

The 2nd Joint Symposium of the International Societies for Environmental Biogeochemistry and Subsurface Microbiology

Banff, Alberta, Canada
22 – 28 October 2023

PROGRAM BOOK



ABSTRACT COLLECTION

Scan this QR Code to go to the abstracts



<https://aca.pensoft.net/collection/407/>



WELCOME



We are pleased to welcome you to the 2nd Joint Symposium of the International Societies for Environmental Biogeochemistry & Subsurface Microbiology in Banff, Canada. The Societies held their 1st Joint Symposium in Jackson Hole, Wyoming (USA), in 2005. This year will also be the 25th Symposium for ISEB and the 11th Symposium for ISSM.

We thank our sponsors, Taylor and Francis Publishing Group, the Mineralogical Society of the UK and Ireland, and private donors from within our societies.

Welcome to Banff! We hope you have an enjoyable and productive week!

-Annette Engel, Sarah Keenan, and Christopher Omelon
on behalf of the ISEB-ISSM Organizing Committee

Organizing Committee

Christopher Omelon, Canada - Chairperson

Alex Chik, Canada

Frederick Colwell, USA

Maria Dittrich, Canada

Annette Summers Engel, USA

Danielle Fortin, Canada

Ernest Chi Fru, UK

William Ghiorse, USA

Sarah Keenan, USA

Rainer Meckenstock, Germany

Lotta Purkamo, Finland

Chris Weisener, Canada



Land Acknowledgement

The 2023 Joint Symposium of ISEB and ISSM will take place in Banff, Canada, and on the side of the Sacred Buffalo Guardian Mountain. The Banff region is known as “Minhrpa,” translated in Stoney Nakoda as “the waterfalls.”

In the spirit of reconciliation, we respectfully acknowledge the Indigenous Peoples of the traditional Treaty 7 region, including the Niitsitapi from the Blackfoot Confederacy, of whom the Siksika, Kainai, and Piikani First Nations are part, the Îyârhe Nakoda of the Chiniki, Bearspaw, and Wesley First Nations, the Tsuut’ina First Nation, and the Métis Nation of Alberta.

We are grateful for all people of these First Nations who live, work, and play in this region and recognize that their histories and cultures have shaped their communities for generations. We honor the land and the stewardship of it by the First Nations and Indigenous Peoples. Throughout our time in Banff, we commit to respecting the land and recognizing the enduring presence and contributions of the First Nations to the region.

ISEB Executive Board



President: Annette Summers Engel

Vice-President: Christopher Omelon

Treasurer: Sarah Keenan

Member-at-large: Qiaoyun Huang

Future ISEB Chair: Christopher Omelon

Past President: Philippe Van Cappellen

Secretary: Magdalena Dębicka

Member-at-large: Jens Kallmeyer

Past ISEB Chair: Jens Kallmeyer

Members of the International Advisory Committee

Term Expires 2023 - Weiguo Cheng (Japan), Ernest Chi Fru (UK), Alexandra Grazon-Garcia (Australia), Sarah Keenan (USA), Marek Matyjasik (USA), Mehran Rezaei Rashti (Australia), Talitha Santini (Australia)

Term Expires 2025 - Adrian Mellage (Germany), Jen Hartmann (Germany), Daniel Ariztegui (Switzerland), Alberto Robador (USA), Lucian Staicu (Poland), Henry Tang (China), Irmina Cwielag-Piasecka (Poland), Simon Apte (Australia), Jacques Berthelin (France), Lian Bin (China), Chengrong Chen (Australia), Hailiang Dong (USA), Jadran Faganeli (Slovenia), Danielle Fortin (Canada), Geoffrey Gadd (UK), William Ghiorse (USA), Qiaoyun Huang (China), Jens Kallmeyer (Germany), Goran Kniewald (Croatia), Jon Lloyd (UK), Chris Omelon (Canada), Annette Summers Engel (USA), Philippe Van Cappellen (Canada), Jerzy Weber (Poland), Jenny Webster Brown (New Zealand), Chris Weisener (Canada)

Term Expires 2027 - Marco Contin (Italy), Irmina Cwielag-Piasecka (Poland), Magdalena Debicka (Poland), Maria Dittrich (Canada), Nives Ogrinc (Slovenia)

ISSM Executive Board



President: Danielle Fortin

Jens Aamand

Murray Close

Frederick Colwell

Julia Derx

Inge van Driezum

Annette Summers Engel

Ji-Dong Gu

Ronald Harvey

Fumio Inagaki

Rainer Meckenstock

Richard Smith

Jack Schijven



GENERAL INFORMATION



History of Banff and the Area

Nestled in the Canadian Rockies, the Town of Banff has a rich and vibrant cultural and natural history. The year-round population of Banff is ~8000. Established in 1885 as Canada's first national park, Banff National Park has become a symbol of Canada's commitment to preserving its landscapes. Banff is recognized by the United Nations, which designated the area of the Canadian Rockies as a United Nations Educational, Scientific, and Cultural Organization (UNESCO) World Heritage Site in 1984.

Banff is a haven for wildlife enthusiasts, hikers, and those seeking solace in the wilderness. The area boasts incredible biodiversity, from rugged mountains to pristine lakes and ancient glaciers. There are many opportunities for outdoor adventures, including hot springs, Sulphur Mountain, Cave and Basin National Historic Site, and other sites within Banff National Park.

The Symposium venue is the locally owned Banff Park Lodge and Resort, situated along the Bow River. Nearby are other associated hotels within the collection, Peaks Hotel & Suites and the Bow View Lodge. All are centrally located and within walking distance to scenic areas and amenities in Banff, including art galleries, museums, restaurants, shops, and spas. Banff's entertainment district and iconic street, Woonerf, is minutes away.

Symposium Venues and Amenities

From 22 – 26 October, the Symposium will be held at the **Banff Park Lodge and Resort**, 2nd floor, and on 27 October at the **Fenlands Banff Recreation Centre**, 2nd floor Concourse. The distance between the Banff Park Lodge and the Fenlands Centre is about 1 km (12–15 minutes walking).

Parking at the Banff Park Lodge is available as underground parking, with a height clearance of 1.8 meters (6 feet), and limited outdoor parking only for vehicles over 1.8 meters in height at the rear of the hotel. Parking availability is not guaranteed. There is also parking at the Fenlands.

Breakfasts and lunches (except on Wednesday) will be provided for delegates as part of their registration. For dinners, delegates and their guests get to explore Banff, or dine-in at The Banff Park Lodge, which has Crave Mountain Grill, La Terrazza Italian Restaurant, Terrace Lounge, and in-room service. The Bluebird Restaurant is across the street from the Banff Park Lodge. Reservations are recommended, especially for 6 or more.

Check-In and On-Site Registration Desk



Check-in and on-site registration for delegates and their guests can be done at the Registration Desk, located in the Mezzanine hallway on the 2nd floor of the Banff Park Lodge, opening on Sunday, 22 October, at 3:00 pm. The Registration Desk will be open from 7:30 – 8:45 am every day of the symposium.

If you require any assistance, please contact any of the organizers who will be stationed at the desk during the symposium. A notice board next to the Registration Desk will also be available to communicate general information, program changes, and announcements.

IMPORTANT INFORMATION



Name Badges

All delegates are requested to wear name badges to all sessions, meals, and social functions while in the Banff Park Lodge and in the Fenlands Banff Recreation Centre.

Dress

Delegates should wear comfortable, casual attire for the Symposium and at social events, appropriate for the weather in late October. Banff is the highest town in Canada, at an elevation of 1,383 meters (4537 feet). Temperatures can range from 10–15°C in the day to below freezing at night. Smart Western wear is encouraged for the Symposium Dinner, which will take place inside.

Wildlife Safety

The town of Banff is within Banff National Park. This setting is home to abundant wildlife, including black and grizzly bears. There have been of recent reports of bears killing people, and Alberta Parks and Parks Canada released “be prepared to encounter a bear” advisories for the Banff area to heighten awareness and encourage precautions. Bears are attracted to smells and follow their noses into town and neighborhoods.

Please dispose of all used/unused food and drink containers and wrappers in wildlife-proof bins, and make sure the bin closes completely. If there is garbage or food waste left outside that may attract a bear, then this is treated as a town emergency. You can call #403-762-1240 for attention.

Carry bear spray if you plan to hike or walk around less crowded areas. You need to know how to use bear spray, too. You should also make noise, talk loudly, wear bells, sing, or clap if you are around dense vegetation, streams, or berries. If you see a bear, then please remain calm. Yelling may trigger aggressive behavior, and do not run away, unless you want to be chased by the bear. Back away slowly, while facing the bear, and have your spray ready. Go to a safe place inside a building or car. If in town, then please call the Banff National Park dispatch to report the sighting, #403-762-1470.

Smoking

Smoking is NOT permitted inside any public places, including the Banff Park Lodge.

Firearms

Canada has very strict gun laws. Firearms are not permitted in Banff National Park. Elsewhere, possession is prohibited except on a person’s personal property or in a vehicle travelling on the highway. Fines are steep if caught in possession of a firearm.

Cell Phones and Mobile Devices

Cellular service in Canada is the same as the USA. Check with your service provider for more information about roaming charges. Please ensure that phones and other devices are turned off or in silent mode during all oral presentations.

Internet

Internet access is provided by the Banff Park Lodge and The Fenlands Centre.

Social Media

Please use the #2023ISEBxISSM to tag posts about the 2nd Joint Symposium.

Personal and Research Privacy

If you do not wish to have your photograph taken, then you can place a “no photo” sticker on your badge, which will be available at the Registration Desk. If you do not want your poster photographed, then please add a “no photo” sticker on your poster and near the title.



Unauthorized photography, audio-taping, video-recording, or any other form of duplication is strictly prohibited in all sessions, oral and poster. If you would like a copy of a presentation, then please approach the presenter with your request.

Certificates of Attendance

A certificate of attendance will be available **only on the last day of the Symposium, on request**. They can also be emailed as a .pdf file but **MUST** be requested on-site.

PRESENTATIONS AND SESSIONS



Oral Presenters

Oral presenters will need to submit their presentation at the Registration Desk one day before their presentation. Accepted formats are .ppt, .pptx, and .pdf. Presentations should be shared with organizers using a standard memory device.

Speakers are kindly requested to stay within their allocated time. Session chairs should ensure that the sessions will progress according to the planned timetable.

- Plenary Speakers will have an hour to speak, which includes time for questions and discussion.
- Invited Speakers will have 30 minutes, which includes time for questions.
- All other oral presentations will be 20 minutes, and **we suggest speaking for 15 minutes and allowing 5 minutes for discussion and questions.**

Oral presentations will take place on the mezzanine level, Ballroom area, of the Banff Park Lodge and Resort. Plenary speakers will begin sharply at 9:00 am in the Ballroom rooms on Monday, Tuesday, and Thursday, and at 9:00 am on Friday at the Fenlands Centre. Two concurrent sessions for oral presentations will take place on Monday and Thursday in the Summit Room and Castle/Assiniboine Rooms. Three concurrent sessions for oral presentations will take place on Tuesday in the divided Summit, Castle, and Assiniboine Rooms. Oral presentations on Friday will take place at the Fenlands Banff Recreation Centre, on the 2nd floor Concourse.

Poster Presenters

Poster dimensions should be no more than 101 cm x 101 cm (40" x 40"). Boards will be shared, so please ensure your poster fits within this size. Also, remember that the text of a poster is best when easily readable from 2 m distance.

The poster session will be from 4:20 – 6:30 pm on Tuesday, October 23rd, in the Summit

and Castle Rooms, co-occurring with an afternoon break in the Alpine Meadows. Poster presenters are asked to remain at their posters during this time.

Posters should be hung any time after 3 pm on Sunday, October 22nd, and will remain on display until 5:30 pm on Thursday, October 26th. We ask poster presenters to take down their posters after the sessions and before the Banquet on Thursday.

Session Chairs

Session chairs are identified in the program, with most sessions having at least two chairs. Please be in the correct room at least 10 minutes before the start of your session to familiarize yourself with the A/V equipment. Please ensure that the presenters remain within their allocated time slot. If there are problems, then contact an Organizer.

Student Awards

A panel of judges will evaluate student oral and poster presentations to award the top four prizes at the Symposium. Decisions will be based on, but not limited to:

- Understandability and impact (scientifically and aesthetically)
- Balance among style (e.g., for talks use of allotted time for introduction, results, discussion or for posters use of visual content of text, figures/tables)
- Evident scholarships, scientific novelty, and excellence
- Response to questions and familiarity of subject matter

Any early-career biogeochemistry investigator or student (35 years or younger) may also compete for the **Wolf Vishniac Memorial Award in Biogeochemistry**, presented by the International Society for Environmental Biogeochemistry. To be eligible, applicants needed to be the first author of either an oral or poster presentation given at the Joint ISEB-ISSM Symposium in Banff, Canada, during the week of 22-28 October, 2023, and must have submitted a .pdf file with (1) a cover letter, (2) a complete but unsubmitted/unpublished manuscript (with text, figures, appendices, etc.), and (3) a current CV to the conference organizers by 22 September 2023.

MEALS



Special Dietary Requirements

If you noted special dietary requirements to the Organizers previously, then your needs have been accounted for in the week's catered events. Names and dietary information have been given to the hotel, banquet, and reception staff. However, if you failed to mention your dietary needs to the Organizers ahead of time, or if there are any problems, then please notify the Organizers and/or the hotel staff during meals or breaks to ensure that your needs are met in the moment and in the future.

Breakfasts

Breakfast is available for all registered delegates and their registered guests, Monday through Friday, in the Glacier Salon & Crave Mountain Grill on the Mezzanine Level of the Banff Park Lodge. Breakfast is served from 7:00 – 9:00 am. Buffet options include eggs, hashbrown potatoes, a variety of meat options, yogurt options, in-house baked pastries, cereal, seasonal fruit, and coffee, tea, juice, and milk.

Lunches

Lunches on Monday, Tuesday, and Thursday will be offered to all registered delegates from 12:20 – 2:00 pm in the Glacier Salon & Crave Mountain Grill. Lunch buffets will include soup and salad options, a meat and vegetarian main dish with seasonal vegetables and starch sides, followed by a dessert buffet of sweets and fruit.

Snack Breaks

Morning and afternoon coffee, tea, and light snacks (pasties, fruit, chips) will be provided in the Alpine Meadows from 10:00 – 10:30 am and around 3:30 pm.

Dinners

Delegates are responsible for their own dinners and are encouraged to explore Banff, except for the Banquet night (Thursday), as this event is included for registered delegates and guests. See the “Getting Around Banff Section” for transit information.

Symposium Opening and Welcome Reception

The official Symposium Opening and Land Acknowledgement will take place in the Ballroom area, Castle/Assiniboine Room, starting at 5:30 pm on Sunday, 22 October.

This will be followed by the opening plenary presentation from 6:00 – 7:00 pm, after which a **Welcome Reception and Mixer** will be held in the Alpine Meadows from 7:00 – 9:00 pm for registered delegates and their registered guests. The reception will include a variety of hot and cold hors d’oeuvres, Canadian meats and cheeses, and a variety of desserts, plus celebratory champagne punch and non-alcoholic options. A cash bar will also be available to purchase additional beverages, paid for by the delegates.

Banquet

The Symposium banquet will be held from 6:30 – 11:00 pm on Thursday, 26 October, at the Mount View Barbecue venue. **All registered delegates and registered guests are welcome.** Dinner will include appetizers, a meal having a variety of salads and sides, and dessert. Vegetarian options will be provided. Each registered delegate (and guests) will be provided two drink tickets at the venue for your choice of alcoholic and non-alcoholic options; there will also be a cash bar to buy additional drinks, paid for by the delegates.

A five-piece band will provide music during and after dinner. We encourage comfortable Western attire and shoes for dancing.

Transportation to the banquet will be provided by Brewster Shuttle. Shuttle buses will depart from the Banff Park Lodge at 5:30 pm and 6:00 pm.

Please ensure to be in the Banff Park Lodge lobby before 5:30 pm, as there are no alternative transportation options to the banquet. No personal vehicles are allowed.

Farewell Lunch & Reception

Following the Closing Plenary on Friday, at the Fenlands Centre, there will be a modest Farewell Reception with a variety of sandwiches and fresh-baked goods. Registered delegates and their guests are welcome to participate. Say farewell to new and old friends.

Until we meet again at the next ISEB and/or ISSM symposia!

EXCURSIONS & ACTIVITIES



Getting Around Banff

There are many shuttle options to get around Banff and the area. Within Banff, the Canmore local routes 5C and 5T are free! <https://roamtransit.com/fares/>

Reservations for routes to popular tourist areas are encouraged. Tickets for other routes can be purchased online (using the **Token Transit** app), at vending machines, and from vendors throughout town. Each bus also accepts Canadian or US bills and EXACT AMOUNTS; no change is returned and bills larger than \$20 are not accepted.

Self-Led Exploration of Banff

On foot or by using shuttles, there are several Self-led Adventures to take within the town of Banff and within Banff National Park, Canada's first national park.

*Inclusion of activities here is meant to inspire adventure while in Banff and should not be interpreted as endorsements of sites, locations, or businesses. Note hours of operations for these sites may not coincide with potential openings in the scheduled Symposium program.

**Admissions charges are not included in delegate registration.

Banff Gondola**: A gondola runs to the top of Sulphur Mountain, where sweeping views of six mountain ranges, the Bow Valley, and Banff can be seen. At the top, there are walking paths, dining options, and a visitor's center. ***Delegates can book their trip online using the Promo Code ISEB-ISSM2023.***

Cave and Basin National Historic Site**: You can easily visit this site on your own. This site is a short (1.5 km) walk from the center of Banff. There is a small museum and a cave with sulfidic, geothermal water.

Banff Park Museum**: This museum was built in 1903 and contains animal and plant exhibits. It is the oldest natural history museum in western Canada. It is also the oldest surviving federal building in Canada's National Parks. The museum is located within Banff and near the Banff Park Lodge, the Symposium site.

Whyte Museum of the Canadian Rockies**: This museum is within walking distance from the Banff Park Lodge, and a place to engage with the evolving Canadian history, peoples, cultures, environment, and ideas of Rocky Mountain culture.

Banff Upper Hot Springs**: An historic site with a bathhouse, spa, and outdoor pool. It is located about 4 km from the center of Banff.

Optional Official Symposium Excursion

"Running Water of the Canadian Rockies"

Delegates can add this mid-week trip to their registration. Wednesday morning, delegates will depart by bus from the Banff Park Lodge for an all-day excursion. We request excursion attendees eat breakfast sharply at 7:00 am, to be ***ready to depart sharply at 8:00 am***. Assembly should be in the Banff Park Lodge by 7:45 am.

Weather permitting, we will explore premier areas of Banff National Park, including **Lake Louise**. We will drive to Lake Louise from Banff (about 40 minutes). After orientation, likely at the Fairmont Chateau Lake Louise Hotel, delegates can explore the area for a

couple of hours. The internet says that Lake Louise is the most photographed place in Canada, if not the world. What do you think?

Lake Louise is Canada's highest permanent settlement, at over 1700 m (5700 feet). The lake and surrounding area are ancestral lands of the Stoney-Nakoda and other First Nations people. The lake is glacier-fed by Victoria Glacier and ringed by high peaks with hanging glaciers and many glacial moraine features, including Mount Victoria, which is on the western end of the lake. The lake elevation is 1600 m (5200 ft) and reaches 70 m (220 feet) deep. The surrounding mountains are part of the Slate Range of the Canadian Rockies and reach over 2500 m (8200 ft) in elevation. Most of the rocks surrounding Lake Louise are comprised of Proterozoic sandstones, siltstones, and carbonates. The water's turquoise color is due to finely ground "glacial flour" produced by the glaciers, and the lake exists because a previous glacier paused briefly and deposited an end moraine that now traps surrounding meltwater.

Rocks outcropping along the shore, including near the Hotel, are Middle Cambrian, Gog Formation, and contain trilobite trace fossils in the quartzite. There are several places along the lakefront where you can take a short hike, eat your lunch, enjoy the scenery, and find prime locations for all your selfies. We will compare selfies back on the bus!

Regular shoes are fine. A warm jacket, layers, gloves, and rain gear may be useful given unpredictable fall weather and higher elevations (~1400–1600 m above sea level). Sunscreen is recommended, as are sunglasses and a hat.

Curling and Networking

Curling sheets have been reserved for delegates on Wednesday, 25 October, from 3:00–5:00 pm at the Fenlands Banff Recreation Centre (~1 km walk away from the Banff Park Lodge). Come join us and learn about one of Canada's most popular winter sports.

HELPFUL INFORMATION FOR DELEGATES



Time: The time zone in Banff, Alberta, is Mountain Daylight Time, UTC-6.

Measure: Canada uses the metric system, although many still use the imperial system. Distance is in kilometers, temperature in degrees Celsius, and petrol and drink are sold in grams or liters.

Tax: Nearly all prices in Canada are quoted without tax, although there is the federal Goods and Service Tax (GST) of 5%. In the province of Alberta, hotels add an additional 4% tax to the bill.

Tippling: Gratuity is seldom added to restaurant bills, but it is customary to tip 15–20% on the total bill before tax. Many restaurants charge an automatic 15–18% gratuity for larger groups (usually 6 or more).

Canadian Currency: The currency is the Canadian dollar (\$), made up of 100 cents (¢). Coins come as 1¢ (penny), 5¢ (nickel), 10¢ (dime), 25¢ (quarter), \$1 and \$2. The \$1 coin is known as a "loonie," after the bird on one face; the \$2 coin is known as a "toonie." There are notes of \$5, \$10, \$20, \$50, and \$100. US dollars are widely accepted near the border. For up-to-date exchange rates, check <https://www.xe.com/>. At the time of

writing, one Canadian dollar was worth 0.60 British pounds, 0.69 euros, 0.73 US dollars, 1.14 Australian dollars, 1.23 New Zealand dollars, and 110 Japanese Yen.

ATMs are commonplace. Most accept a host of debit cards, including all those carrying the Cirrus coding. All major credit and charge cards are widely accepted.

Electricity: Electricity is supplied at an alternating current of 110 volts and at a frequency of 60Hz, the same as in the USA. Appliances (shavers, hair dryers) from most other countries need transformers – most phones, laptops, and tablets can usually handle both 220/240 and 110 volt currents. For all appliances, you'll need a plug converter for Canada's two-pin sockets, either type A (two flat parallel pins) and type B (two flat parallel pins and a grounding pin).

Weather: Late October in Banff can be beautiful. Banff is the highest town in Canada, at an elevation of 1,383 meters (4537 feet). Temperatures can range from 10–15°C in the day to below freezing at night. Delegates should wear good shoes, have a hat and gloves, bring a sweater or two, and have a warm coat. There could also be rain or snow during this time of year, but rarely is snow on the ground for a long period of time. Delegates are encouraged to pack accordingly.

Emergency: For Police, Fire, or Ambulance, dial 911. For information, dial Operator, 0.

THE FINE PRINT

CODE OF CONDUCT



The Joint Symposium of ISEB and ISSM is dedicated to providing a harassment-free experience for everyone, regardless of gender, gender identity and expression, age, sexual orientation, disability, physical appearance, body size, genetic information, race, ethnicity, religion (or lack thereof), or technology choices. We will not tolerate harassment of Symposium delegates and their accompanying guests in any form.

There will be a limited amount of alcoholic beverages available during some events of the Symposium, but ISEB and ISSM are not responsible for the individual intake of the delegates and their guests. Recreational drugs are prohibited, per Canadian law.

If a participant engages in harassing behavior, the Symposium Organizers may take any action they deem appropriate, including warning the offender or expulsion from the symposium without refund. Note that participants with guests (spouses, children, other) are considered fully responsible for the behavior of their guest(s), and may be sanctioned, too.

Harassment includes: offensive comments related to gender, gender identity and expression, age, sexual orientation, disability, physical appearance, body size, genetic information, race, ethnicity, religion, technology choices, neurodiversity, deliberate intimidation, stalking, following, harassing photography or recording (also applies to presentations with a specific "no photography" sign, see below), sustained disruption of talks or other events, inappropriate physical contact, sexual images in public spaces, and unwelcome sexual attention. Sexual language and imagery are inappropriate at any venue and formal/informal events, like talks, posters, gatherings, or social media.

If you are being harassed, notice that someone else is being harassed, or have any other concerns, then please contact an Organizer or hotel staff immediately. Symposium staff can be identified with their dedicated badges and can be found at the Registration Desk. Organizers and hotel staff will be happy to help participants contact security or local law enforcement, or otherwise assist those experiencing harassment to feel safe for the duration of the Symposium.

TERMS OF REGISTRATION

This joint symposium is organized by the International Society for Environmental Biogeochemistry (ISEB) and the International Society for Subsurface Microbiology (ISSM), herein referred to as the "Joint Symposium." The ISEB is a 501(c)3 non-profit organization, with society membership, registered in the State of Delaware, USA.

1. Individuals registering to participate in the Joint Symposium events are referred to as Delegates. Delegates participate at their own risk. The ISEB and ISSM are not responsible for damage, injury, or illness to persons or property during the Joint Symposium and associated activities. Participants indemnify ISEB and ISSM for any claims whatsoever for any damages incurred or illness acquired by the participants in relation to or arising from the Joint Symposium and associated events, except if this damage is caused by a willful act or gross negligence by ISEB and ISSM (according to Canadian and US laws). It is the responsibility of the Delegate to arrange appropriate health, travel, and personal accident insurance coverage in connection to their property and themselves for the whole period of the Joint Symposium. In case a Delegate sustains an injury or serious illness while participating in any role in the Joint Symposium, the Delegate hereby authorizes any medical or health personnel to perform and administer first aid medical treatment, as deemed necessary, and, if required, to seek more specialized medical attention at hospitals and health care institutions. Delegates hereby acknowledge and agree that they have opted to voluntarily enter this agreement and to assume all risks of loss, damage and injury, including death that may be sustained as a consequence of participation in the Joint Symposium and associated activities. Hereby, all of ISEB's and ISSM's affiliated companies, sponsors, agents, officers, directors, advisors, volunteers, and employees are released from any claims, actions, suits or demands of whichever nature arising out of or related in any way to participation in the Joint Symposium and associated activities, including any loss, damage, injury, illness, or death sustained by any third party as a result, directly or indirectly, of the Delegate's participation in the Joint Symposium and associated activities. Delegates indemnify the ISEB and ISSM and all of its affiliated companies, sponsors, servants, agents, officers, directors, advisors, volunteers, and employees against all expenses, losses, damages, and costs that Delegates may incur as a result of participation in the Joint Symposium and related activities. ISEB and ISSM claim no responsibility whatsoever concerning underage accompanying guests of Delegates to the Joint Symposium and associated activities.

2. The ISEB and ISSM are not liable if they fail to comply with the Delegate's obligations and expectations in case of either natural disasters (i.e., force majeure), such as earthquakes, floods, fire, pandemics, etc. for which no one can be held responsible, acts of violence (wars, riots, terrorism), or performance failures of parties outside the control of ISEB and ISSM (such as, transportation problems, subcontractors, lodging problems, weather delays, etc.). In the event of force majeure, ISEB-ISSM have the right to postpone or cancel the Joint Symposium and related activities. In this case, the organizers shall not be liable for any expenditure, damage, or loss incurred by a Delegate. If the Joint Symposium or associated activities can take place on another date, all made bookings between the Delegate and the organizers shall remain in force. If a Delegate decides to cancel their future participation because of the postponement, then the ISEB and ISSM will reimburse the registration fees according to the cancellation policy (see below). For all other costs incurred, the Registrant (i.e., Delegate) is to refer to their personal travel or organization's insurance policy. If ISEB and ISSM cannot come to an agreement with the venue or other third parties to postpone, ISEB and ISSM may decide to cancel the Joint Symposium and associated activities. In this case, refunds will not be issued and the Delegate is referred to their personal travel or organization's insurance policy.

3. All delegates agree to act according to our Code of Conduct.

4. Delegates are aware that all presentations, posters, and abstracts given and associated with the Joint Symposium represent the intellectual property of the authors, ISEB, and ISSM. Further use of the information (e.g., publication, lecture, presentation, education, sales, distribution, etc.) without the consent of the author(s), ISEB, and ISSM is strictly prohibited.

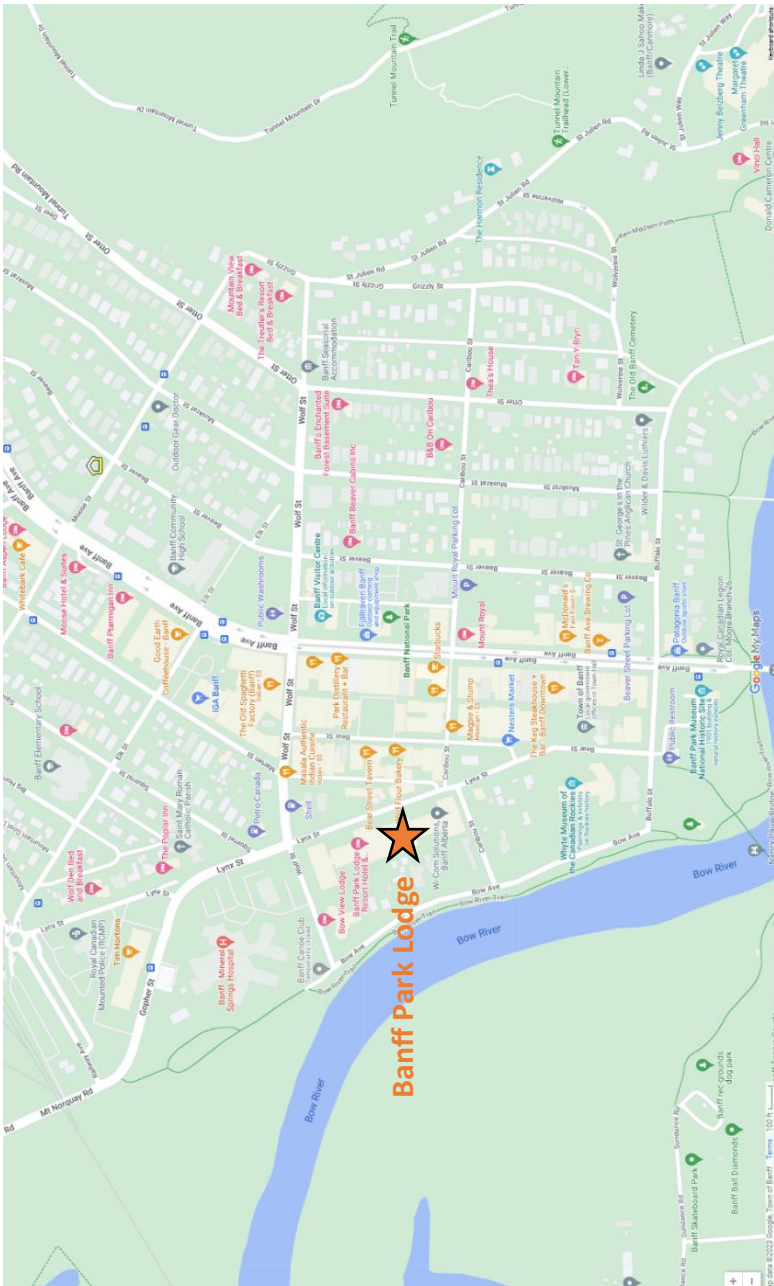
5. Cancellations must be notified in writing. Substitute delegates will be accepted without charge. Cancellations received before 1 August 2023 will receive a full refund, less \$50 administration fee. Cancellations received from 1 August 2023 until 30 August 2023 (45 days from the symposium) will receive a 50% refund. Refunds will not be issued for cancellations received after 31 August 2023.

6. The ISEB and ISSM have the right to make changes to the conference program, venue, destinations, and timings of the Joint Symposium and associated activities at any time.

7. Any dispute arising out of or in connection with the Joint Symposium during the time of the meeting, including any disputes regarding the existence, validity, or termination thereof, will be subject to Canadian law.

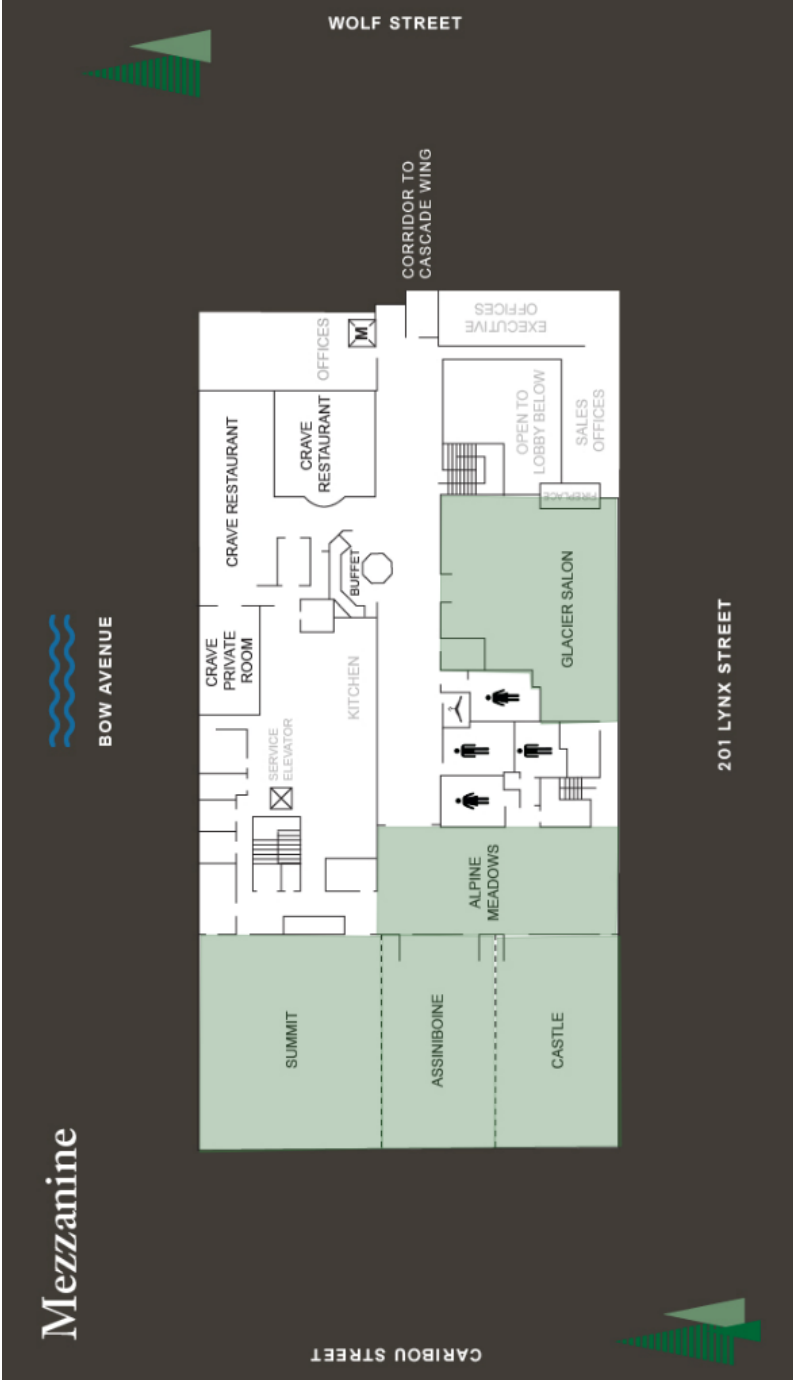


Google Map of area around the Banff Park Lodge, 201 Lynx Street.



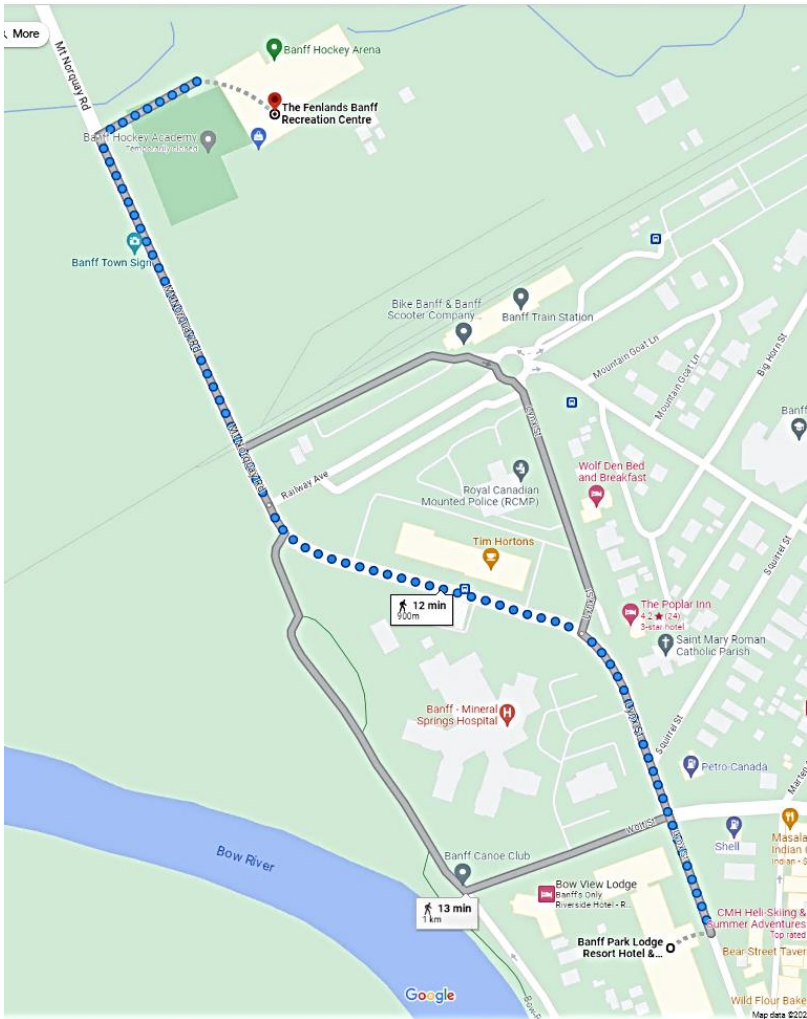
Yellow pins = places to get food (fast food, take-away, or sit-down restaurant)

2nd Floor, Banff Park Lodge



Mezzanine

Fenlands Banff Recreation Centre, ~ 1km from Banff Park Lodge



Directions: The Fenlands is located at 100 Mt Norquay Rd #2F. From the Banff Park Lodge, walk down north along Lynx Street toward Wolf Street (250 m), continue onto Gopher Street (260 m), then continue onto Mt. Norquay Road (300 m), turn right and enter the Fenlands building (84 m).

Estimated walk 12-15 minutes.

We will be on the 2nd floor, Concourse.

PLENARY SPEAKERS



Dr. Kurt Konhauser
Professor of Geobiology
University of Alberta,
Canada

22 October, Sunday, 6:00 PM

This Plenary Talk will open the Joint Symposium. Dr. Konhauser will take us on a journey of the origins of cyanobacteria, the history of oxygen on Earth, and the evolution of aerobic respiration that affects oxidative weathering and nutrient transport to the oceans where primary production increases. Recognizing these feedback processes is critical to understanding how the biogeosphere above and below our feet has changed through time.

23 October, Monday, 9:00 AM

This Plenary Talk, “Coupled Elemental Cycles & Cryptic Processes,” will provide an overview of the importance of coupled elemental cycles and cryptic processes in controlling the biogeochemistry and health of various ecosystems. Dr. Hansel will begin by discussing discoveries that have provided new insight into the role of transient reactive inorganic metabolites in the speciation and cycling and mineralization of metals. Her talk will then focus on the cycling and sources of reactive oxygen species (ROS) and the impact of their formation on other elemental cycles and organismal health. Dr. Hansel will also discuss the importance of integrated science and engineering partnerships in the development of submersible sensing technologies that are critical for measuring short-lived intermediates like ROS over various spatial and temporal scales.



Dr. Colleen Hansel
Senior Scientist
Woods Hole
Oceanographic
Institute, USA

24 October, Tuesday, 9:00 AM

This Plenary Talk, “Linkages Between the Terrestrial Surface and Subsurface Biogeosphere,” will present a truly inspiring and cross-disciplinary look at the biogeosphere below our feet. Dr. Küsel’s work highlights the importance of surface inputs to modern groundwater and rock microbiomes based on a wide range of analytical field and laboratory approaches, including measuring in situ carbon fixation rates and meta-omics applications. Her findings uncover the ecological, metabolic, and trophic strategies that influence the formation, temporal dynamics, and adaptations of groundwater microbes through time.



Dr. Kirsten Küsel
Professor of Aquatic
Geomicrobiology
University of Jena,
Germany

PLENARY SPEAKERS



Dr. William Ghiorse
Emeritus Professor
Cornell University,
New York, USA

26 October, Thursday, 9:00 AM

This Plenary Talk, “*A Brief History of Subsurface Microbiology and Biogeochemistry*,” will focus on the early days of exploration to understand the microbiology of the deep subsurface and groundwater. Although microbiologists acknowledged the presence and activity of microbes in the subsurface, such as in petroleum reservoirs and groundwater, widespread acceptance that microbes play significant roles in subsurface biogeochemical processes did not come until the 1980s and 1990s. Beginning with interests in understanding groundwater contamination, Dr. Ghiorse was among the early innovators who pushed the limits of knowledge and developed methods and aseptic approaches to determine the activity and identity of microbes throughout the subsurface. Recognizing these contributions and achievements from the past will undoubtedly inspire future generations.



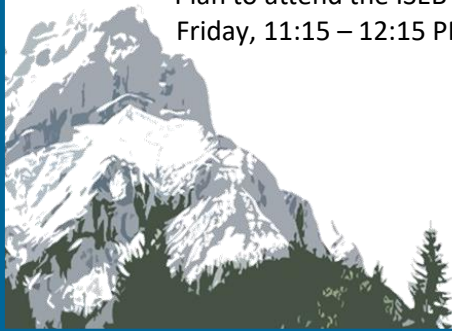
Dr. Danielle Fortin
Professor
University of Ottawa,
Canada

27 October, Friday, 9:00 AM

This Plenary Talk will “Close” the Joint Symposium. Dr. Fortin will educate us on the week’s themes, advancements, and novel findings, as well as point to the challenges that continue to push us to make new discoveries and critical innovations. From this foundation, we will be inspired to work towards solving societal problems and improving biogeosphere sustainability. The future for our organizations is bright. This will be a memorable, motivational talk not to miss!

CALLING ALL ISEB MEMBERS! NEW AND OLD!

Plan to attend the ISEB Members Meeting,
Friday, 11:15 – 12:15 PM, Fenlands Centre



INVITED SPEAKERS



23 October, Monday



Session 1 - Permafrost & Subglacial Environments

Mark Skidmore, a Professor in the Department of Earth Sciences at Montana State University (USA), will speak about "Icy Dive: Microbial Communities and Biogeochemical Processes in Antarctic Subglacial Lakes."

Session 2 - Radioactive Environments

Jon Lloyd, a Professor of Geomicrobiology at the University of Manchester (UK), will speak about "Some Like it Hot: The Microbiology of the Nuclear Fuel Cycle."



Session 3 - Emerging Tools in Subsurface Exploration & Biogeochemical Studies

Kristof Richmond, the Chief Technology Officer of Sunfish, Inc, will speak about "Exploring Extreme Environments and Astrobiology Targets with Autonomous Vehicles," and Micheal Phillips, a Research Scientist at The University of Arizona's Lunar and Planetary Laboratory in Tucson, Arizona, will speak about "Using AI to Fine Tune the Search for Life."



Session 4 - In Memoriam of Henry Ehrlich, Microbes, Minerals, & Metals

Ji-Dong Gu, a Professor of Applied Microbiology in the Environmental Engineering and Sustainability Program at Guangdong Technion – Israel Institute of Technology, China, will speak about "The Microbiome of Decaying Sandstone Monuments," and Bradley Stevenson, an Associate Research Professor in the Department of Earth and Planetary Science at Northwestern University (USA), will speak on "Follow the Energy – Microbial Strategies Across Heterogeneous Terrestrial Subsurface Environments."



24 October, Tuesday

Session 5 - In Memoriam of Tullis Onstott, Early Life, Biosignatures, and the Search for Life

Martina Preiner, leader of the "Geochemical Protoenzymes" research group at the Microcosm Earth Center, the Max Planck Institute for Terrestrial Microbiology and the University of Marburg, Germany, will speak about "The Transition from Geo- to Biochemistry."



Session 6 - Biogeochemistry of Freshwater Resources

Louise Weaver, science leader of environmental microbiology at the Institute of Environmental Science & Research Ltd (ESR) in New Zealand, will speak about "Groundwater Diversity across New Zealand: From Micro to Macro-scale."



INVITED SPEAKERS

24 October, Tuesday



**Session 7 - In Memoriam of Thomas Brock,
Extreme Environments**

Lyle Whyte, a Professor of Environmental Microbiology & Microbial Ecology at McGill University, Canada, will speak about "Extant and Past Microbial Life on Mars and the Icy Moons? Clues from Really Cold, Salty Places on Earth."

26 October, Thursday

**Session 11 - Continental Subsurface Ecosystems
and Biogeochemistry**

Riikka Kietäväinen, an Assistant Professor of Sustainable Earth Resources in the Department of Geosciences and Geography at the University of Helsinki, Finland, will speak about "What the Flux? – Water-Rock-Microbe Interactions and Crustal Gases in the Deep Subsurface."



Session 12- Microbial Processes in Soils

Jennifer DeBruyn, a Professor of Environmental Microbiology in the Department of Biosystems Engineering & Soil Science at the University of Tennessee (USA), will speak about "Animal and Human Decomposition Hotspots in Terrestrial Ecosystems."

27 October, Friday

**Session 17 - The Biogeosphere Above
and Below our Feet**

Emil Ruff, a microbial ecologist at the Marine Biological Laboratory in Woods Hole, Massachusetts (USA), will speak about "Microbial Production of "Dark Oxygen": An Overlooked Process in Earth's Hidden Ecosystems."



Casey Hubert, a Professor of Geomicrobiology at the University of Calgary in Canada, will speak about "Geological Processes Mediate a Microbial Dispersal Loop in the Deep Biosphere."

Lesley Warren, who holds the Claudette Mackay Lassonde Chair in Mineral Engineering in the Department of Civil and Mineral Engineering at the University of Toronto, Canada, will speak about "Bioengineering for Sustainable Development: Water, Mining, and Microbes."



Anthony Ranchou-Peyruse, who holds an industrial chair dedicated to the study of microorganisms and hydrogen reactivity in the underground at the University of Pau and Pays de l'Adour in France, will speak about "SLIMES and Gas Storage in the Subsurface."



**SCIENTIFIC
PROGRAM**

SUNDAY, 22 OCTOBER, AT A GLANCE



Sunday 22 October			
Time	Activity	Location	
7:00 - 7:30			
7:30 - 8:00			
8:00 - 8:30			
8:30 - 9:00			
9:00 - 9:30			
9:30 - 10:00			
10:00 - 10:30			
10:30 - 11:00			
11:00 - 11:30			
11:30 - 12:00			
12:00 - 12:30			
12:30 - 13:00			
13:00 - 13:30			
13:30 - 14:00			
14:00 - 14:30			
14:30 - 15:00			
15:00 - 15:30	Registration Desk Open Presentation Upload	Banff Park Lodge, Reception area, Alpine Meadows (2nd floor)	POSTER SETUP
15:30 - 16:00			
16:00 - 16:30			
16:30 - 17:00			
17:00 - 17:30			
17:30 - 18:00	Official Opening and Land Acknowledgement	Banff Park Lodge Ballroom	
18:00 - 18:30	OPENING PLENARY	Banff Park Lodge Ballroom	
18:30 - 19:00	KURT KONHAUSER "Origins of Cyanobacteria and the Evolution of Oxygen"		
19:00 - 19:30	Welcome Reception - Mix and Mingle	Alpine Meadows	
19:30 - 20:00			
20:00 - 20:30			
20:30 - 21:00			
21:00 - 21:30			
21:30 - 22:00			

SUNDAY 22 OCTOBER

15:00 – 19:00

Banff Park Lodge,
2nd Floor, Reception and
Ballroom, Alpine Meadows

15:00 **Registration Desk opens** (presentations can be uploaded here)

17:30 **Official Symposium Opening & Land Acknowledgement**

18:00 **Opening Plenary**

Chairs: Christopher Omelon and Annette S. Engel

DR. KURT KONHAUSER, Professor of Geobiology at the University of Alberta, Canada, will take us on a journey with, "*Origins of Cyanobacteria and the Evolution of Oxygen.*"

19:00 **Welcome Reception**

Banff Park Lodge,
Alpine Meadows

Come meet new people and find old friends at this "Mix & Mingle" event for registered delegates and their guests. Hot and cold hors d'oeuvres, Canadian meats and cheeses, and a variety of desserts will be offered, plus there will be celebratory champagne punch and non-alcoholic beverage options. A cash bar will also be available to purchase additional local beverages of your choosing, paid for by the delegates.



Attention ISEB Executives & International Advisory Committee

The ISEB Executive Board (EB) in attendance will plan to meet early in the week, likely Monday evening, to go over ISEB business, then the EB and the International Advisory Committee, in attendance, also need to meet, perhaps over a lunch break or Tuesday evening, to discuss ISEB future committee members and the next ISEB Symposium in 2025. We will poll those in attendance for their availability. We will also meet with the rest of the ISEB membership (*everyone in attendance receives a 2-year complimentary membership*) on Friday morning before the Closing Plenary.



Attention ISSM Executive Board

The ISSM Executive Board in attendance will plan to meet over breakfast, early in the week, to introduce new members, decide on the next ISSM Symposium location in 2026, and go over other ISSM business. We will survey those in attendance for the best morning and time to meet.

MONDAY, 23 OCTOBER, AT A GLANCE



Monday 23 October			
Time	Activity	Location	
7:00 - 7:30	Breakfast Banff Park Lodge, Glacier Salon & Crave Mountain Grill		
7:30 - 8:00		Registration Desk Open Presentation Upload	Banff Park Lodge, Reception area, Alpine Meadows (2nd floor)
8:00 - 8:30			
8:30 - 9:00			
9:00 - 9:30	PLENARY SPEAKER		Banff Park Lodge (Ballroom)
9:30 - 10:00	COLLEEN HANSEL "Coupled Elemental Cycles & Cryptic Processes"		
10:00 - 10:30	Morning Break		Banff Park Lodge, Alpine Meadows
10:30 - 11:00	Session 1 - Permafrost & Subglacial Environments	Session 2 - Radioactive Environments	
11:00 - 11:30			
11:30 - 12:00			
12:00 - 12:30			
12:30 - 13:00	Lunch 12:20 - 2:00 pm		Banff Park Lodge, Crave Mountain Grill & Glacier Salon
13:00 - 13:30			
13:30 - 14:00			
14:00 - 14:30	Session 3 - Emerging Tools in Subsurface Exploration & Biogeochemical Studies	Session 4 - In Memoriam of Henry Ehrlich, Microbes, Minerals, & Metals	
14:30 - 15:00			
15:00 - 15:30			
15:30 - 16:00	Afternoon Break		Banff Park Lodge, Alpine Meadows
16:00 - 16:30	Session 3, continued	Session 4, continued	
16:30 - 17:00			
17:00 - 17:30			
17:30 - 18:00	(Possible business meeting times for ISEB & ISSM; more information will be provided)		
18:00 - 18:30			
18:30 - 19:00			
19:00 - 19:30			
19:30 - 20:00			
20:00 - 20:30			
20:30 - 21:00			
21:00 - 21:30			
21:30 - 22:00			

MONDAY 23 OCTOBER

07:00 – 10:30 **Banff Park Lodge,
2nd Floor, Reception and
Ballroom, Alpine Meadows**

07:00 **Breakfast, served until 09:00** **Crave Mountain Grill &
Glacier Salon**

Breakfast is available for registered delegates and their registered guests, Monday through Friday, in the Glacier Salon & Crave Mountain Grill of the Banff Park Lodge. Buffet options include eggs, hashbrown potatoes, a variety of meat, yogurt options, in-house baked pastries, cereal, seasonal fruit, and coffee, tea, juice, and milk.

07:30 **Registration Desk opens** (presentations can be uploaded here)

09:00 **Plenary** **Banff Park Lodge, Ballroom**

Chair: Maria Dittrich

DR. COLLEEN HANSEL, a Senior Scientist at Woods Hole Oceanographic Institute (USA), will discuss discoveries and new insight into "*Coupled Elemental Cycles & Cryptic Processes*."

10:00 – 10:30 **Morning Break** (coffee, tea, and snacks) **Alpine Meadows**

10:30 – 12:30 **Banff Park Lodge, Summit**

Session 1 - Permafrost & Subglacial Environments

Session Chairs: Chris Omelon and Lyle Whyte

10:30 – 11:00 **Invited Talk** MARK SKIDMORE, *Icy Dive: Microbial Communities and Biogeochemical Processes in Antarctic Subglacial Lakes*

11:00 – 11:20 ERIN GIBBONS, *Exploring Biomarker Signatures in Glaciovolcanic Environments: Implications for the Search for Life on Mars*

11:20 – 11:40 BRADY O'CONNOR, *Glacial Secrets Uncovered: Revealing the Modes of Survival of Metabolically Active Microbial Communities Entrapped in Polar Glacial Ice*

11:40 – 12:00 ATE H. JAARSMA, *The Undiscovered Biosynthetic Potential of the Greenland Ice Sheet Microbiome*

12:00 – 12:20 ANDREAS KAPPLER, *Role of Iron-Carbon Interactions in the Release of Greenhouse Gases from Permafrost Soils*

10:30 – 12:30 **Banff Park Lodge,
Castle & Assiniboine**

Session 2 - Radioactive Environments

Session Chairs: Lotta Purkamo and Riikka Kietäväinen

10:30 – 11:00 **Invited Talk** JON LLOYD, *Some Like it Hot: The Microbiology of the Nuclear Fuel Cycle*

11:00 – 11:20 MAX ROSE, *Controlling the Impact of Bentonite Microbial Communities in Disposal of Radioactive Wastes*

11:20 – 11:40 CHLOE MORGAN, *Microbial Impacts on Colloid-Radionuclide Interactions*

MONDAY 23 OCTOBER

Session 2 - Radioactive Environments, continued

- 11:40 – 12:00 SEAN TING-SHYANG WEI, *Friend or Foe? Microbial Impact of Calcigel Bentonite on Metal Materials Used for Nuclear Waste Repository*
- 12:00 – 12:20 KARRIE WEBER, *Nitrate Stimulated Microbial and Viral Activity and the Subsequent Influence on Uranium Mobility in Sedimentary Systems*
-

12:30 – 14:00 **Buffet Lunch** (for all registered delegates) **Banff Park Lodge,
Crave Mountain Grill &
Glacier Salon**

14:00 – 17:30 **Banff Park Lodge, Summit**

Session 3 - Emerging Tools in Subsurface Exploration & Biogeochemical Studies

Session Chairs: Ernest Chi Fru and Annette Engel

- 14:00 – 14:30 **Invited Talk** KRISTOF RICHMOND, *Exploring Extreme Environments and Astrobiology Targets with Autonomous Vehicles*
- 14:30 – 14:50 JONATHAN GROPP, *Studying the Isotopic Composition of Microbial Methane with a Novel Genetically-Tractable Methanogen*
- 14:50 – 15:10 MAYUMI SETO, *Microbial Community Ecosystem Network Model for Chemical Energy Transport*
- 15:10 – 15:30 THOMAS REID, *From Climate Change to AMR: Understanding Environmental-Human Health Issues in a One Health Framework*
-

15:30 – 16:00 **Afternoon Break** (coffee, tea, and snacks) **Alpine Meadows**

- 16:00 – 16:20 TOSHIKI NAGAKURA, *Anabolic and Catabolic Microbial Activity in Hydrocarbon-rich Sediments of Guaymas Basin*
- 16:20 – 16:40 CHRIS WEISENER, *Improving our Understanding of Environmental Stress Impacts and Responses of the Microbiome*
- 16:40 – 17:10 **Invited Talk** MICHAEL PHILLIPS, *Using AI to Fine Tune the Search for Life*
-

MONDAY 23 OCTOBER

14:00 – 17:30

Banff Park Lodge, Castle
& Assiniboine

Session 4 - In Memoriam of Henry Ehrlich, Microbes, Minerals, & Metals

Session Chairs: Danielle Fortin and Bill Ghiorse

This session is held in honor of Professor Henry Lutz Ehrlich, emeritus professor from the Rensselaer Polytechnic Institute, New York (USA). Henry passed away in May 2020. He will forever be remembered as one of the pioneers, and true founding fathers, of modern Geomicrobiology. No student or scholar in our field is without their copy of his iconic *Geomicrobiology* textbook. Henry served as the editor-in-chief of the *Geomicrobiology Journal* from 1983 until 1997. In the early 1970s, Henry was also one of early supporters and founders of the Symposia on Environmental Biogeochemistry, Inc., which would become the organization we know today as the International Society for Environmental Biogeochemistry (ISEB). He would serve on ISEB's executive board from 1975 – 1999. As a teacher, mentor, and scholar, Henry inspired us, and we are all part of his legacy.

14:00 – 14:30 **Invited Talk** JI-DONG GU, *The Microbiome of Decaying Sandstone Monuments*

14:30 – 14:50 ROMAN SEITSHIRO, *Application of Geomicrobial Techniques to Constrain Mechanisms of Arsenic Mobilisation in Anoxic Aquifers*

14:50 – 15:10 MADELINE AMMEND, *Genetic Evidence that Multiple Cytochrome Nanowires are Necessary for Fe(III) Oxide Reduction in Geobacter sulfurreducens*

15:10 – 15:30 MARCO CONTIN, *Soil Salinization May Trigger Mercury Mobilisation from Contaminated Soils and Sediment*

15:30 – 16:00 **Afternoon Break** (coffee, tea, and snacks)

Alpine Meadows

16:00 – 16:20 MAICON ARAUJO, *Surface Reactivity of the Iron and Manganese-Oxidizing Bacterium Leptothrix cholodnii SP-6*

16:20 – 16:40 IVAN STRAKHOV, *Organomineralization of Dolomite in Hypersaline Microbial Mats from Qatar Sabkhas Visualized by TEM & STXM*

16:40 – 17:10 **Invited Talk** BRADLEY STEVENSON, *Follow the Energy – Microbial Strategies Across Heterogeneous Terrestrial Subsurface Environments*

TUESDAY, 24 OCTOBER, AT A GLANCE



Tuesday 24 October			
Time	Activity	Location	
7:00 - 7:30	Breakfast Banff Park Lodge, Glacier Salon & Crave Mountain Grill		
7:30 - 8:00		Registration Desk Open Presentation Upload	Banff Park Lodge, Reception area, Alpine Meadows (2nd floor)
8:00 - 8:30			
8:30 - 9:00			
9:00 - 9:30	PLENARY SPEAKER		
9:30 - 10:00	KRISTEN KÜSEL "Linkages Between the Terrestrial Surface and Subsurface Biogeosphere"	Banff Park Lodge (Ballroom)	
10:00 - 10:30	Morning Break		
10:30 - 11:00	Session 5 - In Memoriam of Tullis Onstott, Early Life, Biosignatures, and the Search for Life	Session 6 - Biogeochemistry of Freshwater Resources	
11:00 - 11:30			Session 7 - In Memoriam of Thomas Brock, Extreme Environments - I
11:30 - 12:00			
12:00 - 12:30			
12:30 - 13:00	Lunch 12:20 - 2:00 pm		
13:00 - 13:30	Banff Park Lodge, Crave Mountain Grill & Glacier Salon		
13:30 - 14:00			
14:00 - 14:30	Session 8 - Phosphorus and Microbial Systems	Session 9 - In Memoriam of Ronald Oremland, Uncovering Novel Microbial Metabolic Processes	
14:30 - 15:00			Session 7, Continued
15:00 - 15:30			
15:30 - 16:00			
16:00 - 16:30			
16:30 - 17:00	POSTER SESSION	Afternoon Break	
17:00 - 17:30			Banff Park Lodge, Alpine Meadows
17:30 - 18:00			
18:00 - 18:30			
18:30 - 19:00			
19:00 - 19:30			
19:30 - 20:00			
20:00 - 20:30	(Possible business meeting times for ISEB & ISSM, more information will be provided)		
20:30 - 21:00			
21:00 - 21:30			
21:30 - 22:00			

TUESDAY 24 OCTOBER

07:00 – 10:30

Banff Park Lodge, 2nd Floor,
Reception and Ballroom area

07:00 Breakfast, served until 09:00

Crave Mountain Grill &
Glacier Salon

Breakfast is available for all registered delegates and their registered guests, Monday through Friday, in the Glacier Salon & Crave Mountain Grill of the Banff Park Lodge. Buffet options include eggs, hashbrown potatoes, a variety of meat, yogurt options, in-house baked pastries, cereal, seasonal fruit, and coffee, tea, juice, and milk.

07:30 Registration Desk opens (presentations can be uploaded here)

09:00 Plenary

Banff Park Lodge, Ballroom

Chair: Rainer Meckenstock

DR. KIRSTEN KÜSEL, Professor of Aquatic Geomicrobiology at the University of Jena, Germany, will present an inspiring, cross-disciplinary look at the biogeosphere below our feet with her talk, "*Linkages Between the Terrestrial Surface and Subsurface Biogeosphere.*"

10:00 – 10:30 Morning Break (coffee, tea, and snacks)

Alpine Meadows

10:30 – 12:30

Banff Park Lodge, Summit

Session 5 - In Memoriam of Tullis Onstott, Early Life, Biosignatures, and the Search for Life

Session Chairs: Danielle Fortin and Philippe Van Cappellen

This session is held in honor of Professor Tullis Onstott who passed away in October 2021, after being a professor of geoscience at Princeton University (USA). Tullis was the consummate explorer and innovator, searching the subsurface for life on Earth but also having his eyes on Mars and elsewhere in the Universe. His expeditions circled the globe, from the world's deepest mines in South Africa to Siberian permafrost. Tullis's first International Symposium on Subsurface Microbiology (ISSM) was in Bath, England, in 1993, as retold in his memoirs, *Deep Life: The Hunt for the Hidden Biology of Earth, Mars, and Beyond*, published in 2017. From that time onward, he found a community of peers and became an important voice in how to creatively but safely explore the subsurface. Without a doubt, Tullis's influence on the fields of subsurface microbiology and astrobiology is the stuff of legends and should inspire generations to come.

10:30 – 11:00 **Invited Talk** MARTINA PREINER, *The Transition from Geo- to Biochemistry*

11:00 – 11:20 MUAMMAR MANSOR, *Traces of life in Río Tinto (Spain): Decoupling of morphological and geochemical biosignatures*

11:20 – 11:40 BAPTISTE COUTRET, *The Crucial Relationship: Reinforcing the Role of Microbial Mats in Early Animal Life*

11:40 – 12:00 HALEY SAPERS, *Identifying Putative Subsurface Microbial Drivers of Methane Flux on Earth and Mars*

12:00 – 12:20 ERNEST CHI FRU, *Emergence of the 2.1 Ga Francevillian Biota Was Preceded by Unprecedented Hydrothermally Driven Seawater Eutrophication*

TUESDAY 24 OCTOBER

10:30 – 12:30

Banff Park Lodge, Castle

Session 6 - Biogeochemistry of Freshwater Resources

Session Chairs: Chris Weisener and Mengyan Li

- 10:30 – 11:00** **Invited Talk** LOUISE WEAVER, *Groundwater Diversity across New Zealand: From Micro to Macro-scale*
- 11:00 – 11:20** CHELSEA CRUNDWELL, *Investigating Microbial Triggers of Nitrous Oxide Emissions in Agriculturally Influenced Aquatic Ecosystems*
- 11:20 – 11:40** HANNAH RIGONI, *Chemolithoautotrophic Organic Matter Contributions to Subterranean Food Webs Dominated by Filter-Feeders*
- 11:40 – 12:00** SAHAR SAEIDI, *Assessing the Impact of Land Use and Land Cover on Water Quality: A Case Study of the Rákos Catchment in Hungary*
- 12:00 – 12:20** CLEMENS KARWAUTZ, *From the Mountain to the Valley - Drivers of Groundwater Prokaryotic Communities along an Alpine River Corridor*

10:30 – 12:30

Banff Park Lodge, Assiniboine

Session 7 - In Memoriam of Thomas Brock, Extreme Environments

Session Chairs: Chris Omelon and John Spear

This session is held in honor of Professor Thomas D. Brock who passed away in April 2021. Tom spent most of his academic career at the University of Wisconsin-Madison (USA). Tom's impact on our disciplines is without bound, from discovering extremophiles in Yellowstone that would redefine life on Earth and lead to the invention of PCR technology, to founding conservation projects to restore native habitats. His authoritative textbook, *Biology of Microorganisms* (now in its 16th edition), continues to be the foundational book for microbiology students around the world. Along with Henry Ehrlich in the early 1970s, Tom participated in the informal group who started the symposia on environmental biogeochemistry that lead to ISEB. Tom attended many symposia and gave the keynote address (re)defining "biogeochemistry" at the 1979, 4th ISEB meeting in Canberra, Australia.

- 10:30 – 11:00** **Invited Talk** LYLE WHYTE, *Extant and Past Microbial Life on Mars and the Icy Moons? Clues from Really Cold, Salty Places on Earth*
- 11:00 – 11:20** GABRIELLE SCHEFFER, *The Provenance of Microorganisms Adapted to Extreme Salinity, Extreme Temperature, and Toxic Metals within the Montney Shale Formation*
- 11:20 – 11:40** DANIEL COLMAN, *The Geochemical Habitats that Favored the Origin of Thermophilic Lineages*
- 11:40 – 12:00** ANIRBAN CHAKRABORTY, *Marine Cold Seeps as a Gateway of Deep Subsurface Extremophiles to The Seafloor*
- 12:00 – 12:20** LAURA SCHWAB, *Detection and Characterization of Active Microbial Cells in Salt Cavern Brine*

12:30 – 14:00 **Buffet Lunch** (for all registered delegates)

Banff Park Lodge,
Crave Mountain Grill
& Glacier Salon

TUESDAY 24 OCTOBER

14:00 – 16:30

Banff Park Lodge, Summit

Session 8 - Phosphorus and Microbial Systems

Session Chairs: Sarah Keenan and Jennifer DeBruyn

- 14:00 – 14:20** PHILIPPE VAN CAPPELLEN, *Phosphorus and Lake Eutrophication: Recent Findings and Emerging Challenges*
- 14:20 – 14:40** XIAOQING SHAO, *The Impact of Phosphorus Level on Vivianite Precipitation during Microbial Reduction of Ferrihydrate*
- 14:40 – 15:00** KURT REINHART, *Dueling Plant Phosphorus Acquisition Strategies Over a Geochemical Gradient: A Biogeochemistry Experiment Approach*
- 15:00 – 15:20** JOVANA RADOSAVLJEVIC, *Beyond Phosphorus: Salinization as a Driver of Eutrophication Symptoms in North American Lakes*
- 15:20 – 15:40** KLARA REHAKOVA, *Unveiling the Ecological Significance of Algal Mats and Meadows: Insights into Phosphorus Cycling and Primary Production of Benthic Algae in Post-Mining Lakes*
- 15:40 – 16:00** KATEŘINA ČAPKOVÁ, *Seasonal variation of gross ecosystem productivity of periphyton in three post-mining lakes in the Czech Republic, Europe*
- 16:00 – 16:20** CANCELLED FRANCISCO DAVILA-ALEMAN, *Effect of Nutrient Availability in Microbial Community Structure and Hydrocarbon Degradation in Oil-Contaminated Microcosms*

14:00 – 17:30

Banff Park Lodge, Castle

Session 9 - In Memoriam of Ronald Oremland, Uncovering Novel Microbial Metabolic Processes

Session Chairs: Jeffrey Gralnick and Denise Akob

This session is held in honor of Dr. Ronald S. Oremland, emeritus Senior Research Scientist at the U.S. Geological Survey in Menlo Park, California (USA). Ron passed away in September 2021. Ron was a pioneer in the fields of environmental microbiology and biogeochemistry. His discoveries of novel metabolic pathways, from redox transformations of various trace metals to the use of C1 compounds, made us reconsider the limits of life. Ron had an enthusiastic, contagious spark and was deeply generous. He was an impassioned mentor and colleague, and his wit and charisma made him an influential leader. He served ISEB for many years, including president from 2001–2007.

- 14:00 – 14:20** CRISTINA ESCUDERO PARADA, *Nitrate-Reducing Fe(II)-Oxidizing Microorganisms: Linking Fe, C and N Cycles in Subsurface Environments*
- 14:20 – 14:40** LISA VOSKUHL, *Microbial Activities Along a 20 Million-Year-Old Pristine Oil Reservoir*
- 14:40 – 15:00** BRENT SLEEP, *Transformation of Benzene Derivatives in Acidic Conditions by the Fungus *Hormoconis resinae* – Reductive, Oxidative, or Both?*
- 15:00 – 15:20** TILLMANN LUEDERS, *Investigating Manganese-Oxidizing Microbial Biofilms in a Historic Copper Mine of Upper Franconia*
- 15:20 – 15:40** RAINER MECKENSTOCK, *Chemo-organo-autotrophic Degradation of Aromatic Hydrocarbons Indicates a New Type of Bacterial Metabolism*
- 15:40 – 16:00** HANNAH KOEPNICK, *Differences Between Heterotrophic and Nitrate-dependent Iron-oxidizing Microbial Communities in Bioreactor Sediment Treating Mine Wastewater*
- 16:00 – 16:20** ZHOU ZHOU, *Non-syntrophic Methanogenic Hydrocarbon Degradation by an Archaeal Species*

TUESDAY 24 OCTOBER

14:00 – 16:30

Banff Park Lodge, Assiniboine

Session 7 – Continued, In Memoriam of Thomas Brock, Extreme Environments

Session Chairs: Martina Preiner and Anthony Ranchou-Peyruse

- 14:00 – 14:20** MARIA DITTRICH, *Raman Microscopy and Microbial Community Analysis of Microbial Mat Hosted Gypsum from hypersaline environment*
- 14:20 – 14:40** JAMES HOLDEN, *Non-Deterministic Factors Affect Competition Between Thermophilic Autotrophs from Deep-Sea Hydrothermal Vents*
- 14:40 – 15:00** JAYNE RATTRAY, *Elevated Bacterial Endospores Associated with Thermogenic Hydrocarbon Seeps in Deep Sea Sediments*
- 15:00 – 15:20** JOHN SPEAR, *The Shoshone Canyon Conduit Cave: A Greater Yellowstone Ecosystem Sulfur Cave*
- 15:20 – 15:40** ANGELA SMIRNOVA, *Microbial Community Dynamics in Base Mine Lake, the First End-Pit Lake in the Alberta Oil sands Industry*

16:30 – 17:00

Afternoon Break (coffee, tea, and snacks)

Alpine Meadows

16:20 – 18:30

Poster Session

Banff Park Lodge, Summit & Castle

Posters should be displayed starting on Sunday, 22 October, and be removed Thursday, 26 October, before the Banquet.

We kindly ask that presenters be at their posters during this Poster session.

TUESDAY 24 OCTOBER - POSTERS

Poster #	Presenter	Title
1	Muammar Mansor	Microbial Pyrite Formation: Mineral Morphology and Precipitation Kinetics
2	Chao-Lung Yang	Relationship Between Sulfidated Nano Zero Valent Iron and a Reductive Dechlorinating Microbial Culture - Synergistic or Antagonistic?
3	Yuhao Li	Using a Novel Approach to Characterize the Surface Reactivities of Silica-Rich Ferrihydrite and Biogenic Cyanobacteria-Ferrihydrite Aggregates and the Implications for Archean Ocean Geochemistry
4	Amelia Danzinger	Gene Expression in Cadmium Sulfide Biological-Nanoparticle Hybrids
5	David Hsu	Genomic Approaches and Analyses of Slow-Growing Obligate Iron-Metabolizing Microbes
6	Tarek Najem	Effects of Gamma(γ)-Irradiation on the Physicochemical Properties and Bioavailability of Iron Oxides Coprecipitated with Varying Concentrations of Na-Alginate
7	Rachel Spietz	Microbiological Treatment of Nitrate and Selenate from Coal Mine-affected Water in a Semi-Passive, In Situ Saturated Rock Fill Facility
8	Eric Nakoh	In situ Sensor-Based Monitoring Strategies for Biogeochemical Reactions in Mine Tailing Environments
9	Andras Tancsics	Biodegradation of Benzene Under Microaerobic Conditions: a Groundwater Microcosm Experiment Combined with a Multiomics Approach and DNA Stable Isotope Probing
10	Denise Akob	Acetylenotrophic and Diazotrophic <i>Bradyrhizobium</i> sp. Strain I71 from TCE-Contaminated Soils
11	Martin Krüger	Hydrogen-Driven Microbial Redox Reactions in Deep Geosystems
12	Magali Ranchou-Peyruse	Assessment of the In Situ Biomethanation Potential of a Deep Aquifer used for Natural Gas Storage
13	Elliot Barnhart	Enhancement of Acetoclastic Methanogenesis during In Situ Biostimulation of Coalbed Methane
14	Erin Griffiths	Enzymatic Degradation of PET plastic
15	Petr Čapek	On the Presence and Detectability of Polyphosphates in Soil Microbial Biomass
16	Montserrat Villegas Torres	Comparing the Microbial Communities in and End-Pit Lake, Active Tailings Ponds and Freshwater Bodies from the Athabasca Oil Sands Region
17	Magdalena Fraç	Legume-Cereal Intercropping as a Strategy of Regenerative Agriculture Supporting Reverse of Biodiversity Loss – Relevance of Microbiome-based Research
18	Magdalena Dębicka	Soil Management Effects on Soil Organic Matter Properties and Carbon Sequestration (SOMPACS)
19	Haruka Sato	Different Manure Management Methods Impact on Nitrogen Use Efficiency - Comparison of Four Dairy Farms in Hokkaido Japan
20	Sabina Pang	Characterization of DNA Degrading Microorganisms from Dewar Creek Hot Springs in Western Canada
21	Francesco Bisiach	Dispersal and Distribution of Thermophilic Endospores in Deep-Sea Ecosystems

TUESDAY 24 OCTOBER – POSTERS, CONTINUED

Poster #	Presenter	Title
22	Marc Strous	Hydrogen and Dark Oxygen drive Microbial Productivity in Diverse Groundwater Ecosystems
23	Guillaume Peugnet	The Impact of Subsurface Life on Ghost-Rock Karstification Processes and Cave Formation
24	Tillmann Lueders	Updates on Microbial Iodine Cycling in Snotty Biofilms of a Prealpine Mineral Spring Cavern
25	Macon Araujo	Shotgun Metagenomics from Monte Cristo Cave (Brazil) Reveals Metabolic Potential Related to Iron and Manganese Biogeochemical Cycles
26	Damon Mosier	Prominence of Candidate Phyla Radiation (CPR) in Alberta Groundwater
27	Susan Pfiffner	Microbial Diversity, Biomass, and Community Structure Differences among Restored and Natural Saltwater Marshes, Louisiana
28	S. Emil Ruff	A Global Atlas of Subsurface Microbiomes Reveals Phylogenetic Novelty, Large Scale Biodiversity Gradients, and a Marine-Terrestrial Divide
29	Maryam Rezaei Somee	Survival Strategies of High GC-Content Microorganisms in Oligotrophic Deep Groundwater
30	Hiba Aoid	N-Alkane Biosignatures in a High Arctic Mars Analogue Gossan Deposit
31	Olivia Blenner-Hassett	Characterizing Biofilms and Their Associated Biosignatures in an Arctic Hypersaline Cold Spring Mars Analog
32	Kateřina Čapková	Microbial Architects of the Cold Deserts: A Comprehensive Research of Biological Soil Crusts in the High-Altitudinal Cold Deserts of the Western Himalayas
33	Binrui Li	Improving Conventional Household Greensand Treatment for Efficient Mn(II) Removal from Drinking Water
34	Louise Weaver	Nitrate Removal in Shallow Groundwater by Permeable Reactive Barriers

WEDNESDAY, 25 OCTOBER, AT A GLANCE



Wednesday 25 October		
Time	Activity	Location
7:00 - 7:30	Breakfast Banff Park Lodge, Glacier Salon & Crave Mountain Grill	
7:30 - 8:00		
8:00 - 8:30	7-8 am for field trip attendees	Registration Desk Open Presentation Upload
8:30 - 9:00		FIELD TRIP DEPARTS 8 AM
9:00 - 9:30	8-11 am for non-trip attendees	OPEN DAY OR OPTIONAL FIELD TRIP "Hot and Cold Water in the Canadian Rockies" Only for delegates who pre-registered for the field tri & boxed lunch will be provided
9:30 - 10:00		
10:00 - 10:30		
10:30 - 11:00		
11:00 - 11:30		
11:30 - 12:00		
12:00 - 12:30		
12:30 - 13:00		
13:00 - 13:30	CURLING & NETWORKING	Fenlands Banff Recreation Centre
13:30 - 14:00		
14:00 - 14:30		
14:30 - 15:00		
15:00 - 15:30		
15:30 - 16:00	(Possible business meeting times for ISEB & ISSM, more information will be provided)	
16:00 - 16:30		
16:30 - 17:00		
17:00 - 17:30		
17:30 - 18:00		
18:00 - 18:30		
18:30 - 19:00		
19:00 - 19:30		
19:30 - 20:00		
20:00 - 20:30		
20:30 - 21:00		
21:00 - 21:30		
21:30 - 22:00		

THURSDAY, 26 OCTOBER, AT A GLANCE



Thursday 26 October		
Time	Activity	Location
7:00 - 7:30	Breakfast Banff Park Lodge, Glacier Salon & Crave Mountain Grill	Registration Desk Open Presentation Upload Banff Park Lodge, Reception area, Alpine Meadows (2nd floor)
7:30 - 8:00		
8:00 - 8:30		
8:30 - 9:00		
9:00 - 9:30	PLENARY SPEAKER WILLIAM C. GHORSE "A Brief History of Subsurface Microbiology and Biogeochemistry"	
9:30 - 10:00	Banff Park Lodge (Ballroom)	
10:00 - 10:30	Morning Break Banff Park Lodge, Alpine Meadows	
10:30 - 11:00	Session 10 - Continental Subsurface Ecosystems and Biogeochemistry	Session 11 - Microbial Processes in Soils
11:00 - 11:30		
11:30 - 12:00		
12:00 - 12:30		
12:30 - 13:00	Lunch 12:20 - 2:00 pm Banff Park Lodge, Crave Mountain Grill & Glacier Salon	
13:00 - 13:30		
13:30 - 14:00		
14:00 - 14:30	Session 12 - In Memoriam of Eugene Madsen, Microbial Roles in Contaminant Fate and Transport	Session 13 - Microbe-Vegetation Interactions
14:30 - 15:00		
15:00 - 15:30		
15:30 - 16:00	Afternoon Break Alpine Meadows	
16:00 - 16:30	Session 12, Continued	Session 14 - Microbial Community Regulation
16:30 - 17:00		
17:00 - 17:30		
17:30 - 18:00	Banquet Transportation Begins (paid attendees must ride a provided bus to the location; no private parking permitted)	
18:00 - 18:30	Wait in the Banff Park Lodge Lobby	
18:30 - 19:00	Symposium Banquet Mount View Barbecue * with the band Kickstart (celebration goes until 23:00) for all pre-registered delegates and their guests *Vegetarian options provided	
19:00 - 19:30		
19:30 - 20:00		
20:00 - 20:30		
20:30 - 21:00		
21:00 - 21:30		
21:30 - 22:00		

TAKE DOWN POSTERS

THURSDAY 26 OCTOBER

07:00 – 10:30 **Banff Park Lodge, 2nd Floor,
Reception and Ballroom area**

07:00 **Breakfast, served until 09:00** **Crave Mountain Grill & Glacier Salon**

Breakfast is available for all registered delegates and their registered guests, Monday through Friday, in the Glacier Salon & Crave Mountain Grill of the Banff Park Lodge. Buffet options include eggs, hashbrown potatoes, a variety of meat, yogurt options, in-house baked pastries, cereal, seasonal fruit, and coffee, tea, juice, and milk.

07:30 **Registration Desk opens** (presentations can be uploaded here)

09:00 **Plenary** **Banff Park Lodge, Ballroom**
Chair: Philippe Van Cappellen

DR. WILLIAM C. GHIORSE, emeritus professor from Cornell University (USA), will discuss discoveries and new insight into "*A Brief History of Subsurface Microbiology and Biogeochemistry*".

10:00 – 10:30 **Morning Break** (coffee, tea, and snacks) **Alpine Meadows**

10:30 – 12:30 **Banff Park Lodge, Summit**

Session 10 - Continental Subsurface Ecosystems and Biogeochemistry

Session Chairs: Sabrina Beckmann and Emil Ruff

- 10:30 – 11:00** **Invited Talk** RIIKKA KIETÄVÄINEN, *What the Flux? – Water-Rock-Microbe Interactions and Crustal Gases in the Deep Subsurface*
- 11:00 – 11:20** CAROLINA GONZÁLEZ-ROSALES, *Integrative Genomics Sheds Light on Global Deep Terrestrial Biosphere Communities*
- 11:20 – 11:40** MATTHEW FIELDS, *Biomass distribution and activity of respective subsurface sediments and groundwater within a shallow subsurface ecosystem*
- 11:40 – 12:00** LOTTA PURKAMO, *Ancient organic matter in black shales as a carbon source for deep subsurface life*
- 12:00 – 12:20** MAURICE SHEVALIER, *Organic Solvent Contamination in Groundwater Around Natural Gas Plants*
-

10:30 – 12:30 **Banff Park Lodge, Castle & Assiniboine**

Session 11 - Microbial Processes in Soils

Session Chairs: Marco Contin and Tillman Lueders

- 10:30 – 11:00** **Invited Talk** JENNIFER DEBRUYN, *Animal and Human Decomposition Hotspots in Terrestrial Ecosystems*
- 11:00 – 11:20** KATHERINE SNIHUR, *Differences in the Physicochemical Properties of Wildfire Generated Pyrogenic Carbon and Biochar*
- 11:20 – 11:40** JOSEPH YAVITT, *Physical Protection of Soil Organic Matter in the Greater Sudbury (Ontario, Canada) Reforestation Area*
- 11:40 – 12:00** SARAH KEENAN, *Disentangling Carcass Size and Climate Effects on Soil Biogeochemistry during Decomposition*
- 12:00 – 12:20** DANIELA QUINTERO MORALES, *Microbial Reduction of Synthetic Biogenic Iron Oxides Containing Various Amounts of Organic Carbon and Silica*
-

THURSDAY 26 OCTOBER

12:30 – 14:00 **Buffet Lunch** (for all registered delegates)

**Banff Park Lodge,
Crave Mountain Grill
& Glacier Salon**

14:00 – 15:30

Banff Park Lodge, Summit

Session 12 - In Memoriam of Eugene Madsen, Microbial Roles in Contaminant Fate and Transport

Session Chairs: Murray Close and Bradley Stevenson

This session is held in honor of Professor Eugene Madsen from Cornell University, New York (USA). Eugene passed away in August 2017. His research was at the forefront of field-based and molecular techniques, such as stable isotope probing, and spanned from uncovering novel microbial metabolisms in soil and groundwater to characterizing bioremediation processes of coal tar waste. He wrote the textbook, *Environmental Microbiology: From Genomes to Biogeochemistry*, published as a 2nd edition in 2016. Eugene frequently attended ISSM symposia and was always good to have around for his stories and jokes, and to offer support and insight to students and early career scientists.

- 14:00 – 14:20 DENISE AKOB, *Illegal Dumping of Oil and Gas Wastewaters Alters Semi-Arid Soil Microbial Communities*
- 14:20 – 14:40 JINGZHI LIANG, *Subsurface Transport of Sulfidated Nano Zero Valent Iron and In Situ Biogeochemical Transformation of Chlorinated Solvents: A Field Study*
- 14:40 – 15:00 NADIA SAMAK, *Confirming the Mechanism of Anaerobic Phenanthrene Degradation: A Validation Study*
- 15:00 – 15:20 MENGYAN LI, *Biotransformation and Biodefluorination of Fluorotelomer Carboxylic Acids (FTCAs)*

14:00 – 15:30

Banff Park Lodge, Castle & Assiniboine

Session 13 - Microbe-Vegetation Interactions

Session Chairs: Yoshitaka Uchida and Magdalena Dębicka

- 14:00 – 14:20 SAMIKSHYA GIRI, *Anaerobic Isoprene-Degrading Microorganisms and their Impact on Microbial Methane Dynamics in Deep-Sea Carbonates and Eucalyptus-Leaf Sediments*
- 14:20 – 14:40 ADAM RUKA, *Seasonal Relationships of Alpine Plants and Microbes through a Stoichiometric and Enzymatic Lens*
- 14:40 – 15:00 CHRISTOPHER OMELOM, *Vegetation communities and summer net ecosystem CO₂ exchange on western Axel Heiberg Island, Canadian High Arctic*
- 15:00 – 15:20 ANNETTE SUMMERS ENGEL, *Rhizobiome of 'ōhi'a lehua (Metrosideros polymorpha) Offers Insight into Plant-Microbe-Invertebrate Interactions in the Subsurface*

15:20 – 16:00 **Afternoon Break** (coffee, tea, and snacks)

Alpine Meadows

THURSDAY 26 OCTOBER

16:00 – 17:30

Banff Park Lodge, Summit

Session 12 – Continued, In Memoriam of Eugene Madsen, Microbial Roles in Contaminant Fate and Transport

Session Chairs: Lesley Warren and Lisa Voskuhl

- 16:00 – 16:20 CHANTEL FURGASON, *Phytoplankton Ecology in an Oilsands End Pit Lake*
- 16:20 – 16:40 HANNA DAVIDSON, *Electron Acceptor Addition to Stimulate Anaerobic Methanotrophy in Oil Sands End Pit Lakes*
- 16:40 – 17:00 AHMAD AMEEN, *Co-transport of Microplastics and a Surrogate for Human Enteric Viruses in a Saturated Column Packed with Quartz Sand*
- 17:00 – 17:20 CANCELLED WENJUAN JIA, *Response of Microbial Community Stability to Chemical Oxidation Remediation Process in a Petroleum Hydrocarbon Contaminated Groundwater Site*

16:00 – 17:30

Banff Park Lodge, Castle & Assiniboine

Session 14 – Microbial Community Regulation

Session Chairs: Louise Weaver and Lisa Kirk

- 16:00 – 16:20 DONALD PAN, *Viruses, Vesicles, and other Biological Nanoparticles: The Sub-cellular Biosphere of a Deeply Buried 2km-Deep, 20-Million-Year-Old Coalbed Community*
- 16:20 – 16:40 EMMA BELL, *Temporal Dynamics of Microbe-Virus Interactions in the Baltic Sea*
- 16:40 – 17:00 BRANDI KIEL REESE, *Global Distribution and Diversity of Antimicrobial Genes across Subsurface Bacterial and Archaeal Metagenome Assembled Genomes*
- 17:00 – 17:20 MURRAY CLOSE, *Pathogen Survival in Groundwater: Influence of Redox and Organic Matter*

17:30 – 18:00

THE BANQUET

MEET IN BANFF PARK LODGE LOBBY FOR BUS TRANSPORT

(no personal or other vehicles can park at Mount View)

18:00 – 23:00 **All registered delegates and their guests are welcome.**

Transportation to/from the banquet will be provided by Brewster Shuttle, and will run between Mount View BBQ and Banff Park Lodge. **Last bus leaves sharply at 22:45 PM.**

Dinner will include appetizers, the main meal, salads and sides, and dessert. Vegetarian options will be provided. A five-piece band will provide music during and after dinner. We encourage comfortable Western attire and shoes for dancing.

Two drink tickets will be provided to each registered delegate and guests at the venue. There will also be a cash bar to buy additional drinks, paid for by the delegate.

FRIDAY, 27 OCTOBER, AT A GLANCE

Friday 27 October				
Time	Activity	Location		
7:00 - 7:30	Breakfast Banff Park Lodge, Glacier Salon & Crave Mountain Grill			
7:30 - 8:00		Registration Desk Open Presentation Upload	Banff Park Lodge, Reception area, Alpine Meadows (2nd floor)	
8:00 - 8:30				
8:30 - 9:00				
9:00 - 9:30	OPENING REMARKS & SESSION 15 - The Biogeosphere Above and Below our Feet			
9:30 - 10:00				
10:00 - 10:30				
10:30 - 11:00				
11:00 - 11:30				
11:30 - 12:00			ISEB MEMBERSHIP MEETING - announcement of Executive Board and membership voting; other announcements (student presentation awards)	
12:00 - 12:30			PLENARY SPEAKER DANIELLE FORTIN "The Closing"	Fenlands Banff Recreation Centre
12:30 - 13:00				
13:00 - 13:30				
13:30 - 14:00				
14:00 - 14:30	FAREWELL RECEPTION			
14:30 - 15:00				
15:00 - 15:30				
15:30 - 16:00				
16:00 - 16:30				
16:30 - 17:00			(optional activities post-symposium, such as bowling; more information to be provided)	
17:00 - 17:30				
17:30 - 18:00				
18:00 - 18:30				
18:30 - 19:00				
19:00 - 19:30				
19:30 - 20:00				
20:00 - 20:30				
20:30 - 21:00				
21:00 - 21:30				
21:30 - 22:00				

FRIDAY 27 OCTOBER

07:00 – 08:30

Banff Park Lodge, 2nd Floor,
Reception and Ballroom area

07:00 Breakfast, served until 09:00

Crave Mountain Grill & Glacier Salon

Breakfast is available for all registered delegates and their registered guests, Monday through Friday, in the Glacier Salon & Crave Mountain Grill of the Banff Park Lodge. Buffet options include eggs, hashbrown potatoes, a variety of meat, yogurt options, in-house baked pastries, cereal, seasonal fruit, and coffee, tea, juice, and milk.

07:30 Registration Desk opens (but presentations can be uploaded at the Fenlands)

08:30

Walk to Fenlands Banff Recreation Centre
(~1 km away, & will take 12-15 minutes)

Session 15 - The Biogeosphere Above and Below our Feet

Session Chairs: Chris Omelon and Annette S. Engel

09:00 – 09:15

Opening Remarks about the session

Fenlands

09:15 – 09:45

Invited talk, EMIL RUFF, *Microbial Production of "Dark Oxygen": An Overlooked Process in Earth's Hidden Ecosystems*

09:45 – 10:15

Invited talk, CASEY HUBERT, *Geological processes mediate a microbial dispersal loop in the deep biosphere*

10:15 – 10:45

Invited talk, LESLEY WARREN, *Bioengineering for Sustainable Development: Water, Mining, and Microbes*

10:45 – 11:15

Invited talk, ANTHONY RANCHOU-PEYRUSE, *SLiMES and Gas Storage in the Subsurface*

11:15 – 12:15

ISEB MEMBERSHIP (OLD AND NEW) MEETING

Announcement of executive board, voting for International Advisory Committee members, and other announcements

12:15

Plenary

Fenlands

DR. DANIELLE FORTIN, professor from the University of Ottawa, Canada, will be our "Closer." She will summarize the week's themes, advancements, and novel findings, and point to the challenges that push us to make new discoveries and critical innovations to help solve societal problems and improve biogeosphere sustainability. This is sure to be an inspiring, motivational presentation!

13:30

Farewell Reception & Student Award Announcements

Fenlands

We reached the end of the Symposium! During this Farewell Reception, you can say good-bye to new and old friends and hear which students won the top presentation (oral and poster, and Wolf Vishniac) awards. To celebrate, we will have a light lunch with sandwiches, desserts, and non-alcoholic beverages.

NOTES

