment Tiger team. Noordwyk, Netherlands. March 2024. Virtual.

Sherwood Lollar, B. Evolving Concepts of Planetary Habitability from Earth Analogue Environments. **Harvard Origins of Life Initiative, Astronomy Dept.** Harvard University, Cambridge, MA USA. Feb. 2024

Sherwood Lollar, B. Evolving Concepts of Planetary Habitability from Earth Analogue Environments. **Invited Visiting Professor** Jan 22-26, 2024. Leverhulme Centre for Life in the Universe. University of Cambridge, UK.

Presentation to NASA Mars Exploration Mission Directorate. “The abiotic/biotic filter step for Mars Sample return”. NASA Johnson Space Centre. Houston Tx. On behalf of the **NASA Jet Propulsion Lab** Mars Sample Return Planning Sample Safety Assessment Tiger team. Jan. 29 2024. In person.

Sherwood Lollar, B. The Expanse of Habitability: Earth Analog Discoveries drive New Conceptual Models of how to build a Habitable Planet. **Carl Sagan Lecture** American Geophysical Union Annual Meeting. Dec. 11 2023. San Francisco CA.

Sherwood Lollar, B. The Hidden Hydrogeosphere: The Search for Habitability and Subsurface Life. University of Ottawa Departmental Lecture. Nov 2023. Ottawa ON Canada.

Sherwood Lollar, B. The Hidden Hydrogeosphere: The Search for Habitability and Subsurface Life. IGP Univ. Paris Cite. Oct. 2023 Paris France.

Sherwood Lollar, B. Opportunities for decarbonization and the water cycle and recourse for the green energy transition. Accelerated Decarbonization meeting. IGP Univ. Paris Cite. Sept. 2023 Vancouver BC.

Sherwood Lollar, B. Exploring the Hidden Earth – Groundwaters and Deep Subsurface Life. **Invited**. CalTech Centre for Comparative Planetary Evolution. Division of Geological and Planetary sciences. CalTech. May 8 2023.

Sherwood Lollar, B. **Invited Panelist**. O’Neill Symposium: Space for the benefit of Earth. Hosted by Blue Origin and the Club for the Future April 24-26 2023. Blue Origin Orbital Manufacturing Complex and Launch Facility. Merritt Island, Florida.

Sherwood Lollar, B. Exploring the Hidden Earth – Groundwaters and Deep Subsurface Life. **Invited**. Vancouver Institute. Vancouver, BC. April 1, 2023.

Sherwood Lollar, B. The Hidden Hydrogeosphere and Biosphere: Implications for deep subsurface microbiology and the search for life. **Invited**. Dept. of CPS. UTM University of Toronto. Feb. 1, 2023.

Sherwood Lollar, B. Exploration of the Deep Subsurface Biosphere in Fracture Waters of the Precambrian Continents. **Invited**. Dept. of

Energy and Mineral Engineering. Penn State. State College PA Sept. 19, 2022.

Karolyt , R., Warr, O., Sherwood Lollar, B., and Ballentine, C. **Invited** Noble gas tracers as proxy to deep subsurface energy production and residence times. AGU Fall Meeting Chicago, IL. December 12-16, 2022.

M n z, B., Andreani, M., Sherwood Lollar, B., Pisipia, C., Richard, L., and Schmitt-Kopplin, P. Hydrogen promoted co-evolution of minerals and carbon in modern and ancient rocks. **Keynote**. Goldschmidt Annual Meeting. Honolulu HI. July 2022.

Sherwood Lollar, B. Opening Pandora's box – challenges and promise of a multi-element isotopologue future in organic geochemistry. **Keynote Gordon Research Conference** on Organic Geochemistry Holderness NH. July 2022.

Sherwood Lollar, B. Subsurface life on Earth and implications for other planets in the solar system. **Invited**. International Space Science Institute Game Changers Lecture Series. BERN CH. Dec. 16, 2021.

Sherwood Lollar, B. Earth's deep hydrogeosphere and deep biosphere: Implications for planetary exploration and astrobiology. **Invited**. York University CREATE Program. Dec. 10, 2021.

Sherwood Lollar, B. New models of habitability: Implications for prebiotic chemistry, abiotic organic synthesis and life sustained by radiolysis. **Invited Speaker**. Breakthrough Initiative and South African Astronomical Observatory 2nd Life in the Universe Nov 22, 2021.

Sherwood Lollar, B. Imaging Habitable Worlds – Lessons from the Deep Biosphere and Hydrogeosphere. **Keynote Lecture** on the opening of the new Peter Deines Isotope Mass Spectrometry Laboratory. Penn State. Oct. 28, 2021.

Sherwood Lollar, B. The deep subsurface biosphere. **Invited**. New Mars Underground ISSI (International Space Science Institute)/CIFAR Working Group Virtual Meeting. BERN CH. Oct. 19, 2021.

Sherwood Lollar, B. Life in diverse environments on earth and possibilities beyond. **Invited**. Sanford Underground Laboratory Executive Committee Meeting. Sept. 14, 2021.

Sherwood Lollar, B. Life in diverse environments on earth and possibilities beyond. **Invited**. CIFAR Joint meeting of Earth 4D and Fungal Kingdom Programs. Aug. 20, 2021.

Sherwood Lollar, B. Radiolysis: Implications for prebiotic chemistry and abiotic organic synthesis sustaining habitability. **Invited Talk** and Panelist for Geochemical Context for Prebiotic Plausibility. Cambridge University Initiative for Planetary Science and Life in the Universe (IPLU) July 21, 2021.

Ballentine, C.J., Sherwood Lollar, B. and Gluyas, J.G. Helium and hydrogen accumulation. **Invited Talk**. Goldschmidt Annual Meeting. Lyons France, July 4-9 2021.

Sherwood Lollar, B. The Hidden Hydrogeosphere: Implications for deep subsurface microbiology and the search for life. **Invited** seminar for UK-wide Earth2Earth Seminar Series sponsored jointly by the Universities of Oxford, Cambridge, Bristol and St. Andrews. Feb. 11, 2021.

Sherwood Lollar, B., Warr, O., Ballentine, C.J., Tarnas, J.D., Mustard, J.F. Stamenkovic, V., Ferguson, G., Kim, J., McIntosh, J.C., McDonnell, J. To impermeable, and beyond: Expanding conceptual models for the hidden hydrogeosphere. **Invited**. American Geophysical Union Fall Meeting. San Francisco, CA. Dec. 7-11, 2020.

Sherwood Lollar, B. Breaking the Wall of the Planetary Deep Subsurface. Falling Walls **Finalist**. Falling Walls Conference Berlin Science Week (Berlin, Germany) Nov. 2020.

Sherwood Lollar, B. "Ancient groundwaters and the implications for habitability of Earth and other planets and moons". **Invited Keynote**. 2020 Life in the Universe Symposium sponsored by the Breakthrough Initiatives, the South African Radio Astronomy Observatory, the South African Astronomical Observatory and the Palaeontological Scientific Trust. Virtual

symposium from Cape Town, South Africa. Nov. 4 2020.

Warr, O., Giunta, T., Onstott, T.C., Kieft, T.L., Harris, R.L., Nisson, D.M., Sherwood Lollar, B. Oxygen exchange in the hidden hydrogeosphere: Towards a new equilibrium? Geological Society of America 2020 Montreal, QC. virtual meeting, Oct. 26-30, 2020.

Sherwood Lollar, B. A deep dive into the subsurface biosphere and hidden hydrogeosphere. Global Climate Change **Invited** Speaker Series. University of Toronto. Sept. 2020.

Sherwood Lollar, B. Earth4D: A deep dive into the subsurface biosphere and hidden hydrogeosphere. Woods Hole Oceanographic Institution **Invited** Speaker Series. June 30, 2020.

Sherwood Lollar, B., Phillips, E., Ojeda, A.S., Chen, W., Gilevska, T. Quantification of transformation and transport across biogeochemical boundaries by multi-element CSIA. **Invited C.C. Patterson Medalist 2019**. Goldschmidt Annual Meeting 2020, Honolulu HI, June 21-26, 2020.

Sherwood Lollar, B., Exploration of Subsurface Habitability and Microbial Life in Deep Fracture Waters of the Precambrian Continents **Invited Speaker** Gallagher Colloquium Series, University of Calgary, Calgary AB. Jan. 16 2020.

Sherwood Lollar, B. Exploration of the deep hydrogeosphere in crystalline rocks. Implications for resources and for life. **Keynote**. United States Geologic Survey 27th Hubbert Quorum. Menlo Park CA. Dec. 8, 2019.

Sherwood Lollar, B. Multiple Isotope Patterns within Organic Compounds **Invited Panelist**. American Geophysical Union Annual Meeting San Francisco CA. Dec. 2019.

Sherwood Lollar, B. Looking Up (and Down) to the Stars: Adventures in exploration of the deep hydrogeosphere and deep subsurface biosphere. **Keynote**. 2019 BioZone Research Symposium. University of Toronto. Toronto ON. Nov. 2019

Sherwood Lollar, B. Exploration of Subsurface Habitability and Microbial Life in Deep Fracture Waters of the Precambrian Continents **Invited Speaker** Delaware Biotechnology Institute, University of Delaware. Oct. 2019.

Sherwood Lollar, B. Exploring the Earth's Deep Biosphere and Hydrogeosphere. **Keynote** Deep Carbon Observatory Final Symposium. Washington DC. Oct. 2019.

Ballentine, C.J., Cheng, A., Sherwood Lollar, B. and Warr, O. Release the Juice. **Keynote** Deep Carbon Observatory Final Symposium. Washington DC. Oct. 2019.

Warr, O., Sherwood Lollar, B., Fellows, J., Sutcliffe, C.N., McDermott, J.M., Holland, G., Mabry, J.C. and Ballentine, C.J. Using noble gases to investigate the carbon-rich ancient fluids of the deep subsurface. **Invited** Deep Carbon Observatory Final Symposium. Washington DC. Oct. 2019.

Cheng, A., Sherwood Lollar, B., Warr, O., Ferguson, G., and Ballentine, C.J. Determining the helium flux from the deep crystalline basement and the processes controlling its transport in overlying Paleozoic sedimentary basins. Geological Society of America Annual Meeting. Phoenix AZ. Sept. 2019.

Sherwood Lollar, B. Earth 4D - A deep dive into the Earth's deep biosphere and hydrogeosphere. **Keynote** 24th International Symposium on Environmental Biogeochemistry 2019, Potsdam Germany. Sept. 23-27, 2019.

Sherwood Lollar, B. Evolving perspectives on rock-hosted deep biospheres: Earth and Mars. **Invited Talk** AbSciCon 2019, Bellevue, Washington. June 24-28, 2019.

Sherwood Lollar, B. Biogeochemical processes in the deep subsurface – Progress in case studies relevant to a deep geologic repository for used nuclear fuel. **Invited Talk** Nuclear Waste Management Organization 17th Annual Geoscience Seminar. Toronto ON. June 4-5, 2019.

Sherwood Lollar, B. Subsurface habitability in the Earth's deep hydrosphere: Implications for planetary science and astrobiology. **Keynote** GAC-MAC Annual Meeting, Quebec City, QC. May 12-15, 2019.

Sherwood Lollar, B. Novel insights and emerging questions on the deep CH₄ methane from investigations in the world's oldest rocks. **Invited Lecture**. Methane on Earth: Global distribution, processes and importance. Hanse-Wissenschaftskolleg, Institute for Advanced Study (HWK) Delmenhorst, Germany. April 1-3, 2019.

Sherwood Lollar, B. Lessons from the Deep Earth for the Search for Life in the Solar System and Beyond. **Invited Talk** John's Hopkins Applied Physics Lab. Laurel, MD. Feb. 26 2019.

Sherwood Lollar, B. Exploration of the Earth's deep hydrogeosphere and subsurface microbial life. **Invited** Departmental Seminar University of Western Ontario, London, ON. Feb 7, 2019.

Sherwood Lollar, B., Atreya, S.K., Boss, A.P., Falkowski, P.G., Farmer, J.D., Guyon, O., Joyce, G.F., Kasting, J.F., Meadows, V.S., Neches, P.M., Pilcher, C.B., Renno, N.O., Rogers, K.L., Schmidt, B.E., Summons, R., Westall, F. and Wright, S.A. Astrobiology Science Strategy for the Search for Life in the Universe. **Invited Talk**. American Geophysical Union Fall Meeting. Washington, D.C. Dec 10-14, 2018.

Sherwood Lollar, B. Novel radiogenic end-members and chemolithotrophic ecosystems in the world's oldest rocks. **Invited Talk**. Princeton University. Princeton, NJ. Oct. 2018

Sherwood Lollar, B. Follow the carbon - Spatial and temporal constraints on habitability and carbon cycling in the Earth's continental lithosphere. **Keynote Gordon Research Conference** on Deep Carbon. Bryant College, Smithfield, RI. June 2018.

Sherwood Lollar, B. Exploration of subsurface habitability in deep fracture waters of the Precambrian continents – Analog studies for planetary sciences and astrobiology. **Invited Talk**. Brown University. Providence, RI. April. 2018

Sherwood Lollar, B. Habitability, microbial potential and activity in subsurface fracture fluids. **Keynote Gordon Research Conference** on Geobiology. Galveston, TX. Jan. 2018.

Sherwood Lollar, B. Exploration of Earth's Deep Subsurface Hydrosphere and Microbial Life. **Invited Departmental** University of Waterloo. Waterloo, ON. Jan. 2018

Sherwood Lollar, B. Exploration of subsurface habitability in deep fracture waters of the Precambrian continents – Analog studies for planetary sciences and astrobiology. **Invited Talk**. Applied Physics Laboratory, John's Hopkins University, Baltimore, MD. Jan. 2018

Warr, O., Guinta, T. and Sherwood Lollar, B. Exploring the ancient hydrosphere of the crystalline basement using geochemical footprints. **Invited Talk**. University of Innsbruck Seminar, Innsbruck, Austria. 11th January, 2018.

Sherwood Lollar, B. Exploration of Earth's Deep Subsurface Hydrosphere and Microbial Life. **Invited Colloquium** Oregon State University. Corvallis, OR Nov. 2017

Sherwood Lollar, B. Follow the Water: Exploration for habitability and microbial life in the Earth's deep subsurface. **Invited Colloquium** Department of Physics, University of Toronto. Toronto, ON. Sept. 2017

Lollar, G.S., Telling, J., Voglesonger, K., Warr, O. and Sherwood Lollar, B. Microbial metabolisms in ancient fracture fluids investigated via Most Probable Number Analysis. Goldschmidt Annual Meeting 2017, Paris, France, Aug. 13-18, 2017. (Invited poster)

Sherwood Lollar, B., Gilevska, T., Passetport, E., Lacrampe-Couloume, G. Effects of scale in high resolution compound specific stable isotope analysis. **Keynote** Isotopes 2017, Mt. Ascona, Switzerland. July 9-14, 2017.

B. Sherwood Lollar. Exploring the deep subsurface biosphere in the world's oldest rocks. **Keynote Gordon Research Conference** on

Applied and Environmental Microbiology. South Hadley, MA. July 16-21, 2017.

- B. Sherwood Lollar. "Follow the Water": Exploring the deep hydrogeosphere and the subsurface terrestrial biosphere. **Keynote** 67th Annual Conference of the Canadian Society of Microbiologists, Waterloo, Ontario, June 20-23, 2017.
- Warr, O., Giunta, T., and Sherwood Lollar, B. *Using geochemical footprints to explore the ancient hydrosphere of the crystalline basement*. APGO Networking Event, Timmins, Canada. 5th June, 2017.
- Sherwood Lollar, B., Li, L., Wing, B.A., Warr, O., Ballentine, C.J., Giunta, T., McDermott, J.M.M., Lollar, G.S., and Telling, J. Novel isotope discoveries on the biogeochemistry of the deep Earth and the habitability of planetary subsurface environments. **Invited**. AbSciCon 2017, Mesa, Arizona. April 24-28, 2017.
- B. Sherwood Lollar. Exploring the deep terrestrial hydrosphere and biosphere. **Invited** Annual Microbiology Society Meeting, Edinburgh, Scotland. April 3-6, 2017.
- Sherwood Lollar, B. and Ballentine, C.J. A vision of global synthesis of hydrogen, methane and higher hydrocarbon production and distribution over time constrained via noble gases. **Invited** Third DCO International Science Meeting, St. Andrews, Scotland, March 23-25, 2017.
- Warr, O., Sherwood Lollar, B., Fellowes, J., Sutcliffe, C., McDermott, J., Holland, G., Mabry, J. and Ballentine, C.J. The role of noble gases in interpreting deep carbon-rich systems in the crystalline basement. **Invited** Third DCO International Science Meeting, St. Andrews, Scotland, March 23-25, 2017.
- Ladau, J., Magnabosco, C., Ruff, E., Colwell, F., D'Hondt, S., Gaidos, E., Grim, S., Kieft, T., Leon Zayas, R., Lloys, K., Onstott, T.C., Kiel Reese, B., Rogers, K., Schrenk, M., Sherwood Lollar, B., Soares, A., Sogin, M. Exploring ecological patterns of Earth's subsurface life. **Invited** Third DCO International Science Meeting, St. Andrews, Scotland, March 23-25, 2017. (poster)
- Passeport, E., Landis, R., Lacrampe-Couloume, G., Lutz, E.J., Mack, E.E., West, K., Morgan, S., and Sherwood Lollar, B. Coupling of high resolution pore water sampling and Compound Specific Isotope Analysis to monitor sediment natural attenuation. **Invited** 2017 RemTEC Summit, Denver, CO, March 7-9, 2017.
- B. Sherwood Lollar. Microbial Life in the world's oldest rocks: Potential preservation signals. **Invited** Mars Exploration Advisory Group Rock-Hosted Life Virtual Workshop. Feb. 8, 2017.
- B. Sherwood Lollar. **Invited**. Departmental Seminar Series. California Institute of Technology, Pasadena CA. January 2017.
- B. Sherwood Lollar. **Invited**. Captain Nemo was right – Exploring the deep biosphere. Royal Canadian Institute Lecture. Jan. 2017.
- B. Sherwood Lollar. Exploration Frontiers for Deep Fluids and Deep Life in the World's Oldest Rocks? **Invited**. Departmental Seminar Series. Dept of Earth and Planetary Sciences Northwestern University, Evanston, IL. October 2016.
- Onstott, T.C., Magnabosco, C., Lau, C.Y.M., Kieft, T.L., van Heerden, E., Dong, H., Lin, L-H, Pedersen, K., Ghiorse, W. and Sherwood Lollar, B. The biomass and biodiversity of the Continental subsurface biosphere. **Invited**. Goldschmidt 2016, Yokohama, Japan, June 26-July 1, 2016.
- B. Sherwood Lollar. Follow the Water – time constraints of deep old groundwater and subsurface life. **Invited**. Origins and Movements of Subsurface Microbes Workshop. Deep Carbon Observatory Deep Life and C-DEBI sponsored workshop. USC Los Angeles CA. June 2016.
- Musa, M. Sherwood Lollar, B., Onstott, T.C. and van Heerden, E. Seismic detection to map potential conduits for methane in deep gold mines in the Witwatersrand basin, South Africa **Invited**. European Association of Geoscientists and Engineers. Vienna Austria May 2016.
- Ballentine, C.J., Warr, O., Sutcliffe, C.N., McDermott, J.M., Fellowes, J., Holland, G., Mabry, J.C., and Sherwood Lollar, B. **Invited**. Deep

ancient fluids in the continental crust and their impact on near-surface economic, environmental and biological systems. European Geosciences Union (EGU) General Assembly 2016, Vienna, Austria April 17-22, 2016.

Sherwood Lollar, B., Wang, D., Gruen, D., Ono, S., Young, E., Rumble, D., McDermott, J., *Sutcliffe, C.*, Ballentine, C.J., Warr, O., Holland, G. **Invited**. New developments in stable isotope investigations of fugitive gases. International Atomic Energy Agency Technical Consultants Meeting. Vienna, Austria. March 2016.

Sherwood Lollar, B., *Sutcliffe, C., Glein, C., McDermott, J.*, Ballentine, C.J., *Warr, O.*, Onstott, T.C., Moser, D. and Fisher, J. **Invited**. Understanding the global distribution of ancient groundwater: Implications for subsurface life on Earth and Mars. Departmental Seminar. Dept of Chemical Engineering and Applied Chemistry. University of Toronto. March 2016.

Sherwood Lollar, B., *Sutcliffe, C., Glein, C., McDermott, J.*, Ballentine, C.J., *Warr, O.*, Onstott, T.C., Moser, D. and Fisher, J. **Invited**. Exploration of the deep hydrosphere and subsurface life. Departmental Seminar. Dept of Chemistry. University of Toronto. January 2016.

Sherwood Lollar, B. Quantifying the depth and volume of the Earth's deep hydrosphere. **Invited**. Royal Society (United Kingdom) Discussion Meeting "The origin, history and role of water in the evolution of the inner solar system" Royal Society Kavli Hall, Buckinghamshire, UK. Feb. 2016.

Sherwood Lollar, B. Deep subsurface habitability of the Precambrian continents. **Invited Seminar**. Imperial College London, UK. Jan. 2016.

Sherwood Lollar, B. Exploration of the deep hydrosphere and subsurface life in Precambrian continents. **Invited Seminar**. Oxford University, UK. Nov. 2015.

Onstott, T.C. Lau, C.Y.M., Magnabosco, C., Slater, G.F., Sherwood Lollar, B., Kieft, T.L., Stepanauskas, R., van Heerden, E., Borgonie G. The deep continental biosphere: Abundance, diversity and activity. **Invited**. Geological Society of America Annual Meeting. Baltimore MD. Nov. 2015.

Kieft, T.L., Onstott, T.C. Lau, C.Y.M., Magnabosco, C., Slater, G.F., Sherwood Lollar, B., Stepanauskas, R., van Heerden, E. Microbial carbon cycling in the deep biosphere of the Kaapval Craton, South Africa. **Invited**. Geological Society of America Annual Meeting. Baltimore MD. Nov. 2015.

Sherwood Lollar, B. Recent advances in clumped isotopes for elucidating the origin of methane. **Invited**. INTRA Workshop on Position Specific Isotope Techniques. Aix-en-Provence, France. Oct. 2015

Sherwood Lollar, B. Exploration of the Earth's Deep Hydrosphere and Biosphere. **Invited**. Departmental Lecture Series. SUNY Buffalo, NY. Sept. 2015.

Sherwood Lollar, B., *Sutcliffe, C.N., McDermott, J.M., Glein, C.R., Warr, O., Onstott, T.C., Ballentine, C.J.* Contributions to abiotic and biological deep carbon cycling from H₂ sources in the Precambrian continental lithosphere. **Keynote**. Goldschmidt 2015. Prague, CZ. Aug. 16-21, 2015.

Sherwood Lollar, B. *Sutcliffe, C., McDermott, J. Glein, C., Ballentine, C.J., Warr, O., Onstott, T.C., Lau, C.Y.M., Magnabosco, C., and Moser, D.P.* The Other Deep Biosphere: Deep fracture fluids of the Precambrian. Helmholtz Institute Potsdam Germany. June 23 2015

Sherwood Lollar, B. *Sutcliffe, C., McDermott, J. Glein, C., Ballentine, C.J., Warr, O., Onstott, T.C., Lau, C.Y.M., Magnabosco, C., and Moser, D.P.* The Other Deep Biosphere: Deep fracture fluids of the Precambrian. MARUM Seminar Hinrichs Lab Bremen Germany. June 2 2015

Sherwood Lollar, B. *Passeport, E., Horst, A. and Lacrampe-Couloume, G.* New developments in CSIA for halogenated organic hydrocarbons: from groundwater to surface water to atmosphere. Helmholtz Institute UFZ Leipzig, Germany. May 2015.

Sherwood Lollar, B., *Sutcliffe, C.*, Ballentine, C.J., Onstott, T.C., Lau, C.Y.M., Magnabosco, C., Slater, G.F., and Moser, D.P. Search for life in deep time and space: The role of Precambrian rocks in analogue research. **Invited.** American Geophysical Union Fall Meeting. San Francisco, CA. Dec. 14-19, 2014.

Sherwood Lollar, B., *Sutcliffe, C.*, Ballentine, C.J. Warr, O., *Li, L.*, Ono, S., and Wang, D.T. Deep carbon cycling in the deep hydrosphere: Abiotic organic synthesis and biogeochemical cycling. **Invited.** American Geophysical Union Fall Meeting. San Francisco, CA. Dec. 14-19, 2014.

Morrill, P.L., Rietze, A., Kohl, L., Miles, S., Cox, A., Cumming, E., Brazelton, W.J., Suzuki, S., Sherwood Lollar, B., Schrenk, M.O., Neelson, K.H., Ziegler, S, Lang, S.Q. Microbial substrate utilization at sites of continental serpentinization: The Tablelands, NL, CAN and the Cedars, CA, USA. **Invited.** American *Geophysical* Union Fall Meeting. San Francisco, CA. Dec. 14-19, 2014.

Sherwood Lollar, B. Twenty Year Legacy of CSIA in the Environment. **Invited.** European Union Marie-Curie Integrated Training Network CSI Environment Final Meeting. Obernai, France. Oct. 2014

Ballentine, C.J., Sherwood Lollar, B, *Lacrampe-Couloume, G.*, *Sutcliffe, C.*, Holland, G., Zhou, Z., *Li, L.*, Fellowes, J., Warr, O. Determining the role of water in hydrocarbon-rich crustal systems. **Invited.** Pardee Keynote Symposia (GSA). Vancouver, B.C. October, 19-22, 2014.

Sherwood Lollar, B. Carbon-bearing Fluids in Precambrian Rocks: Deep Energy for Deep Life. **Invited.** Deep Carbon Short Course. Vancouver, B.C. October, 19-22, 2014.

Mancini, S.A., *Passeport, E.* and Sherwood Lollar, B. The Use of CSIA to investigate sources and degradation of chlorobenzenes. Consortium on Groundwater Remediation. **Invited.** Denver, CO. Oct. 2014

Onstott, T.C., Lau, M.C.Y., Magnabosco, C., Lindsay, M., Alleva, R., Tetteh, G., Kieft, T.L., Pullin, M.J., Hendrickson, S., Cameron, C., Schilkey, F.D., Grim, S., Morrison, H., Sogin, M., Kuloyo, O., Linage-Alvarez, B., Cason, E., Erasmus, M., van Heerden, E., Borgonie, Slater, G.F., *Simkus, D.*, *Lacrampe-Couloume, G.*, Sherwood Lollar, B., Labonté, J. and Stepanauskas, R. Does Your Deep Biosphere differ from My Deep Biosphere? What Comparative Genomics Tells Us. **Invited.** 10th International Congress on Extremophiles. Saint Petersburg, Russia. Sept. 7-11, 2014.

Sherwood Lollar, B., Holland, G., *Li, L.*, *Lacrampe-Couloume, G.*, Slater, G.F., Onstott, T.C. and Ballentine, C.J. Tracers in the Deep: Ancient waters and subsurface microbiology of the Precambrian Shields. **Invited.** Helmholtz Institute, Leipzig, Germany. Sept. 2014.

Ono, S., Wang, D., Gruen, D., Sherwood Lollar, B., McManus, B., Zahniser, M., Nelson, D. Measurements of clumped methane isotopologue (¹³CH₃D) by tunable mid-infrared laser direct absorption spectroscopy. **Invited.** The 7th International Symposium on Isotopomers. Tokyo, Japan. July 1-4, 2014.

Ono, S., Wang, D., *Gruen, D.*, Sherwood Lollar, B., McManus, B., Zahniser, M. and Nelson, D. Measurements of clumped methane isotopologue (¹³CH₃D) by tunable mid-infrared laser spectroscopy. **Keynote.** 24th Annual V.M. Goldschmidt Conference. Sacramento, CA. June 8-13, 2014.

Sherwood Lollar, B., Holland, G., *Li, L.*, *Lacrampe-Couloume, G.*, Slater, G.F., Onstott, T. C., and Ballentine, C.J. Ancient waters of the Precambrian Shields: Implications for subsurface life and astrobiology. **Invited.** NSERC CREATE Canadian Astrobiology Training Program (CATP) Annual Meeting, Montreal, QC. June 2-4, 2014.

Sherwood Lollar, B. Exploring the Biotic/Abiotic Fringe: Integration of Deep Life and Deep Energy. **Keynote.** Deep Energy- Deep Life Joint Workshop Deep Carbon Observatory and Sloan Foundation, Lyon, France April 8, 2014

Sherwood Lollar, B. Insights into enzymatic transformation of organic contaminants using CSIA. **Invited.** Gordon Research Conferences on Isotopes in Chemical and Biological Sciences, Galveston, TX. Feb. 2-7, 2014.

Sherwood Lollar, B., Holland, G., *Li, L.*, *Lacrampe-Couloume, G.*, Slater, G.F., Onstott, T. C., and Ballentine, C.J. **Invited.** Deep mining

exploration reveals ancient waters of the Precambrian Shield. The Toronto Geological Discussion Group (TGDG), Toronto, ON. Jan 21, 2014.

Sherwood Lollar, B., Ballentine, C.J., Holland, G., *Li, L.*, Slater, G.F. and Moser, D.P. The deep cool Terrestrial Biosphere: Habitability of ancient fracture waters of the Canadian Shield. **Invited**. American Geophysical Union Annual Fall Meeting, San Francisco, CA. Dec. 9-13, 2013.

Sherwood Lollar, B. Continental lithosphere doubles global hydrogen flux estimates for the deep biosphere. Massachusetts Institute of Technology **Invited** Seminar. Nov. 2013

Sherwood Lollar, B. Ancient water of the Precambrian Shield: Implications for subsurface life and Astrobiology. **Invited**. NASA Astrobiology Institute Directors Seminar Series, Mountain View, CA. Nov. 25, 2013.

Sherwood Lollar, B. New view of reduced gas flux from the Precambrian Continental Lithosphere. Centre for Global Change Science Distinguished Lecturer Series. **Invited**. University of Toronto, Toronto, Canada. Oct. 1, 2013.

Sherwood Lollar, B. Ancient water of the Precambrian Shield: Implications for subsurface life and Astrobiology. **Invited**. Origins Institute Lecture Series, McMaster University, Hamilton, Canada. Sept. 30, 2013.

Sherwood Lollar, B., *Brisco, T., Esen, B. and Lacrampe-Couloume, G.* Billion year old cratons provide clues for habitability of subsurface waters and reduced gases on Mars. **Keynote**. NASA Workshop on Analog Sites for Mars Missions II. Washington DC. Aug. 2013

Sherwood Lollar, B., Onstott, T.C., van Heerden, E., Kieft, T. and Ballentine, C.J. Serpentinization in space and time; Hydrogen flux and energy budget from the terrestrial deep subsurface. Deep Carbon Observatory International Science Meeting– Sloan Foundation Symposium. National Academy of Sciences, Washington D.C., March 3-5, 2013

Sherwood Lollar, B., Onstott, T.C., van Heerden, E., Kieft, T. and Ballentine, C.J. Serpentinization in space and time; A hydrogen energy budget for methane production. DCO Deep Energy Workshop– Sloan Foundation. University of Manchester, United Kingdom. Jan.31-Feb. 1, 2013

Sherwood Lollar, B., Onstott, T.C., van Heerden, E., Kieft, T. and Ballentine, C.J. Life in Inner Space – Subsurface Microbiology Investigations in Underground Research Laboratories and Deep Mines **Invited**. American Geophysical Union Annual Fall Meeting, San Francisco, CA. Dec. 3-7, 2012.

Sherwood Lollar, B. Emerging Trends in CSIA for Environmental Forensics and Bioremediation. University of Toronto, School of the Environment Seminar Series. Toronto Canada Nov. 21, 2012.

Sherwood Lollar, B. Follow the Water - Exploration of the Deep Terrestrial Biosphere. Joint Seminar for the Dept. of Geosciences and Institute for Environmental and Engineering Sciences. University of Stockholm. Sweden. Oct. 2012

Sherwood Lollar, B., Onstott, T.C., Kieft, T.L., *Li, L.*, van Heerden, E., Slater, G.F., Moser, D.P., *Lacrampe-Couloume, G.*, Holland, G. and Ballentine, C.J. **Invited**. Network of terrestrial subsurface sites in Precambrian Shields: Insights for early Earth and Mars. 22nd Annual V.M. Goldschmidt Conference, Montreal, Quebec, June 24-29, 2012.

Sherwood Lollar, B. Compound Specific Isotope Analysis of Organic Contaminants in Water. Polytechnic University of Milan. Milan Italy. June 2012.

Sherwood Lollar, B. Serpentinization in space ... and time. University of Lyon, France Departmental Seminar Series. May 2012.

Sherwood Lollar, B. Tracers in the Deep. Isotopic insights into subsurface energy for life and microbial metabolism. **Invited**. Seattle, WA. Nov. 2011.

Sherwood Lollar, B., van Heerden, E., Onstott, T.C., Kieft, T.M., Itavaara, M. (2011) Follow the water – a search strategy for

exploration of the Earth's deep biosphere. **Keynote.** Pardee Symposium, Geological Society of America Annual Meeting. Minneapolis, MN. Oct. 2011.

Sherwood Lollar, B., van Heerden, E., Onstott, T.C., Kieft, T.M. (2011) Underground research laboratories and deep mines as a window into subsurface microbiology. **Keynote.** 12th International Conference on Topics in Astroparticle and Underground Physics. Munich, Germany. Sept. 5-9, 2011

Sherwood Lollar, B. Tracers in the Deep. Isotopic insights into subsurface energy for life and microbial metabolism. **Keynote.** International Symposium on Subsurface Microbiology. Garmisch-Partenkirchen, Germany. Sept. 11-16, 2011.

Sherwood Lollar, B. Emerging trends in contaminants research from CSIA. **Invited.** CSI-Environment Meeting. Prague CZ. Aug. 19-20, 2011

Sherwood Lollar, B. Biosignatures and Clues to Life: Implications for Origins of Life and Bioastronomy. **Invited** Introductory Talk. Origins 2011 Joint Meeting of the ISSOL (International Astrobiology and Origins of Life Society) and Bioastronomy Society. Montpellier, FR. July 3-8, 2011.

Sherwood Lollar, B. **Invited Panel Presentation** CSIA: Monitoring and Assessing Biogeochemical Processes. Battelle International Symposium on Bioremediation and Sustainable Environmental Technologies, Reno, NV. June 27-30, 2011.

Mundle, S.O.C., Johnson, T., Lacrampe-Couloume, G., Duhamel, M., Perez-de-Mora, A., Edwards, E.A., Kluger, R., Sherwood Lollar, B., Tiedeman, C. R., Revesz, K., Imbrigiotta, T. E., Cox, E. Using ¹³C isotope signatures of ethene as a direct indicator to assess the accumulation of toxic daughter products of trichloroethene. **Invited.** Battelle International Symposium on Bioremediation and Sustainable Environmental Technologies, Reno, NV. June 27-30, 2011.

Chan, C.H., Tang, S., Eckert, T., Lacrampe-Couloume, G., Edwards, E.A., Sherwood Lollar, B. Compound specific isotope analysis on biotic degradation of chloroform and implication for monitoring anthropogenic-sourced trichlorinated carbon compounds. **Invited.** Battelle International Symposium on Bioremediation and Sustainable Environmental Technologies, Reno, NV. June 27-30, 2011.

Elsner, M., Lacrampe-Couloume, G., Mancini, S., Burns, L. and Sherwood Lollar, B. The use of compound specific isotope analysis (CSIA) to distinguish between biotic and abiotic degradation of chlorinated hydrocarbons in the field. **Invited.** Battelle International Symposium on Bioremediation and Sustainable Environmental Technologies, Reno, NV. June 27-30, 2011.

Sherwood Lollar, B. Far Field Microbiological considerations relevant to a deep geological repository: Nuclear Waste Management Organization **Invited.** The 9th Annual NWMO Geoscience Seminar. Hockley Valley, ON. June 6-8, 2011.

Sherwood Lollar, B. Insights into deep carbon and subsurface microbial life derived from noble gases. **Invited Departmental Seminar.** Institute de Physique du Globe (IPGP), Universite de Paris, Paris France. April 2011.

Sherwood Lollar, B., Ballentine, C.J., and Shock, E. Deep Horizons: Research themes within the Deep Carbon Observatory and links to astrobiology. **Invited.** Webinar for Canadian Astrobiology Training Program (NSERC Create). March 2011.

Sherwood Lollar, B., Ballentine, C.J., and Shock, E. Deep Horizons - Implications of the deep carbon cycle for life, energy and the environment. **Invited.** American Geophysical Union Annual Fall Meeting, San Francisco, CA. Dec. 13-17, 2010.

Sherwood Lollar, B. and Ballentine, C.J. Moving beyond tracers: ¹³C insights into carbon sequestration. **Keynote.** Geological Society of America Annual Meeting Denver, CO. Oct. 31-Nov. 3, 2010.

Sherwood Lollar, B. Noble gas-derived insights into carbon cycling into the deep biosphere. **Invited.** Washington University at St. Louis, Departmental Seminar St. Louis, Oct. 2010.

Sherwood Lollar, B. Beyond the Deep Hot Biosphere: Subsurface Microbiology of the Deep Continents. **Invited.** Gordon Research Conference in Organic Geochemistry. Holderness NH. Aug. 1-6, 2010

- Sherwood Lollar, B. and Ballentine, C.J. Moving beyond tracers: 13C insights into carbon sequestration. **Keynote-1** 20th Annual V. M. Goldschmidt Conference, Knoxville TN June 21-25, 2010.
- Ballentine, C.J. and Sherwood Lollar, B. Noble gas isotope insights into the geological storage of carbon. **Keynote-2** 20th Annual V. M. Goldschmidt Conference, Knoxville TN June 21-25, 2010.
- Sherwood Lollar, B., McKelvie, J., *Elsner, M., Mancini, S., Johnson, T.*, Simpson, M., Simpson, A., Edwards, E., Gossett, J., Jennings, L., Spain, J. and Cox, E. **Invited**. New developments in forensic evaluation of contaminant sources and microbial degradation pathways using CSIA. Seventh International Battelle Conference on Remediation of Chlorinated and Recalcitrant Compounds. Monterey, CA. May 2010.
- Sherwood Lollar, B. Noble gas-derived insights into carbon cycling into the deep biosphere. **Invited**. Penn State Departmental Colloquium. April 2010. State College, PA.
- Sherwood Lollar, B., Morrill, P.L., Cody, G.D., Fogel, M.L., Lacrampe-Couloume, G., McCollom, T.M., Seewald, J.S., Weinberger, D. **Invited**. Bridging the gap between experimental and field investigations of abiotic hydrocarbon synthesis. ABSCICON 2010. Astrobiology Science Conference. League City Tx. April 26-29, 2010.
- McCollom, T.M., Sherwood Lollar, B., *Lacrampe-Couloume, G.*, and Seewald, J.S. **Invited**. The role of carbon source in abiotic hydrocarbon synthesis and isotope fractionation under hydrothermal conditions. ABSCICON 2010. Astrobiology Science Conference. League City Tx. April 26-29, 2010.
- Sherwood Lollar, B. **Invited**. Astrobiology: The Search for Signs of Life in Outer and Inner Space. Presentation to Canadian Institute for Advanced Research (CIFAR) Board. Petroleum Club. Calgary AB. Oct 2009.
- Sherwood Lollar, B. **Invited**. Astrobiology - the Study of Life in the Universe. Presentation to Canadian Institute for Advanced Research (CIFAR) Board. Toronto ON. June 2009.
- Ballentine, C.J., Gilfillan, S.M.V., Sherwood Lollar, B., Holland, G., Blagburn, D., Stevens, S., Schoell, M., Cassidy, M., Ding, Z., Zhou Z. and *Lacrampe-Couloume G.* **Invited**. Carbon dioxide gas fields: A science gold mine. The 10th International Conference on Gas Geochemistry (ICGG). Cluj-Napoca, Romania. Sept. 14-21, 2009.
- Sherwood Lollar, B., *Tille, S., Moran, J., Voglesonger, K., Lacrampe-Couloume, G.*, Onstott, T.C. and Slater, G.F. (2009) The deep cool terrestrial biosphere: Fracture waters and dissolved gases at > 2.5 km in the Canadian Shield. **Invited**. 19th Annual V. M. Goldschmidt Conference, Davos, Switzerland. June 21-26, 2009.
- Gilfillan, S.M.V., Sherwood Lollar, B., Holland, G., Blagburn, D., Stevens, S., Schoell, M., Cassidy, M., Ding, Z. *Lacrampe-Couloume, G.*, Zhou, Z. and Ballentine, C.J. CO₂ dissolution in formation water dominant sink in natural gas fields. **Invited**. 19th Annual V. M. Goldschmidt Conference, Davos, Switzerland. June 21-26, 2009.
- Sherwood Lollar, B., Tille, S., Moran, J., Voglesonger, K., Lacrampe-Couloume, G., Onstott, T.C., Pratt, L.M. and Slater, G.F. (2009). **Invited**. Hydrogeologic Controls on the Deep Terrestrial Biosphere - Chemolithotrophic Energy for Subsurface Life on Earth and Mars. American Geophysical Union Spring Meeting. May 24-27, 2009. Toronto, ON Canada.
- Sherwood Lollar, B. Earth subsurface analogues and relevance for Martian methane. **Invited Lecture** to CIFAR Astrobiology Workshop. Toronto ON. April 2009.
- Sherwood Lollar, B., Edwards, E., Hirschorn, S., Mancini, S., and Devine, C. Compound Specific Stable Isotope Fractionation to Distinguish Metabolic Pathways in Microbial Systems. **Invited Lecture**. REMTEC 09. Atlanta GA. March 3-5, 2009.
- Edwards, E. and Sherwood Lollar, B. Compound Specific Isotope Analysis as a natural reaction probe for delineation of microbial degradation pathways. **Invited**. REMTEC 09. Atlanta GA. March 3-5, 2009.

- Sherwood Lollar, B. Tracers in the deep: Isotopic and geochemical evidence for H₂ autotrophy and methanogenesis in the deep subsurface. **Invited Lecture.** Arizona State University. Tempe AZ March 2009.
- Sherwood Lollar, B. Tracing contaminant source and fate in groundwater using compound specific isotope analysis. University of Florida Hubbell **Distinguished Lecture.** Feb. 2009. Gainesville, FL.
- Sherwood Lollar, B. Stable isotopes to determine the origin of hydrocarbon gases. **Invited Lecture** to NWMO (Nuclear Waste Management Organization) Toronto ON. Jan. 2009
- Sherwood Lollar, B., McCollom, T., Seewald, J.S. and *Lacrampe-Couloume, G.* Abiotic Organic Hydrocarbon Chemistry of the Terrestrial Deep Subsurface: Isotopic Constraints on Reaction Mechanisms. **Invited.** American Geophysical Union Fall Meeting. San Francisco, CA. Dec. 15-19, 2008.
- McKelvie, J., Mackay, D., Scow, K., Kaiser, P.* and Sherwood Lollar, B. 2008. Quantification of *in situ* biodegradation rates of groundwater contaminants using laboratory-derived isotopic enrichment factors. **Invited.** Geological Society of America Annual Meeting. Houston TX. Oct. 5-9, 2008.
- Ballentine, C.J., Gilfillan, S., Holland, G., Zhou, Z., Sherwood Lollar, B. And Cassidy, M. 2008. The geological storage of CO₂: Quantification of natural gas/groundwater interaction. **Keynote.** 18th Annual V. M. Goldschmidt Conference, Vancouver BC July 13-18, 2008.
- Sherwood Lollar, B. Deep abiotic synthesis of organic molecules, and the abiotic-biotic controversy. **Keynote.** Deep Carbon Cycle Sloan Foundation Workshop. Carnegie Institute of Washington. May 15-17, 2008.
- Sherwood Lollar, B. Using stable carbon and hydrogen isotope analysis to characterize microbial degradation of organic contaminants in groundwater. Electron Transfer Processes at Biogeochemical Gradients Workshop. **Invited Keynote.** UFZ Leipzig, Germany. March 4-7, 2008.
- Sherwood Lollar, B. Compound Specific Isotope Geochemistry for Assessment and Quantification of Remedial Performance. **Invited.** Partners in Environmental Technology Technical Symposium and Workshop. SERDP-ESTCP. Washington DC. Dec. 4-7, 2007.
- Sherwood Lollar, B. *Mancini, S., Morrill, P., Elsner, M.E., VanStone, N., Chartrand, M.M.G., Hirschorn, S., McKelvie, J., Lacrampe-Couloume, G.,* Edwards, E. The role of vital effects on stable carbon isotope fractionation during transformation of hydrocarbon contaminants in groundwater: Implications for identification of reaction pathways and quantification. **Keynote** International Workshop on Stable Isotope Tools for the Assessment of Chemical and Microbial Transformation Reactions in Complex Natural and Contaminated Environments. Swiss Federal Institute of Technology (ETH) Zurich Mt. Verita CH Nov. 18-23, 2007.
- Sherwood Lollar, B., *Chartrand, M.M.G., Hirschorn, S., Howlett, M.,* Bidleman, T., Jantunen, L., *Mancini, S., McKelvie, J., Lacrampe-Couloume, G.* and Edwards, E.A. Compound Specific Stable Isotope Analysis: Research Frontiers in Isotope Hydrology and Water Resources Management. **Invited Keynote.** International Symposium on Advances in Isotope Hydrology and its Role in Sustainable Water Resources Management. Vienna Austria. May 21-25, 2007.
- Sherwood Lollar, B. Tracers in the Deep: Hydrogeologic controls on release of H₂ energy for deep subsurface life. **Invited.** Stanford University Oceans Seminar Series. Palo Alto, CA. April 2007.
- Elsner, M., Cwiertny, D.M., *Chartrand, M.M.G., Lacrampe-Couloume, G.,* Roberts, A.L. and Sherwood Lollar, B. Probing oxide surface reactivity with organic contaminants: From kinetic and product studies to stable isotope fractionation. **Invited.** American Chemical Society Annual Spring Meeting. Chicago, IL. March 25-29, 2007. Awarded **American Chemical Society Division of Environmental Chemistry Certificate of Merit**
- Sherwood Lollar, B. Life's Chemical Kitchen: Support of deep terrestrial subsurface life by abiogenic hydrogen and hydrocarbons. **Invited.** United States Geological Survey Western Region Colloquim Seminar Series. Menlo Park, CA. March 19, 2007.

- Sherwood Lollar, B. Hydrogen-rich fluids in the deep earth: Potential for chemoautotrophy. **Royal Society of Canada - Science Council of Japan WISET Invited Lecture.** Tokyo Institute of Technology, Tokyo, Japan. Jan. 2007.
- Sherwood Lollar, B. Stable Isotope Geochemistry and Groundwater Remediation. **Royal Society of Canada - Science Council of Japan WISET Invited Lecture.** Ochanomizu University, Tokyo, Japan. Jan. 2007.
- Sherwood Lollar, B. Hydrogen-rich fluids in the deep earth: Potential for chemoautotrophy. **Royal Society of Canada - Science Council of Japan WISET Invited Lecture.** Japan Agency for Marine-Earth Science & Technology (JAMSTEC) Yokohama, Japan. Jan. 2007.
- Sherwood Lollar, B. Challenges for Women in Science and Engineering in Canada. **Royal Society of Canada - Science Council of Japan WISET Invited Lecture.** National Womens' Education Centre (NWEC) Saitama, Japan. Jan. 2007.
- Sherwood Lollar, B., Lacrampe-Couloume, G., Slater, G.F., Telling, J. and Voglesonger, K. H₂-rich fluids in the deep Earth: Potential for chemoautotrophic microbial ecosystems. Origins Institute **Invited Seminar.** McMaster University, Hamilton, ON. October 2006.
- Sherwood Lollar, B. Lacrampe-Couloume, G., Telling, J., Slater, G.F. and McCollom, T.M. Compound specific isotope analysis and the challenge for identifying life: the role of biosignatures and abiosignatures. **Invited.** 16th Annual V. M. Goldschmidt Conference, Melbourne Australia. Aug. 2006.
- Onstott, T.C., Pratt, L.M., Clifford, S.M., Sherwood Lollar, B. and Phelps, T.J. Martian subsurface biomes: How important is radiolysis? **Invited.** 16th Annual V. M. Goldschmidt Conference, Melbourne Australia. Aug. 2006.
- Sherwood Lollar, B. H₂-rich fluids in the deep earth - Role of abiogenic water-rock interactions and potential for chemolithoautotrophy. **Invited.** Gordon Research Conference on Organic Geochemistry Holderness School, NH. Aug. 2006.
- Sherwood Lollar, B. Isotopic constraints on habitability and activity of the deep biosphere - tales from 2-3.5 km in the deep Precambrian Shield groundwaters. **Invited.** University of Southern California International Geobiology Symposium on the Deep Biosphere. June 2006. Santa Catalina CA.
- Sherwood Lollar, B. Telling, J., Lacrampe-Couloume, G., Slater, G.F., Onstott, T.C. and Pratt, L.M. Distinguishing abiogenic versus biogenic sources of methane and implications for Mars exploration. **Invited Keynote.** American Geophysical Union Spring Meeting. Baltimore MD May 2006.
- Sherwood Lollar, B. Using stable carbon isotope analysis to identify source and degradation of chlorinated solvents in groundwater. **Invited talk.** Buckley Lecture in Environmental Geology. University of Illinois. Urbana, IL. April 2006
- Sherwood Lollar, B. Tracing contaminant source and fate in groundwater using stable carbon isotope analysis. **Invited talk.** Division of Earth and Ocean Sciences. Duke University. Durham NC. April 2006
- Sherwood Lollar, B. Tracers in the Deep: Isotopic and geochemical evidence for H₂ autotrophy and methanogenesis in the deep subsurface. **Invited talk.** University of Toronto at Mississauga. Feb. 2006
- Sherwood Lollar, B. Tracers in the Deep: Isotopic and geochemical evidence for H₂ autotrophy and methanogenesis in the deep subsurface. **Invited talk.** Centre for Applied Geosciences. University of Tuebingen. Tuebingen, Germany. Jan. 2006
- Sherwood Lollar, B. Contaminant source and fate in groundwater using stable carbon isotopes. **Invited talk.** Centre for Applied Geosciences. University of Tuebingen. Tuebingen, Germany. Jan. 2006
- Sherwood Lollar, B. Threats to Canadian Groundwater: Microbial Clean-up and the Challenge of Invisible Technology. **Special Invited Lecture on Technology.** Queen's University. Kingston, Ontario. Nov. 2005.
- Sherwood Lollar, B. Carbon and hydrogen isotope measurements in abiogenic hydrocarbon synthesis. **Invited talk.** Carnegie Institute

of Washington, Washington DC. June 2005.

Sherwood Lollar, B., *Telling, J., Lacrampe-Couloume, G., Slater, G.F., Onstott, T.C. and Pratt, L.M.* Resolving abiogenic versus biogenic sources of methane and implications for Mars exploration. **Invited Talk.** Methane on Mars NASA Astrobiology Institute Distributed Workshop. NASA Goddard Space Flight Centre, Greenbelt MD. May 18, 2005.

Sherwood Lollar, B. Use of stable isotopes to evaluate contaminant degradation. **Invited.** 2005 CNYAPG Symposium on Isotopic Geochemistry. Skeneatales NY. April 2005.

McKelvie, J., Sherwood Lollar, B., Lacrampe-Couloume, G., (University of Toronto), Mackay, D., de Sieyes N.R. and M.D. Einarson Assessing the impact of ethanol on MTBE and BTEX biodegradation using compound specific isotope analysis. **Invited Student Poster.** 2005 CNYAPG Symposium on Isotopic Geochemistry. Skeneatales NY. April 2005.

Mancini, S., Ulrich, A. Sherwood Lollar, B., Lacrampe-Couloume, G., and E. Edwards. Elucidating Pathways of Benzene Biodegradation In Subsurface Environments Using Carbon and Hydrogen Isotope Analysis. **Invited Student Poster.** 2005 CNYAPG Symposium on Isotopic Geochemistry. Skeneatales NY. April 2005.

Sherwood Lollar, B., *Telling, J.P., Lacrampe-Couloume, G., Fu, Q., Seyfried, Jr., W., Horita, J. and T.M. McCollom.* Carbon and hydrogen isotope measurements in abiogenic hydrocarbon synthesis. **Invited.** 15th Annual V. M. Goldschmidt Conference, Moscow, ID. May 2005.

Sherwood Lollar, B. Threats to Canadian Groundwater: Canadian Solutions for Hydrocarbon Pollution. **Invited.** Bacon & Eggheads lecture series to Members of Parliament. Ottawa ON. May 2005.

Sherwood Lollar, B. Slater, G.F., Moser, D.P., Gihring, T.M., Telling, J., Lacrampe-Couloume, G., Lin, L.-H., and T.C. Onstott. Abiogenic gases, H₂-based autotrophy and methanogens in the deep subsurface. **Keynote** for session on “Biogeochemistry at the Limits of Habitability”, American Chemical Society Annual Meeting, San Diego CA. March 2005.

Sherwood Lollar, B. Unravelling abiogenic and biogenic sources of methane - Implications for the Earth's deep biosphere and astrobiology. **Invited** Departmental Lecture. School of Geology and Geography. McMaster University. Hamilton ON. Feb. 2005

Sherwood Lollar, B. Novel geochemical and isotopic techniques for delineating abiotic versus biotic sources of hydrocarbons in the subsurface. **Invited.** Canadian Mining Industry Research Organization (CAMIRO) - Exploration Division, Soil Gas Hydrocarbons Meeting. Toronto, ON. Dec. 2004

Sherwood Lollar, B. Use of Compound Specific Stable Isotope Techniques for Quantification of Biodegradation Rates. **Keynote.** UNESCO Workshop on Transport and Fate of Diffuse Organic Contaminants in Catchments. GSF-Research Centre for Environment and Health, Munich Germany. Dec. 2004

Sherwood Lollar, B. Stable Isotope Forensics: Promise and Pitfalls. **Invited.** Golder Associates Inc. Symposium on Innovative Strategies for Management of Contaminated Sites. Toronto, ON. Nov. 2004.

Sherwood Lollar, B. Stable Isotope Environmental Geochemistry - Recent Advances. **Invited.** Fields Institute - Research in Mathematical Sciences Annual Conference for Fellows of the Royal Society Canada. Toronto, Ont. Oct. 2004.

Sherwood Lollar, B. Geological and Geochemical Controls on the Earth's Deep Biosphere. **Invited.** Canadian Institute for Advanced Research (CIAR) - Earth Systems Evolution Program Annual Meeting. Toronto, Ont. Sept. 2004.

Sherwood Lollar, B. Stable Isotope Environmental Geochemistry - Recent Advances. **Keynote.** Notre Dame Environmental Education and Research Symposium. Dept. of Civil Engineering and Geological Sciences. University of Notre Dame, Notre Dame IN. Nov. 12, 2003.

- VanStone, N., Prezpriora, A., Vogan, J., Hart, S. Lacrampe-Couloume, G., Mabury, S. and B. Sherwood Lollar.* Using stable carbon isotope analysis to assess the performance of an iron PRB for the remediation of TCE. **Invited.** Remediation Technology Development Forum. Niagara Falls, NY. Oct. 2003
- Sherwood Lollar, B. The origin of hydrocarbon gases in Precambrian environments. **Invited.** Dept. of Geological Sciences Departmental lecture series, Harvard University, Cambridge MA. Nov. 25, 2002.
- Sherwood Lollar, B., G.F. Slater, Ward, J., Westgate, T. and G. Lacrampe-Couloume. **Invited.** Canadian Institute of Mining Ore Deposits at Depth 2003 - Challenges and Opportunities. Gases and Fluids in the Precambrian Shield: Implications for Deep Mining. Timmins, ON Sept. 2003
- Sherwood Lollar, B. Deep Crustal gases and Fluids: Interactions with the Deep Biosphere. Hubbert Quorum on Hydrogeology. **Invited.** United States Geological Survey, Menlo Park, CA. Dec. 5, 2002.
- Sherwood Lollar, B. Compound Specific Isotope Analysis: A Novel Method of Assessment and Quantification of In Situ Remediation Potential. **Invited.** American Geophysical Union Fall Meeting. San Francisco CA. Dec. 6-10, 2002.
- Onstott, T.C., Lin, L.-H., Fredrickson, J.K., Moser, D.P., Gihrig, T.M., Brockman, F.J., Phelps, T.J., Pfiffner, S., Peacock, A., White, D.C., Kieft, T., McCuddy, S., Sherwood Lollar, B., Ward, J., Slater, G., Pratt, L.M., Boice, E., Fong, J. The Witwatersand Deep Microbiology project: Observations pertaining to hypothetical microbial ecosystems beneath the surface of Mars. **Invited.** American Geophysical Union Fall Meeting. San Francisco CA. Dec. 6-10, 2002.
- Sherwood Lollar, B., Ward, J., Slater, G., Lacrampe-Couloume, G., Hall, J., Lin, L., Moser, D. and Onstott, T.C. Hydrogen and hydrocarbon gases in crystalline rocks: Implications for the deep biosphere. **Invited.** National Science Foundation Neutrinos and Subterranean Science Symposium, Washington D.C. Sept. 19-21, 2002.
- Sherwood Lollar, B. Deep crustal gases and fluids: Implications for the Deep Biosphere. **Invited.** Canadian Geoscience Council - Standing Committee on the International Continental Scientific Drilling Program - Scientific Drilling of the Sudbury Structure. Sept. 11-12, 2002.
- Sherwood Lollar, B. The origin of hydrocarbon gases in Precambrian environments. **Invited.** National Underground Science Laboratory Geomicrobiology Meeting. Lead, S.D. Nov. 29-30, 2001.
- Sherwood Lollar, B. **Key Note** New developments in isotopic tracers on contaminant degradation. **Key note.** The 3rd Asia-Pacific Symposium on Environmental Geochemistry. Guangzhou, China. Nov. 7-9, 2001.
- Sherwood Lollar, B. Applications of stable isotopes to investigate biodegradation of chlorinated ethenes. **Invited.** Department of Chemical Engineering and Chemistry. University of Toronto. Departmental Lecture Series. Oct. 2001
- Onstott, T.C., Moser, D.P., Pfiffner, S., White, D.C., Peacock, A., Phelps, T., Deflaun, M.F., Hoek, J., Ghiorse, W.C., Colwell, F., Kieft, T., Reysenbach, A.-L., Fredrickson, J.K., Southam, G., Kotelnikova, S., Omar, G., Slater, G.F., Pratt, L.M., Boone, D. and Sherwood Lollar, B. **Invited.** Do superplumes select for hyperthermophiles in the deep subsurface. Earth Systems Processes - Global Meeting. Edinburgh. June 24-28, 2001.
- Sherwood Lollar, B. and *Westgate, T.* **Invited.** Carbon isotopic evidence for abiogenic synthesis of C1-C4 hydrocarbons in crystalline rock environments. Symposium on "Abiotic formation of organic species in hydrothermal systems: Catalytic and mineral-fluid equilibria" 11th Annual V. M. Goldschmidt Conference. Roanoke, Virginia, May 20-24, 2001.
- Sherwood Lollar, B. **Key Note** New developments in isotopic tracers on contaminant degradation. Symposium on "The Geochemistry of Contaminated Aquifers" 11th Annual V. M. Goldschmidt Conference. Roanoke, Virginia, May 20-24, 2001.
- Sherwood Lollar, B. Stable isotopic tracers for contaminant biodegradation. **Invited lecture** at Meteorological Service of Canada. Downsview, Ontario. Feb. 2001

- Slater, G.F., Sherwood Lollar, B., Sleep, B. and Edwards, E. Variability in carbon isotopic fractionation during biodegradation of chlorinated ethenes. **Invited**. American Geophysical Union Annual Meeting. San Francisco, CA. Dec 15-19, 2000.
- Sherwood Lollar, B. Earth surface processes and environmental science: A geologist's perspective. **Invited**. Geo Canada 2000 Summit Session. Annual Meeting of Geological Association of Canada. Calgary Alberta, May 2000.
- TC Onstott, DP Moser, H Dong, J.Fredrickson, FJ Brockman, TJ Phelps, SM Pfiffner, A Peacock, DC White, S Macnaughton, FS Colwell, DL Balkwill, MF DeFlaun, T Kieft, DR Boone, AL Reysenbach, J Hoek, GI Omar, WC Ghiorse, G Southam, *G Slater, B Sherwood Lollar*, S Kotelnikova, K Pedersen, L Pratt, J Fong, B Baker, C Wimpee, B MacGregor, S Fishbain, DA Stahl, M Stute, and R Hoover. (1999) The Witwatersrand Deep Microbiology Project: A Window Into the Extreme Environment of Deep Subsurface Microbial Communities. **Invited**. American Geophysical Union Fall Meeting. San Francisco CA. Dec.1999.
- Sherwood Lollar, B., *Slater, G.F., Ahad, J.*, Sleep, B. and Edwards, E. (1999) Use of stable carbon isotope to trace bioremediation of organic contaminants. **Invited Plenary**. 14th International Symposium on Environmental Biogeochemistry. Sept. 26-30, 1999. Deerhurst, Ontario, Canada.
- Sherwood Lollar, B., *Slater, G.F., Ahad, J.*, Sleep, B. M. Witt, G. Klecka, M. Harkness, J. Spivack (1999) Stable carbon isotope evidence for intrinsic bioremediation of tetrachloroethene (PCE) and trichloroethene (TCE) at Area 6, Dover Air Force Base. University Consortium on Solvents-in-Groundwater Fall Meeting. Hocley Valley Resort, Ontario (Sept. 1999). **Invited**.
- Slater, G.F., Sherwood Lollar, B. Sleep, B. Edwards, E. and Lee, R.W. Isotopic fractionation associated with biodegradation of chlorinated hydrocarbons: laboratory and field results. University Consortium on Solvents-in-Groundwater Fall Meeting. Portland, Oregon (Oct. 1998). **Invited**.
- Sherwood Lollar, B. Stable carbon isotopes - Tools for detection of the origin and fate of environmental contaminants. Geological Society of America Annual Meeting. Toronto. (Oct. 1998). **Invited**. (Oct. 1998)
- Ballentine, C.J. and Sherwood Lollar, B. Origins of non-hydrocarbon gases in the Texas Panhandle and Hugoton gas fields. 8th Annual V.M. Goldschmidt Conference. **Invited**. Toulouse, France (Aug. 1998).

Invited Lectures for 1998 Henry Darcy Distinguished Lecture Series

Stable Carbon Isotopes: Tools for detection of the origin and fate of environmental contaminants

University of Texas at Austin	Thurs. Jan 22
Texas A&M	Fri. Jan. 23
University of Virginia	Thurs Feb. 5
University of California Santa Cruz	Weds. Feb 18
University of California Davis	Thurs Feb 19
United States Geological Survey Menlo Park	Fri. Feb 20
Colorado School of Mines	Mon. Feb 23
University of Florida	Weds. Mar 4
Florida State University	Thus Mar 5
Princeton University	Mon. Mar 9
University of Toronto	Thurs March 12
University of Tennessee	Thurs. Mar 19
Queens University, Canada	Tues. Mar 24
University of Michigan	Tues Apr. 7
Laval University	Mon May 18
Johns Hopkins University	Fri Oct 2
United States Geological Survey Reston	Mon. Oct. 5
Portland State University	Thurs. Oct. 15
Washington State University	Fri Oct. 16

Michigan State University	Thurs Nov 12
University of Waterloo	Thurs Nov. 19
University of Western Ontario	Weds Nov. 25
NGWA National Meeting, Las Vegas	Tues. Dec 14

International Darcy Lectures

University of Brest, France	Thurs April 23
University of Rennes, France	Friday April 24
Queens University - Belfast	Mon. April 27
University College London	Tues April 28
Hebrew University of Jerusalem	Sun June 14

Plus 46 more invited and other lectures in the previous 10 years (not listed).

THESES SUPERVISED (I am primary supervisor for all those listed except where indicated with *, indicating joint supervision)

Totals: 29 undergraduates; 31 Masters (5 co-supervised); 13 PhD (5 co-supervised); 35 PDFs; 7 Research Associates/Technicians

The >114 postdoctoral fellows, technicians, research associates and students trained occupy prestigious academic positions around the world including research chairs and positions at Toronto (Passeport - CRC Chair), Alberta (Li – CRC Chair), McMaster (Slater -CRC Chair), Helmholtz Professorship Univ of Munich (Elsner), Ottawa, Lehigh, Auburn, Illinois IFREMER-Brest, University of St. Andrew's Scotland, NASA JPL, Blue Newcastle, Manchester, Memorial, Windsor. Many others have gone on to leading positions in the private and non-profit sector as well, including prominently Blue Origin, GeoSyntec, Golders, Sirem, ENVIRON, AMEC) and highly impactful positions in government in both Canada (Director of Geosciences at the Nuclear Waste Management Organization, National Resources Canada; Geologic Survey Canada; City Councilor and Deputy Mayor Toronto); and in the U.S. (Pacific Northwest National Laboratories, SouthWest Research Institute, Environmental Protection Agency).

High School Co-op Education Students

Mark Janelle Jan-June 2005
Logan Germain Summer 2015
L. Growski Sept-April 2017-2018

NSERC USRA Undergraduate Summer Students

S. Desrocher (Geology) (1994 and 1995)
C. Norcross (Geology) (1995)
J. Gray (Geology) (2000)
C. Hunter (Geology) (2000)
S. Hirschorn (Geology) (2001)
A. Pierce (Geology) (2002)
M. Chartrand (Chemistry) (2002)
J. Liu (Chemistry) (2008)
C. Chan (2009 and 2010)
S. Yang (2011) NSERC Create Scholarship via Canadian Astrobiology Training Program (CATP)
G. Lollar (Earth Science and Microbiology) (2015)
P. Watt (Earth Science) (2015)
G. Lollar (Earth Science and Microbiology) (2016)

Undergraduate Students

Crystal Beaudoin (2010)
Xia Zhu (2014-2015)
C. Sica (2015)
J. Manna (2016)
N. Sabatini (2024)

4th Year Research Theses:

Isotopic and geochemical constraints on the migration of CH₄ from Beare Rd Landfill Toronto, Ontario

S. Desrocher (1994-1995) Dept. of Geology

Isotopic and compositional effects of bacterial oxidation of volatile n-alkanes

C. Norcross (1994-1995) Dept. of Geology

Hydrogen isotope fractionation during anaerobic biodegradation of toluene

J. Ward (1999-2000) Dept. of Geology

Stable carbon isotopes as an indicator of natural attenuation of EDC

S. Mancini (1999-2000) Dept. of Geology

Analysis of surface and subsurface borehole sampled gases by a refined GC method able to detect low concentrations of hydrocarbons

P. Kral (2003-2004) Dept. of Geology

Development of GC-IRMS techniques for CSIA analysis of pesticides

C. Rose (2007-2008) Dept. of Chemistry

Diffusion Membrane Sampler for CSIA of Dissolved Methane in Porewaters

Adam Virani (2012-2013) Dept. of Earth Sciences

Most Probable Number Analysis of Microbial Metabolisms in Ancient Fracture Waters

Garnet Lollar (2016-2017) Dept. of Earth Sciences

Masters Students:

Bacterial methanogenesis in Canadian Shield groundwaters

F. Doig (1994)

An isotopic study of CH₄ and associated N₂ and H₂ gases in Canadian Shield mining environments

J. Montgomery (1994)

Carbon cycling in the microbial mats and bottom accumulations of selected lakes of the Cariboo Plateau: Isotopic constraints and implications for interpretation of the geologic record

G. Slater (1996) Holder of:

University of Toronto Open Scholarship 1994-95

Ontario Graduate Scholarship 1995-97.

NSERC PGS Scholarship 1997-99.

Bacterial hydrocarbon gases in surficial aquitards and shallow bedrock aquifers in the Western Canadian Sedimentary Basin

S. Taylor (1996) Holder of:

University of Toronto Open Scholarship 1995-96

American Association of Petroleum Geologists Grants in Aid of Field Work (\$2000)

Isotopic applications to contaminant hydrogeology: Using $\delta^{13}\text{C}$ analysis to investigate the origin and fate of dissolved organic contaminants

H. Dempster (1997) Holder of:

NSERC PGS Scholarship 1995-97

Travel Scholarship from American Geophysical Union Spring Meeting, Baltimore 1996.

CH₄ gas and associated groundwaters at Kidd Creek Mine, Timmins, Ont.

T. Westgate (1998) Holder of:

University of Toronto Open Scholarship 1997-98

Monitoring stable carbon isotopes during biodegradation of toluene: Implications for contaminated site assessment

J. Ahad (2000) Holder of:

NSERC PGS Scholarship 1998-2000

Endogenous decay sustaining PCE degradation and associated stable isotope effects

***A. Brown** (2000) Holder of:

OGSST Scholarship 1999-2000

Jointly supervised with Dr. B. Sleep of Dept. of Civil Engineering, University of Toronto

Hydrogen isotopic fractionation: Potential as an indicator of MTBE biodegradation at contaminated field sites

J. Gray (2002)

University of Toronto Open Graduate Scholarship 2000-2001

NSERC PGS Scholarship 2001-2002

Monitoring biodegradation of benzene in groundwater systems using carbon and hydrogen compound specific isotope analysis

S. Mancini (2002)

University of Toronto Open Graduate Scholarship 2000-2002

Identifying subsurface gas origins within the Witwatersrand Basin, South Africa

J. Ward (2000-2002)

Stable carbon isotope fractionation during aerobic and anaerobic biodegradation of ethene

Tiffany Johnson (2007-2008)

University of Toronto Entrance Scholarship 2007

NSERC PGS Scholarship 2008

Application of compound specific stable carbon and hydrogen isotope analysis to monitor biodegradation of monoaromatic compounds

Micheal Howlett (2007-2008)

OGSST Scholarship 2007-2008

Stephanie Tille 2006-2008 (all thesis work completed but student has not written up thesis)

Holder of Connaught International Student Scholarship for 2006-2007

Investigation of the anaerobic biodegradation of trichloroethane by the microbial consortium KB-1 using compound specific carbon isotope analysis

Lisa Douglas (2008-2010)

Carbon isotope fractionation during biodegradation of chloroform

Calvin Chan (2010-2012)

Explorer's Fund Scholarship

Ontario Graduate Scholarship

Massey College Junior Fellow

Development of two novel sampling techniques for compound specific isotope analysis of organic contaminants in the environment

Mathieu Morin (2011-2012)

Isotopic composition of methane in fluid inclusions from the Sudbury basin

Trevor Brisco (2012-2013)

NSERC Postgraduate Scholarship

Gas and fluid geochemistry of groundwater in kimberlite-hosted **deposits**

Berivan Esen (2012-2013)

Canadian Astrobiology Training Program CREATE Scholarship

Hydrogen isotope fingerprinting of South West Ontario hydrocarbons

Patrick Watt (2015-2016)

Multidisciplinary Applied Geochemistry Network NSERC CREATE Undergraduate Scholarship

Isotopic signatures of hydrocarbon containing fluid inclusions

Cheyenne Sica (2015-2016)

Multidisciplinary Applied Geochemistry Network NSERC CREATE Graduate Scholarship

Biodegradation and transport of chlorofluorohydrocarbons in the subsurface

Jesse Manna (2016-2017)

Multidisciplinary Applied Geochemistry Network NSERC CREATE Undergraduate Scholarship

Variable fractionation of CF and DCM in the environment

Elizabeth Phillips (2016-2017)

Multidisciplinary Applied Geochemistry Network NSERC CREATE Graduate Scholarship

Source differentiation of chlorofluorohydrocarbons

Camille Malcolm (2017-2018)

Riverine geochemistry and isotopic signatures in Southwestern Ontario

Joanna West (2017-2018)

Soil gas CO₂ emissions and carbon isotope signatures in Northern Ontario

Hamnah Majeed (2019-2020)

PhD Students:

Constraining the fate of chlorinated ethenes in groundwater systems using stable carbon compound specific isotope analysis

G. Slater (2000)

NSERC PGS Scholarship 1996-98

University of Toronto Open Graduate Scholarship 1998-2000

G. Slater won the **D.N. Chorafas Foundation Prize** for his PhD. He also won an **NSERC Postdoctoral Fellowship** and a prestigious **Woods Hole Oceanographic Institution Fellowship**. He is currently the **Canada Research Chair** in Environmental Isotope Geochemistry at McMaster University.

Investigation of stable carbon compound specific isotope analysis to monitor and quantify the biodegradation of chlorinated ethanes in groundwater systems

P. Morrill (2004)

University of Toronto Open Graduate Scholarship 1999-2001

OGSST Scholarship 2002-2004

Won the prestigious Carnegie Institute (Washington) DC Postdoctoral Fellowship and NSERC Postdoctoral Fellowship.

Current Position: Professor Memorial University of Newfoundland

Investigation of reductive dechlorination reactions of chlorinated ethenes and ethanes on zero-valent metals using compound specific isotopic analysis

***N. van Stone** (2005)

University of Toronto Open Graduate Scholarship 1999-2000 CresTECH Industrial Scholarship 2001-2003

Jointly supervised with Dr. S.A. Mabury of Dept. of Chemistry, University of Toronto

Investigating mechanisms of chlorinated ethane biotransformation using compound specific carbon isotope analysis

S. Hirschorn (2007)

University of Toronto Open Graduate Scholarship 2001-2002

NSERC PGS Scholarship 2003-2005

Current Position: Director of Research Nuclear waste Management Organization, Toronto ON Canada

Assessing mechanisms of isotopic fractionation during petroleum hydrocarbon biodegradation- Implications for evaluation of in-situ

biodegradation

S. Mancini (2007)

NSERC PGS Scholarship 2002-2004

Mary H. Beatty Award 2003-2004 (Faculty of Arts & Science, University of Toronto)

American Petroleum Institute/National Ground Water Association Scholarship 2003-2004

Current Position: Partner GeoSyntec Consultants, Toronto Ontario

Assessing biodegradation pathways and in-situ biodegradation of gasoline constituents using stable isotopes and metabolic intermediates

J. Gray McKelvie (2006)

NSERC PGS 1 Scholarship 2002-2003

American Petroleum Institute/National Ground Water Association Scholarship 2002-2003

NSERC Canada Graduate Scholarship 2003-2005

Current Position: Deputy Mayor and City Councilor, City of Toronto, Ontario Canada

Verification of biodegradation, delineation of biodegradation mechanisms, and differentiation of sources of chlorinated contaminants using compound specific isotope analysis

M. Chartrand (2007)

NSERC PGS Scholarship 2002-2004

American Petroleum Institute/National Ground Water Association Scholarship 2004-2005

Current position Research Associate University of Ottawa

Co-inhibition effects of TCE and TCA biodegradation investigated using CSIA

Lisa Douglas (2015)

OGSST Scholarship 2010-2011

QE II Scholarship 2011-2012

Modelling carbon isotope fractionation associated with diffusive transport of contaminants in aquifers and aquitards

Bruce Xu (2016) (co-supervised with Dr. Brent Sleep Dept. of Civil Eng. U of Toronto)

Current Position: Aquanty Consulting Kitchener-Waterloo, Ontario

Noble gas constraints on diffusion controlled transport of hydrocarbons in sedimentary basins

Anran Cheng (2020) (co-supervised with Dr. C.J. Ballentine Chair of Geochemistry (Oxford University UK)

Current Position: Snowfox Exploration

Dual Isotope investigation of biodegradation of chlorohydrocarbons

Elizabeth Philips (2021)

NSERC PGS Scholarship 2018-2021

Current Position: Schmidt Science Fellowship and Postdoctoral Fellowship Oxford University

Postdoctoral Fellows:

Dr. J.M. Lansdown – 1992-1995.

Current position - Research Associate, University of Texas, Austin TX

Dr. Grace Aye - 1994.

Current position - Chemist - City of London, Ontario, Canada

***Dr. C. Wong** – 1999-2002

U.S. Environmental Protection Agency Bronze Medal for Commendable Service (2000).

Jointly supervised with Dr. S.A. Mabury of Dept. of Chemistry, University of Toronto

Current position - Dept. of Chemistry, Assist. Professor, University of Alberta

Dr. G.F. Slater - 2001

Radiocarbon dating of hydrocarbon gases from Witswatersrand Basin, South Africa
NSERC Postdoctoral Fellow and Woods Hole Oceanographic Institution Fellow, Woods Hole Oceanographic Institution
Falmouth, MA USA

Current position - Canada Research Chair in Environmental Isotope Geochemistry - McMaster University, Hamilton, ON

Dr. M. Elsner – 2004-2006

Modeling primary and secondary isotope effects during degradation of CT

Swiss National Science Foundation Postdoctoral Fellowship 2004-2006

Present Position Helmholtz Association Professorial Position

GSF National Research Center for Environment and Health, Munich Germany

Dr. J. Telling – 2004-2006

NASA Astrobiology Institute - Biosustainable Energy and Nutrient Cycles
in the Deep Subsurface of Earth and Mars

Current Position: Assistant Professor Newcastle University UK

Dr. K. Voglesanger – 2006-2008

NASA Astrobiology Institute - Biosustainable Energy and Nutrient Cycles
in the Deep Subsurface of Earth and Mars

Current Position: Assistant Professor Northwest Illinois University

Dr. I. Jabeen – 2007-2008

Isotopic analysis of carbon isotopes in methane from fluid inclusions - analytical development

Dr. J. Moran- 2007-2009 (co-supervised with Dr. G.F. Slater McMaster University)

NASA Astrobiology Institute - Biosustainable Energy and Nutrient Cycles
in the Deep Subsurface of Earth and Mars

Current Position: Pacific Northwest National Laboratory

Dr. X. Liang – 2009-2011

Abiotic and biotic fractionation comparison to reveal mechanisms of PCE degradation

Dr. Scott Mundle – 2010-2014

Compound specific isotopes as natural probe for reaction chemistry

Current Position: Assistant Professor, University of Windsor

Dr. Long Li 2009-2012

Nitrogen and sulfur cycling in the deep subsurface biosphere

NSERC CREATE PDF Fellowship through CATP (Canadian Astrobiology Training Program)

CRC Chair Tier II University of Alberta

Dr. Kenna Wilkie – 2012-2013

Sloan Foundation Deep Carbon Observatory Fellow

Fate of volatile fatty acids in deep subsurface microbial cycling

Dr. Elodie Passeport – 2012-2014

Biodegradation of aromatic hydrocarbons

Professor and **CRC Tier II** Dept. of Civil Engineering, and Dept. of Chemical Engineering
University of Toronto

Dr. Axel Horst (PhD Stockholm) – 2013-2016

Compound specific isotope analysis of CFCs

Current Position: Marie-Curie Postdoctoral Fellow at Helmholtz Institute Leipzig Germany

Dr. Nadine Chelsea Sutcliffe (PhD Oxford) – 2013-2015

Origin and residence time of deep crustal fluids in Precambrian Shield

Current Position: PDF University of Toronto

Dr. Jill McDermott (PhD MIT-WHOI Joint Program) – 2014-2016

NSERC CREATE (MAGNET) Postdoctoral Fellow

Carbon sources and geochemical cycling of volatile organic acids in deep subsurface microbial communities

Current position: Associate Professor, Lehigh

Dr. Chris Glein (PhD Arizona) – 2014-2015

Experimental program in abiotic organic synthesis

University of Toronto Deane Fellowship

Current Position: Enceladus Mission Scientist SouthWest Research Institute San Antonio Texas

Dr. Lisa Douglas (PhD U of T) – 2015

CSIA pathway differentiation during TCE biodegradation

Dr. Thomas Giunta (PhD IPGP Univ. de Paris) – 2016-2018

Conservative and stable isotopes in isolated aquifers

Current Position: Research Faculty Universite de Brest, IFREMER France

Dr. Christopher Charles (PhD Toronto) – 2016-2019

Current Position: Research Scientist TRUIMF Vancouver, B.C.

Dr. Aleksandra Mloszewska (PhD Alberta) – 2016-2018

NSERC CREATE (MAGNET) Postdoctoral Fellow

Current Position: Postdoctoral Researcher, Health Sciences North, Sudbury, ON

Dr. Mahsa Shayan (PhD Waterloo) – 2017

Current Position: Consultant AMEC Inc.

Dr. Tetyana Gilevska (PhD Leipzig) – 2016-2019

Compound specific isotope analysis of chlorobenzenes

Current Position: PDF Univ. Gotenburg, Sweden

Dr. Oliver Warr (PhD Oxford) – 2016-2019

Noble gas investigations of the deep hydrogeosphere

Current Position: Assistant Professor, University of Ottawa

Dr. Ann Sullivan Ojeda (PhD Oklahoma) 2018-2019

Statistical Foundations for Multi-element Compound Specific Isotope Analysis

Current Position: Assistant Professor Auburn University

Dr. Stephanie Flude 2018-2021

Methane and hydrogen gas formation in Brazil

Co-supervised with Dr. Chris Ballentine Oxford University.

Dr. Nivea Magalhaes (PhD University of Maryland) 2019-2020.

Methane and hydrogen gas formation in Brazil deep mines

Current Position: Laboratory Manager, University of St. Andrew's Scotland

Dr. Weibin Chen (PhD Trent University) 2019-2022

Modelling of abiotic and biotic transformation of contaminated groundwaters

Current Position: Research Associate University of Toronto

Dr. Joan de Vera (PhD University of Toronto) 2020-2022
Bioremediation of chlorinated aromatics hydrocarbons t one of the world's largest contaminated sites
Current Position: Postdoctoral Fellow UCLA

Dr. Anran Cheng (PhD Oxford) 2020 to present
Noble gas analysis of subsurface pore fluids
Co-supervised with Dr. Chris Ballentine Oxford University.
Current Position: Snowfox Exploration

Dr. Jethro Sanz-Robinson (PhD McGill) 2020-2021
Methane in fluid inclusions
Current Position: Golder Environmental Consultants – Calgary AB

Dr. Huan Cui (PhD University of Maryland) 2020-2021
Sulfur, oxygen and hydrogen isotopes in Kidd Creek cores
Co-Supervised with Dr. Benedicte Menez IGP Univ. Paris.
Current Position: Assistant Professor University of Southern Mississippi

Dr. Alero Gure (PhD University of Wyoming) 2020-2021
Energy and Power modelling of microbial metabolisms
Current Position: Golder Environmental Consultants – Vancouver B.C.

Dr. Li Liu (PhD Australia National University) 2022-2023.

Dr. Min Song (PhD MARUM University of Bremen Germany) 2021 to present.

Dr. Peter Higgins (PhD University of Edinburgh) 2022 to present.

Dr. Jonas Brunjes (PhD MARUM University of Bremen Germany) March 2023 to present.

Dr. Sourojeet Chakraborty (PhD University of Toronto) Sept. 2023 to present.

Co-supervised Graduate Students under NSERC CREATE Programs:

Carol Cheyne (co-supervised with Dr. Bridget Bergquist under NSERC Create MAGNET program)
University of Toronto MSc 2013-2015
Lead isotopes as chronological markers and particulate contaminant tracers in lakes

Danielle Simkus (co-supervised with Dr. Greg Slater under NSERC CREATE-CATP)
McMaster University MSc 2011-2013
Characterization of PLFA in deep groundwaters

Raven Comery (co-supervised with Dr. Lyle Whyte under NSERC CREATE-CATP)
McGill University MSc. 2012 -2014
CH₄ generation and flux from high Arctic springs generation and flux from high Arctic springs

Guillaume Lamarche-Gagnon (co-supervised with Dr. Lyle Whyte under NSERC CREATE-CATP)
McGill University MSc. 2010 -2014
CH₄ generation and flux from high Arctic springs - generation and flux from high Arctic springs

Isabelle Raymond-Bouchard (co-supervised with Dr. Lyle Whyte under NSERC CREATE Canadian Astrobiology Program)
McGill University PhD 2012 to 2016

Molecular microbiology of perennial spring communities
(current position PDF McGill University)

Gregor Lucic (co-supervised with Dr. J. Stix McGill NSERC Create MAGNET program)
McGill University PhD. 2012 to 2015
An isotope study of volcanic CH₄, CO₂ and Helium
(current position Picarro Instruments)

Kalina Malowany (co-supervised with Dr. J. Stix McGill NSERC Create MAGNET program)
McGill University MSc. 2015
(current position Hydrogeochemist at Core6 Environmental Ltd.)

Research Associates:

Dr. G. Lacrampe-Couloume - Sept. 1999 to 2017 Senior Research Associate
Dr. T. Eckert - Jan. 2009-March 2010 (current position Research Associate University of Guelph) Junior RA
K. Chu – Sept. 2011 to 2017 Junior Research Associate
Dr. O. Warr – Research Associate October 2019-2022
Dr. W. Chen – Research Associate October 2023 to present

Laboratory Technician and Manager

M. Wong - Sept. 2004-Aug. 2005
J. Heidenheim - Sept. 2005-Aug. 2007
C. Heidorn - Jan. 2009-March 2010

Graduate Supervisory Committee member for:

Felicia Young Lok Liu (MSc Civil Engineering, UT): Supervisor: L. Warren - 2024
P. Liberty - (PhD Earth Sciences UTM) Supervisor: M. LaFlamme – 2023 to present
EvelynLove Fosu Duah - (PhD Earth Sci.) Supervisor: A. Swidinsky (**External on PhD Proposal Committee 2022**)
K. Nason - (PhD Earth Sciences) Supervisor: B. Bergquist **2021 to present**
A. Whitaker - (PhD Earth Sciences UTM) Supervisor: M. LaFlamme (**External on PhD Proposal Committee 2022**)
L. Twible – (PhD Civil Engineering) Supervisor: L. Warren **2019 to present**
N. Rahman – (PhD Earth Sciences) Supervisor: B. Bergquist **2018 to present**
N. Sponzar – (PhD Earth Sciences) Supervisor: B. Bergquist **2018-2022**
J. De Vera – (PhD Earth Sciences) Supervisor: B. Bergquist **2014-2019**
C. Cheyne – (MSc Earth Sciences) Supervisor: B. Bergquist **2013-2015**
G. Schudel – (MSc Earth Sciences) Supervisor: B. Bergquist **2013-2014**
A. Vandersteen - (PhD - Chemistry) Supervisor: R. Kluger **2009-2015**
P. Chandra (MSc - Geology) Supervisor: B. Bergquist **2009-2010**
P. Chandra (PhD - Geology) Supervisor: B. Bergquist **2011-2018**
C. Rose - (MSc - Geology) Supervisor: B. Bergquist **2008-2010**
J. Longstaffe - (PhD - Chemistry) Supervisor: A. Simpson **2008-2012**
S. Mundle - (PhD - Chemistry) Supervisor: R. Kluger **2007-2010**
S.J. Brown - (PhD - Chemistry) Supervisor: M. Simpson **2006-2010**
C. Washer - (PhD - Chemical Eng. And Applied Chemistry) Supervisor: E. Edwards **2006-2013**
K. Torayk - (PhD - Geology) Supervisor: F.G. Ferris **2006-2010**
T. Eckert - (PhD - Geology) Supervisor: U. Wortmann **2004-2009**
J. Dinglasan - (PhD - Chemistry) Supervisor: S. Mabury and E. Edwards **2002-2006**
Natasa Draculic – (PhD - Geology) Supervisor: M. Douglas **2002-2007**
Natalie Caciagli - (PhD - Geology) Supervisor: J. Brenan **2001-2009**
U. Basuki - (PhD - Geology) Supervisor: E. Spooner **2001-2006**
C. Shunthirasingham - (MSc - Chemistry) Supervisor: M. Simpson **2004-2005**
Yvonne Litwin - (PhD - Geology) Supervisor: F.G. Ferris **2001-2003**
Darlene Lim – (PhD - Geology) Supervisor: M. Douglas **1999-2003**

Jonathan Dupe – (PhD - Geology) Supervisor: J. Rucklidge **1996-2001**
Roger Moss - (PhD - Geology) Supervisor: S. Scott **1996-2000**
Rick Gerber (PhD - Geology) Supervisor: K.W.F. Howard **1995-98**
Richard Taylor (PhD - Geology) Supervisor: K.W.F. Howard **1995-97**
Xia Li (MSc - Geology) Supervisor: G. Anderson **1995-97**
Nurudin Ladah - (MSc - Geography) Supervisor: J. Gerits. **1995-97**

ADMINISTRATIVE ACTIVITIES

COMMITTEES AND ORGANIZATIONS WITHIN THE UNIVERSITY

“What can a fellowship do you your career” Faculty of Arts and Sciences Orientation for new faculty members, March 2024.

Faculty of Arts and Science Dean’s Research Excellence Awards (2022-2023)
Faculty of Arts and Science Internal Review University Professor Appointments (2020, 2024)
University of Toronto Internal Review Committee for CERC (2017)
Faculty of Arts and Science Internal Review University Professor Appointments (2017-2018)
Advisory Committee for the Dean of the Faculty of Applied Science and Engineering (2016)
University of Toronto Advisory Committee on Fossil Fuel Divestment (2014-2015)
University of Toronto Internal Review Committee for CFI (2015)
University of Toronto Selection Committee for University Professors (2014, 2015, 2019)
University of Toronto Governing Council 2003-2007
University of Toronto Governing Council Executive Committee 2004-2007
University of Toronto Academic Appeals Committee 2006-2007
University of Toronto Academic Priorities and Planning 2004-2005
University of Toronto Academic Board 2001-2004
Faculty of Arts and Science Senior Promotions Committee 2002-2005
Faculty of Arts and Science Awards Advisory Committee 2011-2013

Massey College, Search Committee for Principal (2024)
Massey College, Corporation Board 2012-2022
Massey College, Science Activities Chair (2016-2022)
Massey College Governance Committee (2015)
Massey College Standing House Committee (2014-2015)

Natural Sciences and Engineering Panel of the Research Advisory Board, University of Toronto
Office the Vice-President, Research and International Relations (1999 to 2002)

Various Departmental Committees (1992-2024):

- Undergraduate Curriculum Renewal Committee
- Graduate Affairs Committee
- Graduate Awards and Admissions
- Undergraduate Affairs Committee
- Safety Committee
- Public Relations and Curriculum Advisory to Students Committee
- Promotions Committee
- Academic Appeals
- Space Committee
- Workload Policy Committee

Member of Search Committees for:

- Chairman - Department of Geology 1995
- Tenure Stream Appointment in Environmental Geosciences (Geology) 1995
- Tenure Stream Appointment in Mathematics - Dean's representative 1997

Tenure Stream Appointment in Structural Geology (Geology) 1999
Chairman - Department of Geology 2000
Canadian Research Chair Tier II Appointment in Climate Change 2002
Senior Lecturer Position 2002
Chairman - Department of Chemistry 2003
Chairman - Department of Physics 2004
Director - Dunlap Institute, University of Toronto 2009-2010
Chair, Department of Geology 2011
Graduate Three Campus Chair, Department of Geology 2011
Chairman - Department of Geology 2015
Graduate Three Campus Chair, Department of Geology 2015
Chair Search, Department of Earth Sciences 2021

Chair of Third Year Review for Dr. J. Mungall (Geology 2001) and Dr. J. Bollmann (Geology 2007)
Member of Third Year review Committee Dr. J. Murphy, Dept. of Chemistry (2009)
Member Reading Committee for Tenure for Dr. J. Bollmann (2010)
Member Reading Committee for Promotion to Full Professor for Dr. M. Simpson (2011)
Chair of Third Year review Committee Dr. M. Anderson, Dept. of Earth Sciences (2021)

Tenure and Promotion Committee Member

M.S.V. Douglas Dept. of Geology (1999)
K. Strong, Dept. of Physics (2000)
J. Brenan Dept. of Geology (2002)
G. Srinivasan Dept of Geology (2008)
C.-J. Banks Dept. of Geology (2008)
B.A. Bergquist Dept. of Earth Sciences (2015)
M. LaFlamme UTSC (2018) (Reading Sub-Committee)
H. Peng (2023) Dept of Chemistry
M. LaFlamme UTSC (2023) (Reading Sub-Committee for Promotion to Full Professor)

Dept. of Geology Coordinator on Planning Committee for 'Discover Science Day' 1993 and 1994
and for Take our Daughters to Work Day 1996-98

Faculty of Art and Science - Women in Science Committee Member 1994-96 and 1998-99.

Royal Canadian Institute - Joint Session with the University of Toronto
Panel Discussion: Women Scientists - Current Issues and Realities

Faculty of Arts and Science Women in Academe Annual Forum - Guest Speaker in 1997, 1999 and 2000.

COMMITTEES AND ORGANIZATIONS OUTSIDE THE UNIVERSITY

(see also **Professional Affiliations and Activities** p. 2-3)

Organizer of Special Theme Sessions:

1. **Geological Society of America Annual Meeting** 1997 (Salt Lake City, Utah)
"New isotopic tools for detection of the origin and fate of environmental contaminants"
Chairs: B. Sherwood Lollar and T.A. Abrajo
2. **Geological Society of America Annual Meeting** 1998 (Toronto, Ontario)
"Origin of non-hydrocarbon gases in sedimentary basin systems"
Chairs: B. Sherwood Lollar and C.J. Ballentine
3. **Geological Society of America Annual Meeting** 1998 (Toronto, Ontario)
Organic Geochemical Division (OGD) of the Geochemical Society (GS) Symposium:
"Research Issues in Petroleum and Environmental Organic Geochemistry"

- Chairs: B. Sherwood Lollar and M. Lewan
4. **Goldschmidt 2000** (Oxford, UK)
 “Chemistry and Microbiology of Pollution” Special Symposium
 Chairs: B. Sherwood Lollar and A. Bath
 5. **8th International In Situ and On Site Bioremediation Symposium June 2005** (Baltimore)
 “Tools/Techniques for Chlorinated Solvent Sites” Session
 Chairs: B. Sherwood Lollar and C.M. Aelion.
 6. **9th International In Situ and On Site Bioremediation Symposium June 2007** (Baltimore)
 “Microbial Ecology of Reductive Dechlorination and the pH Impact” Session
 Chairs: B. Sherwood Lollar and C.M. Aelion
 7. **Executive Program Committee Co-Chair - Goldschmidt 2008 Vancouver, BC July 2008**
 Chairs: R. Carlson and B. Sherwood Lollar
 8. CIFAR (Canadian Institute for Advanced Research) Workshop I on Astrobiology, Toronto ON. April 2009
 Chairs: G.F. Slater, B. Sherwood Lollar, R. Pudritz, C. Suttle, L. Whyte
 9. **International Program Committee Co-Convenor - Goldschmidt 2009 Davos CH June 2009**
 Theme: Earth's Resources I: Origin and Sustainable Exploitation of Oil/Water/Gas Systems
 10. **Program Committee ABSCICON 2010** Galveston TX. April 2010.
 11. **CIFAR** (Canadian Institute for Advanced Research) Workshop I on Astrobiology, Toronto ON. Oct. 2010
 Chairs: G.F. Slater, B. Sherwood Lollar, R. Pudritz, C. Suttle, L. Whyte
 12. **Sloan Foundation Deep Carbon Observatory Workshop**, Carbon Cycling in the Deep Crustal Biosphere
 University of Free State, Bloemfontein South Africa, Jan. 2011
 Organizers: B. Sherwood Lollar, T.C. Onstott, E. van Heerden and T. Kieft
 13. **Battelle International Symposium on Bioremediation and Sustainable Environmental Technologies**, Reno, NV. June 2011.B.
 Organizers: B. Sherwood Lollar and T. Buscheck (Chevron) Co-Chairs
 Special session on **Compound Specific Isotope Investigations at Contaminated Field Sites**.
 14. **Origins 2011 Joint Meeting of the ISSOL** (International Astrobiology and Origins of Life Society) and Bioastronomy Society.
 Montpellier, FR. July 2011. Session Chair and Best Poster Judge.
 15. **CIFAR** (Canadian Institute for Advanced Research) Workshop III on Astrobiology, Toronto ON. Feb. 2012
 Chairs: G.F. Slater, B. Sherwood Lollar, R. Pudritz, C. Suttle, L. Whyte
 16. **Gordon Research Conference on Organic Geochemistry** – Harkness, NH USA July 29-Aug.3, 2012
 Session Organizer: B. Sherwood Lollar
 17. **Goldschmidt 2013** (Florence, Italy) August 2013
 Deep Subsurface Fluids, Habitability and Microbial Ecosystems
 Chairs: M. Schrenk, B. Sherwood Lollar and C.J. Ballentine
 18. **International Scientific Drilling Program Conference** – Potsdam Germany Nov. 11-14, 2013
 Session Chairs: The Hidden Biosphere. B. Sherwood Lollar and J. Kallmeyer
 19. **Gordon Research Conference on Isotopes of Chemical and Biological Sciences** - Galveston Tx USA Feb. 2013
 Session Organizer – Environmental Isotope Frontiers: B. Sherwood Lollar and A. Kohen
 20. **Battelle International Symposium on Bioremediation and Environmental Technologies**, Monterey CA. May 2013.
 Special session on **Compound Specific Isotope Investigations at Contaminated Field Sites**.
 Organizers: B. Sherwood Lollar and T. Kuder Co-Chairs
 21. **Gordon Research Conference on Isotopes of Chemical and Biological Sciences** - Galveston Tx USA Jan. 2018
 Session Chair – Limits to Life: B. Sherwood Lollar
 22. **Goldschmidt 2018** (Boston, Mass) August 2018
 Let there be light – Novel global resources in helium and hydrogen
 Session Chairs: B. Sherwood Lollar, A. Prinzhofer, C.J. Ballentine
 23. **American Geophysical Union** Annual Meeting (San Francisco, CA) Dec. 2019
 A Deep Dive into the Habitability of the Blue Planet
 Session Chairs: B. Sherwood Lollar, J.F. Mustard, M. Osburn
 24. **Geological Society of America** Annual Meeting 2022
 Exploration of Helium in Sedimentary Basins: The New “Gold” Rush?”
 Session Chairs: D. Pinti, O. Warr, B. Sherwood Lollar
 25. Member of Organizing Committee for **Breakthrough Initiative and South African Astronomical Observatory 2nd Life in the Universe** Nov 22-24, 2021. Registration of >500 from 40 nations to this international and interdisciplinary virtual program

26. **CIFAR** (Canadian Institute for Advanced Research) Workshop on Earth 4D: Subsurface Science and Exploration, Paris France. June 2022
27. **Goldschmidt 2022** (Honolulu Hawaii) July 2022
The fate of hydrogen: from natural hydrogen fluxes, to underground hydrogen storage and nuclear waste repositories.
Session Chairs: C. Ostertag-Hennig L. Truche, B. Sherwood Lollar, E. Popa
28. **CIFAR** (Canadian Institute for Advanced Research) Workshop on Earth 4D: Subsurface Science and Exploration, Toronto ON. Nov. 2022
29. **CIFAR** (Canadian Institute for Advanced Research) Workshop on Earth 4D: Subsurface Science and Exploration, Calgary AB. June 2023
30. Member of Organizing Committee for **Goldschmidt 2024** to be held in Chicago USA. Aug. 20-24, 2024. Registration of >3500 from 40 nations to this international and interdisciplinary conference
31. **CIFAR** (Canadian Institute for Advanced Research) Workshop on Earth 4D: Subsurface Science and Exploration, Toronto. Nov. 2023
32. **GeoConvention Canada** Calgary AB June 2024. Session Co-Chair.
33. **CIFAR** (Canadian Institute for Advanced Research) Workshop on Earth 4D: Subsurface Science and Exploration, Quebec City. June 2024

MEDIA AND PUBLIC OUTREACH AND LECTURES

PUBLIC LIAISON in 1999-2024 took the form of a number of popular articles/interviews that appeared in the press and highlighted my research in environmental geochemistry, storage and transport of carbon dioxide in the subsurface, and abiogenic hydrocarbon gas formation and deep subsurface microbiology in Precambrian rocks. These included:

- | | |
|-------------|---|
| March 2024 | BBC World Service Unexpected Elements. Radio interview on the hidden hydrogeosphere discoveries. |
| Feb. 2024 | FAS Newsletter. https://www.chemistry.utoronto.ca/news/jonathan-abbatt-and-barbara-sherwood-lollar-receive-honours-american-geophysical-union |
| Jan 13 2024 | CBC Quirks and Quarks: Natural Hydrogen and the green energy transition.
https://www.cbc.ca/radio/quirks/quirks-quarks-jan-13-2024-1.7081742 |
| Jan 2024 | Talk and mentoring. The Expanse of Habitability – Lessons from the deep earth for space exploration and astrobiology. SEDS Student Canadian Space Conference. Jan. 26-28 2024. Toronto ON. |
| Dec 2023 | The Washington Post Habitability and Origins of Life |
| Nov. 2023 | TVO Film Production The Water Boys – based on our 2022 Nature Communications paper. “The World’s Oldest water” |
| March 2023 | Arts and Science story on discovery of new helium and hydrogen published by our group in Nature
https://www.artsci.utoronto.ca/news/new-method-locate-hidden-helium-gas-fields-could-avert-global-supply-crisis |
| March 2023 | BBC Radio interview with first author Dr. Annie Cheng on discovery of new helium and hydrogen published by our group in Nature https://www.bbc.co.uk/sounds/play/m001jl2n?partner=uk.co.bbc&origin=share-mobile |
| March 2023 | Science AAAS interview re native hydrogen sources in the climate and energy transition.
https://www.science.org/content/article/hidden-hydrogen-earth-may-hide-vast-stores-renewable-carbon-free-fuel |
| Nov. 2022 | Interview for Wired Science Magazine “Gold hydrogen” https://www.wired.co.uk/article/gold-hydrogen |
| Nov. 2021 | Nature Reviews: Earth and Environment editors select our paper on biodegradation of groundwaters as a highlight
https://www.nature.com/articles/s43017-021-00248-7 |
| Nov. 2021 | CNRS Highlights story https://lejournal.cnrs.fr/articles/la-radioactivite-naturelle-moteur-dune-vie-souterraine-insoupconnee |
| Oct. 2021 | https://cifar.ca/cifarnews/2021/10/01/new-study-reveals-earths-crust-has-largest-reservoir-of-water-ahead-of-ice-sheets/?utm_medium=email&utm_source=newsletter&utm_campaign=news_ideas/ |
| Aug. 2021 | Quanta Magazine (Simon’s Foundation) podcast:
https://d2r55xnwy6nx47.cloudfront.net/uploads/2021/08/quanta-169_Radioactive-Life_FINAL.mp3 |
| Aug. 2021 | Nature Research Highlights https://www.nature.com/articles/d41586-021-02232-z and AGU EOS
https://news.agu.org/press-release/new-estimate-makes-groundwater-not-ice-sheets-largest-water-reservoir-on-land/ Geophysical Research Letters paper on deep groundwater |
| May 2021 | Quanta Magazine (Simon’s Foundation) article Radioactivity may fuel deep life underground and inside other worlds
https://www.quantamagazine.org/radioactivity-may-fuel-life-deep-underground-and-inside-other-worlds-20210524/ |

- <https://www.quantamagazine.org/radioactivity-may-fuel-life-deep-underground-and-inside-other-worlds-20210524/>
- May 2021 CBC Quirks and Quarks Bob MacDonald Blog <https://www.cbc.ca/radio/quirks/new-evidence-of-recent-volcanic-activity-on-mars-raises-the-possibilities-of-subterranean-life-1.6026849>
- May 2021 Maclean's article (May edition 2021) **Bottled in Time** (on our discoveries of ancient water and implications for Mars Perseverance rover mission) <https://www.macleans.ca/society/science/this-geologist-found-the-oldest-water-on-earth-in-a-canadian-mine/>; followed by related stories on CBC TV (Ottawa); The Indian Express <https://indianexpress.com/article/explained/explained-why-finding-the-oldest-water-on-earth-matters-in-the-quest-for-life-on-mars-7295729/>; The Science Times <https://www.sciencetimes.com/articles/30896/20210428/worlds-oldest-water-found-canada-shed-light-beginning-life.htm>; Good Morning Britain
- April 2021 News stories re our paper (Tarnas et al. 2021) Cover Story of Astrobiology on subsurface microbial life on Earth and implications for exploration on Mars. Highlighted on Geochemical Newsletter; with related stories on SciTech Daily; <https://scitechdaily.com/life-on-mars-scientists-find-mars-has-right-ingredients-for-present-day-microbial-life-beneath-its-surface/>; <https://newatlas.com/space/mars-microbes-subsurface/>
- Jan. 2021 CTV News Interview "Life on Mars: Ancient water could unlock the mystery" <https://www.ctvnews.ca/sci-tech/life-on-mars-ancient-water-in-ontario-could-help-unlock-the-mystery-1.5271071>
- Jan. 2021 The Future Economy – Conversations with *Winners of the 2020 Canada Council Killam Prizes*
- Jan. 2021 Toronto Star article on Sherwood Lollar research "Key to life on Mars may be in Timmins".
- Dec. 2020 Public Lecture Kingston Rotary Club
- Nov. 2020 Reimaging the Earth – GG Conversations (English) - Interview with Canada's Governor-General https://www.youtube.com/watch?v=2RP3JvMFpZM&ab_channel=GGJuliePayette
- Nov. 2020 Repenser le monde – GG Conversations (French) https://www.youtube.com/watch?v=H7FniS_kxg8&ab_channel=GGJuliePayette
- Nov. 2020 Globe and Mail; Ottawa CTV; Sudbury Star News stories "CANADIAN SCIENCE-MUSEUM ACQUIRES BOTTLE OF BILLION-YEAR-OLD WATER" <https://www.theglobeandmail.com/politics/article-national-science-museum-acquires-billion-year-old-water/> <https://www.thesudburystar.com/news/local-news/billion-year-old-water-from-timmins-finds-home-in-ottawa>
- Oct. 2020 CBC Radio One interview Ideas "Meet the Winners of the 2020 Canada Council Killam Prizes" <https://www.cbc.ca/radio/ideas/meet-the-winners-of-the-2020-canada-council-killam-prizes-1.5755298>
- Sept. 2020 Faculty of Art and Sciences Bulletin <https://www.artsci.utoronto.ca/news/earth-sciences-barbara-sherwood-lollar-receives-royal-society-canadas-2020-willet-g-miller>
- June 2020 Rogers TV Ottawa – "Entre Nous" on Canada Council Killam Prize in Natural Sciences
- June 2020 French radio interview with Radio-Canada "Y a des matins" on Canada Council Killam Prize in Natural Sciences
- May 2020 Simons Foundation Quanta Magazine <https://www.quantamagazine.org/inside-deep-undersea-rocks-life-thrives-without-the-sun-20200513/>
- April 2020 Massey Dialogs – Public Lecture and Discussion on "A life's career in exploration of the deep Earth" with Principal Nathalie Des Rosiers, Massey College, University of Toronto. April 1 2020.
- Feb. 2020 Preparation of public exhibit on deep water with staff of Ingenium at the Ottawa Science Centre.
- Feb. 2020 Third Age Learning Lecture Series – Burlington Arts Centre. "Microbial Life in the Deep Earth – What Captain Nemo got right, and wrong".
- Jan. 2020 Public Lecture Massey College Monday Club. "Deep water and deep life in the Earth's subsurface".
- Aug. 2019 Publication by our lab's undergraduate researcher is profiled in more than a dozen international news stories including Science (<https://www.sciencemag.org/news/2019/08/strange-microbes-found-earth-s-oldest-water>), NBC news (<https://www.nbcnews.com/mach/science/strange-life-forms-found-deep-mine-point-vast-underground-galapagos-ncna1050906>), The Scientist (<https://www.the-scientist.com/news-opinion/microbial-life-discovered-deep-in-canadian-mine-66333>), and others including selected links as follows. <https://deepcarbon.net/worlds-oldest-groundwater-supports-life-through-water-rock-chemistry> <https://interestingengineering.com/life-forms-found-deep-in-worlds-oldest-groundwater>
- May 2019 Interviews with the Globe and Mail, CBC (As it Happens), CBC North, and Radio-Canada regarding the NSERC Herzberg Gold Medal
- April 2019 UofTNews: www.utoronto.ca/news/three-u-t-researchers-named-fellows-uk-s-royal-society
- Mar. 2019 EOS American Geophysical Union Centennial Collection. "Looking Down to Reach the Stars". A perspective on subsurface science, planetary science and astrobiology

Feb. 2019 2019 C. Gordon Winder Memorial SCUGOG Public Lecture, University of Western Ontario London, ON.

Jan. 2019 Radio-Canada Interview related to co-authored Nature publication on microbial methane discharge from base of glacial ice sheets – implications for climate change (*Lamarche-Gagnon, Wadham, Sherwood Lollar et al., 2019*)

Dec. 2018 American Geophysical Union TownHall – US National Academies “Astrobiology Strategy for the Search for Life in the Universe”

Dec. 2018 American Geophysical Union Podcast – “Third Pod from the Sun” – Deep subsurface exploration

Dec. 2018 The Economist – Deep life in ancient waters

Dec. 2018 University of Toronto Bulletin news story – Is there life beyond Earth?

Dec. 2018 Edmonton Journal - Easting sulfur and breathing iron - Estimating the deep continental biosphere

Oct. 2018 Interviews with Los Angeles Times, Scientific American, Globe and Mail, and web-based interviews on Science.com, Quartz, Astrobiology Today, Astronomy Magazine, Discover Magazine, NASA Astrobiology covered my role as Chair of the Astrobiology Science Strategy for the National Academies and NASA.

2018 Montreal Science Centre Exhibit on world’s oldest water – worked with curators on this permanent display

Mar. 2018 Earth Hour Public Lecture Dept. of Astronomy and Astrophysics University of Toronto.

Nov. 2017 61st Annual Thomas Condon Public Lecture Oregon State University

2017 Ontario Science Centre Exhibit on world’s oldest water – worked with curators on the 6 month display

Dec. 2016 Television interview on Business network, Global TV National News, radio interviews with CBC, BBC, ABC, and print stories in Toronto Star and Canadian Press following our research on ancient water discoveries and implications for Mars exploration

Nov. 2016 CBC documentary “The Nature of Things” with David Suzuki “Destination Mars” profiled our deep subsurface research.

Oct. 2016 Science@Massey Co-organizer of Science, Public Policy and Society Panel on Fracking Impacts on Groundwater

Oct. 2016 Research stories in Globe and Mail, Edmonton Journal Calgary Herald, CBC Radio “The Current”, Sudbury CBC One radio, Timmins CTV, National Public Radio, BBC World Service covered our Nature Communications publication Li et al. (2016) documenting source of sulfate supporting deep subsurface life

Sept. 2016 **BBC World Service.** Hour long radio interview for The Forum entitled “Underground”

Aug. 2016 **Royal Society of Canada Bulletin** “The research of the Stable Isotope Laboratory University of Toronto”

Aug. 2016 Cited in **New Scientist** cover article “Life, spontaneously” by Penny Sarchet Vol 20. 26-29 Aug. 20 2016

July 2016 Interviews in Globe & Mail, Toronto Star, Kingston Whig Standard at time of appointment as Companion of Order of Canada.

June 2016 Public Lecture (in French and English) at **Montreal Science Centre** – “Jules Verne was right – Journey to the Centre of the Earth”

April 2016 **Nature of Things documentary (CBC TV – Radio-Canada)** featuring Stable Isotope Lab shoot and following Dr. Sherwood Lollar on Underground field trip in Sudbury, Ontario. 3 days filming for Nov. 2016 release

Feb. 2016 NSERC Documentary, **Globe & Mail**, UofT Bulletin, **The National Evening News** – coverage of research on deep groundwaters resulting in NSERC John C. Polanyi Award to Sherwood Lollar

Dec. 2015 **CBC Interview Quirks and Quarks, Globe & Mail** coverage of our discovery of first eukaryote in deep subsurface groundwaters up to 12,000 years in age (Borgonie et al., 2015)

Sept. 2015 Interview with **Macleans Magazine** on our research on deep saline groundwaters and connection to Mars discovery of saline fluids <http://www.macleans.ca/society/science/theres-water-on-mars-but-is-there-life/>

Dec. 2014 **Nature paper (Sherwood Lollar et al. 2014)** on reduced gas production in ancient crust published same day as Mars Curiosity confirmation of methane in Mars atmosphere. Related interview for BBC Radio 5, BBC International, The Toronto Star, Globe and Mail, Scientific American, Huffington Post, Science Daily, German National Radio and others news outlets worldwide. On day of publication our interview was most downloaded on BBC news site.

Dec. 2014 **Profile published in Nature.** “*Earth’s deep crust could support widespread life*”

July 2014 **New Scientist** “Ancient water cache may be pristine primordial soup” profile of PDF C. Sutcliffe’s Goldschmidt presentation on deep mines waters. <http://www.newscientist.com/article/mg22329762.600-ancient-water-cache-may-be-pristine-primordial-soup.html?full=true#.U7bNhi-61Cc>

July 2014 Public lecture “**Chautauqua of the North series**” Thousand Island Park Corporation “The World’s Oldest water”

March 2014 **Global News Television Documentary** “Search for Life” highlights interview and footage from Stable Isotope Lab and Sudbury as well as interviews with NASA Rover team

Dec. 2013 Billion year old water study published in **Nature** 497: 367-360 selected as one of **Top Ten Science Stories of 2013** by Fox News, Discovery and the Geochemical News.

Dec. 2013 **Macleans Magazine List of Top Stories to Follow for 2014**

Dec. 2013 Interviews in the **Independent (UK)** and **New Scientist** on topic of the Deep Carbon Observatory and deep subsurface microbial life

Nov. 2013 Ancient waters of the Canadian Shield. Public Lecture, **Science North Science Centre**. Sudbury, Ontario.

Oct. 2013 **Canadian Geographic** October Issue. Profiled in list of **Top Ten Canadians who are changing the world** along with director/deep sea explorer James Cameron; astronaut and Commander of the International Space Station Chris Hadfield, paleoclimatologist and Herzberg Medalist Dr. John Smol, and others.

Sept. 2013 Toronto Science Festival. Life in the Universe. Panelist: Life in Extreme Environment along with NASA JPL Kevin Hand and oceanographer John Baross, University of Toronto, Toronto, Ontario.

May-Oct. 2013 Billion year old water study published in **Nature** 497: 367-360. This study generated over 200 international news stories including profiles and interviews in Nature, National Public Radio, Popular Science, CBC Radio, CBC The National, CNN, Fox, Globe and Mail, Quirks and Quarks. The story in the LA Times alone garnered over 200,000 hits and 10,000 written responses.

April 2013 Panelist on Judging Panel for **Weston Innovation Youth Award in Science** sponsored by Ontario Science Centre

March 2013 U of T Bulletin "U of T geochemist joins the hunt for deep carbon" features Sherwood Lollar and deep subsurface research. Related stories ran in the Ottawa Citizen, Montreal Gazette and on-line stories on CTV and CBC.

March 2013 Deep Carbon Observatory Symposium and Launch of "Carbon in the Earth" RiMG volume results in 21 stories on 13 international newswires including Reuters, Associated Press, Canadian Press, Agence France Press and Agencia EFE with DCO researchers interviewed on National Public radio, El Pais, EOS, CBS Smart Planet and stories on 500+ sites in 12 languages.

Feb. 2013 **Canada Press Interview:** Deep Carbon Observatory

June 2012 Interviews in European media re **Eni Protection for the Environment Gold Medal** Award ceremony in Rome Italy.

Jan. 2012 Interview in "Source Code: the Methane Race" **Earth Magazine** p. 40-45 (Jan. 2012 edition)

Nov. 2011 **Convocation Address** to 2012 Graduating Class School of Graduate Studies, University of Toronto

March 2011 **CBC radio Quirks and Quarks: World's Oldest Water-** based on our recent publication on billion year old Neon in deep groundwaters. Day after interview the story had the record for most hits on CBC website.

March 2011 Panelist on Judging Panel for **Weston Innovation Youth Award in Science** sponsored by Ontario Science Centre

Feb. 2011 44 stories in media on **World's Oldest Water** (based on our recent publication on billion year old Neon in deep groundwaters) including Spiegel on-line, Norwegian broadcasting Corporation, Australian Broadcasting Corporation (radio interview) and story in MICROBE (popular science magazine)

Feb. 2011 Panelist "Science without Borders" Press Breakfast. AAAS Annual Meeting. Washington D.C. Feb. 2011

Dec. 2010 CTV Evening News – Commentary on discovery of Weird Life – Mono Lake Arsenate bacterium

Nov. 2010 **Vancouver Institute**. University of British Columbia. "Can Carbon Capture and Storage Solve (or Reduce) Global Climate Change: Lessons from Nature"? Vancouver BC.

May 2010 Highlighted in University of Toronto's publication "**Ideas that could Change the World**"

March 2010 Panelist on Judging Panel for **Weston Innovation Youth Award in Science** sponsored by Ontario Science Centre

Feb 2010 **Australian Broadcasting Corporation:** Interview for Science Radio program on carbon sequestration

Nov. 2009 **Massey College University of Toronto** Science and Medicine Round Table "Follow the Water". Toronto ON

Oct. 2009 **Royal Society of Canada** International Year of Astronomy Symposium - The Universe and Our Place in it. Invited Presentation at Canada Museum of Science and Technology, Ottawa. "Astrobiology - Life on Earth and Beyond?"

April 2009 Press related to Nature Cover story included Canada Press, **Quirks and Quarks, CBC Radio** morning shows in Calgary and Edmonton, and international coverage by the BBC, The Independent, Reuters, El Pais, Chemical Engineering News and News and Views piece in Nature

April 2009 Introduction and Q&A for new IMAX film at **Ontario Science Centre**

March 2009 Panelist on Judging Panel for **Westin Innovation Youth Award in Science** sponsored by Ontario Science Centre

Feb 2009 Press related to publication of U.S. Environmental Protection Agency (EPA) White paper on Compound Specific Isotope Analysis Press included stories in U of T Bulletin; HazMat Journal and Chemical News

Jan. 2009 Girls Rock Science - High School Outreach Program at U of Toronto "Astrobiology - Beyond the Men in Black"

Nov. 2008 Public Lecture sponsored by U of T Alumni: "Threats to Canadian Groundwater"

May 2008 Introduction and Q&A for new IMAX film at **Ontario Science Centre**

May 2008 John Fisher Public School - 4th Grade presentation

Jan. 2008 Girls Rock Science - High School Outreach Program at U of Toronto "Astrobiology - Beyond the Men in Black"

Nov. 2007 Public Lecture at UTSC to Alumni on ancient microbial communities found at 2.8 kmbs in South Africa gold mine

Aug. 2007 PBS - Sloan Foundation documentary film crew accompanies our field team in the deep subsurface Kidd Creek Mine (Timmins ON)

January 2007 Public Lecture to Attached High School of Ochanomizu University of Tokyo, Japan.
Royal Society of Canada - Science Council of Japan WISET Invited Lecture.

December 2006 **Ripley's "Believe it or not" Editorial** cartoon runs throughout North American newspapers highlighting our *Science* paper by Lin et al., 2006 on ancient microbial communities found at 2.8 kmbs in South Africa gold mine

October 2006 **CBC radio Quirks and Quarks** - Interview our *Science* paper by Lin et al., 2006 on ancient microbial communities found at 2.8 kmbs in South Africa gold mine

Aug. 2006 **Toronto Star** feature on our research on deep subsurface biosphere and origin of methane

July 2006 **CBC Radio** Interview - NASA searches for life on Mars deep in the Canadian Shield

July 2006 **Timmins Daily Press** Kidd Creek Mine: NASA search for extraterrestrial life

April 2006 **Canadian Space Agency** - New research on terrestrial analogue sites for space studies

April 2006 **Canadian Chemical News** highlights our work "Countering the hydrocarbon threat - sources and remediation of Canada's groundwater contamination"

October 2005 **Geotimes** - published by the American Geological Institute - interview and photo on our research on abiogenic hydrocarbons

April 4, 2005 **Chemical and Engineering News** - Details of Sherwood Lollar American Chemical Society Invited Talk in Session of Biogeochemical Limits of Habitability highlighted

April 2005 Coordinated 4th grade visit to U of T - St. Bridget's Catholic School - Toronto District Separate School Board

April 2005 4th grade talk on geology - John Fisher Public School - Toronto District School Board

March 2005 Seminar on science careers - Linden School Toronto

Feb. 2005 **BBC Radio** - Interview by lead author C.J. Ballentine on our research on neon isotopes and mantle-derived gases and related publication in *Nature*

Jan. 2005 **CBC Radio - Quirks and Quarks** - Interview on our research on neon isotopes and mantle-derived gases and related publication in *Nature* by Ballentine et al., 2005

Nov. 2004 **Geotimes** - published by the American Geological Institute - interview on abiogenic hydrocarbons p. 11 "Taking the fossil out of fuels"

Sept. 2004 **New York Times** interview - Petroleum from decay? Maybe not, study says (Tues. Sept. 14, 2004); additional interview on same topic for **ScienceOnline** (website for the leading scientific publication *Science*)

May 2003 **Scientists in Schools** - Toronto Separate School Board of Education

Nov. 2002 **American Association of Petroleum Geology Explorer** "Gas Origin Theories to be Studied"

July 2002 **Canadian Chemical News** - The Chemical Institute of Canada

Apr. 8, 2002 **U of T Bulletin** "Geochemist identifies origin of mysterious gases"

Apr. 6, 2002 **CBC Radio - Quirks and Quarks** - Interview on my research on abiogenic hydrocarbons and related publication in *Nature*

Apr. 5, 2002 **NATIONAL POST** - Article by J. Bryan "Canadian Shield Mystery Solved - U of T Mine Gas Study"

Apr. 5, 2002 Online german version **Scientific American** (<http://www.wissenschaft-online.de>) "Canadian Shield Mine gas study"

Apr. 5, 2002 **National GeographicWebsite** (<http://news.nationalgeographic.com/>) story by B. Trivedi "Earth gases may provide clues to evolution of life"

Apr. 5, 2002 **Radio CKTB** Niagara "Drive at Five" Interview

Apr. 4, 2002 **Discovery TV** - Interview on my research on abiogenic hydrocarbons and related publication in *Nature* on "@discovery.com" show

Feb. 2002 University of Toronto publication on research = "**The Edge**" - profiled in cover story on environmental research at University of Toronto

Sept. 5, 2001 **Globe and Mail** - - Natural Science and Engineering Council insert - "They don't walk on water but ..". NSERC research initiatives in environmental water research.

Sept. 5, 2001 **La Presse** - Natural Science and Engineering Council insert - "They don't walk on water but ..". NSERC research initiatives in environmental water research. French language version of same

Sept. 1999 **TIME Magazine** - Canada Edition - Profiled as one of 25 "Leaders for the 21st Century"

Sept. 1999 **CBC Radio Metro Morning** Interview

Sept. 1999 **CBC Radio Ontario Morning** Interview

Sept. 1999 S&T Post, the official newspaper of the Department of Science & Technology (DOST), Philippines.

Sept. 1999 Technology News section of **Pollution Engineering** magazine.

Sept. 1999 Physics Today (scientific periodical). Scientific profile of my research program
Sept. 1999 **Environment News** - Environmental Sciences newsletter of *Organic Geochemistry*
May 1999 NSERC Tribute to Research Excellence
Apr. 12, 1999 **University of Toronto Bulletin** "Process to benefit groundwater cleanup".
Mar. 31, 1999 **NATIONAL POST** article "A new technique measures bacteria's progress in pollution" by A. Lamey
Spring 1999 NSERC Issue of **Contact**