Vol 3, Issue 2

Thawing Ground

A Newsletter of the US Permafrost Association

Hot Off the Press: Publications by our Members

The mission of USPA is to advance permafrost science and engineering, support career development for students and early-career professionals and facilitate international collaborations.

This issue spotlights just a few of the many publications of the USPA membership, and future issues will use this theme as well. One of our two main missions is to advance permafrost science and engineering, and all of you are doing such tremendous work to keep up with advancing research techniques and deliver cutting edge knowledge to the reading public. We typically highlight one article in The Active Layer, but this time we'll do four in some detail and point you to others well worth a read. Enjoy!

Got Something to Share?

We'd love to showcase your work in *Thawing Ground*. Send the link to your article or a summary of a current project to secretary@uspermafrost.org. When others read it, you may find a new collaborator!

USPA Regular Member Lesleigh Anderson, new Board Member Brad Baxter, and Bruce Finney have an Article in Press for *Nature Communications*. "Shifting winter atmospheric teleconnections to the North Pacific reconcile Younger-Dryas and Holocene δ18O signals" **read it here** tackles the issue of differentiating drivers of weather patterns in winter versus summer. The key is in the oxygen isotopes. Here is the article abstract:

Using Alaskan Lake sediment oxygen isotope records (δ18O), which trace the δ18O of precipitation, we establish that abrupt atmospheric shifts occurred during the last deglacial period in the North Pacific-Arctic. The robust lake δ18O chronologies confidently correlate Younger-Dryas (YD) atmospheric adjustments in Alaska with Greenland ice-core records and their seasonal sensitivity are consistent with cooling during winter. In contrast, abrupt δ18O decreases during the late Holocene observed in our records, of similar magnitude as the YD, are best explained by atmospheric modes involving long-distance transport of sub-tropical Pacific moisture. Our sediment cores are among the most reliably dated records yet produced in the circum-Arctic and show that similar decreases in δ18O of winter precipitation during the YD and late Holocene were driven by different atmospherics teleconnections. These results underscore major roles for seasonality and atmospheric patterns in the conceptual understanding of global scale climate observations, both past and future.

Strong work, Lesleigh, Brad and Bruce!

Lesleigh Anderson

Brad Baxter

Types of Membership

Regular—Our basic type. You want to keep up with permafrost news and maybe join a committee or project. Dues are $60/year.

Student—We keep student dues low and we offer travel scholarships/grants to help you get to conferences or fieldwork. Dues are just $15/year.

Ice Vein/Wedge/Massive (Institutional)-- You give from the coffers to help us do our work, and we appreciate it! Dues are $250 to $1200/year depending on the level.

Life (Individual)—You value the mission of USPA and are often a long-time member. Your gift of $1000 is deeply appreciated.

Check out these by our Regular Members, too!

Thomas Glass on **Aquatics and Water Quality**
Verity Salmon on **Carbon Dynamics**

Raven Mitchell, a Ph.D. student at Michigan State University (and Student Member, of course), recently published "The Hickory Run Boulder Field, Carbon County, Pennsylvania, USA: Morphology, sedimentology and development," which you can access here with co-author and USPA Life Member, Fritz Nelson.

Raven explores the formation of boulder fields and how permafrost plays a role in their development. Previous studies were qualitative or semi-quantitative, and Raven and Fritz conducted more rigorous sampling and analysis. Her results confirmed the existing, but previously unconfirmed, hypothesis that "HRBF formed as an allochthonous feature under extreme periglacial and permafrost conditions during the [Last Glacial Maximum] LGM." The work is a fine example of the breadth of permafrost research. Far afield from Alaska and looking deep into the past, she offers new knowledge on the role of permafrost in geology.

Nice work, Raven and Fritz!

Fritz Nelson

Raven Mitchell

The University of Virginia is one of our Institutional Members. UVA faculty members Valentina Ekimova and Howie Epstein are Regular Members. Along with Life Member Tom Douglas, MacKenzie Nelson, Taylor Sullivan, and Matthew Jull, they published "Characterizing near-surface permafrost in Utqiagvik, Alaska using Electrical Resistivity Tomography and Ground Penetrating Radar" in EGU's *The Cryosphere* in January: read here. When permafrost thaws, it can damage infrastructure, but does the damage run both ways? Yes, it looks like it does.

Using ERT and GPR, the group studied the geophysics and surveyed four land use types in Utqiagvik. Their findings add significant value to risk assessments and "risk-informed siting, maintenance, and adaptation." They "…developed a unique dataset that reveals the structural variability of permafrost in Utqiagvik, how infrastructure and local environmental conditions can jointly influence active layer depth….At all four sites, variations in active layer depth were consistently linked to land use and surface characteristics."

Big thanks to the UVA team!

Howie Epstein

Tom Douglas

Life Member Ted Schuur; his graduate student, first author and Regular Member Allison Kelley; and others shed light on a critically important topic: carbon mobilization from thawing permafrost. In "Permafrost thaw exposes old dissolved organic carbon [DOC] to photo- and biodegradation" which you can read here, they conducted a laboratory study where "we experimentally evaluated the relative roles of photodegradation and biodegradation pathways on DOC concentration and age along a hydrologic continuum…." Photodegradation, they determined, plays a stronger role than biodegradation. Good to know.

Summarizing, they reported, "Our findings support all three hypotheses: (1) light exposure history strongly shapes DOC loss pathways, (2) rapid degradation occurs within the first week driven by labile, young and old carbon sources, and (3) a residual, stable, mineral-associated DOC pool persists after extensive degradation. Together, these patterns emphasize that permafrost thaw and increased light exposure can accelerate the mobilization and transformation of previously stable carbon."

Thank you, Ted, Allison and crew!

Ted Schuur

Allison Kelley

YouTube

USPA is now on YouTube! Check out our brand-new offering and subscribe to The Permafrost Channel
Got some videos on permafrost? Let our secretary, Katherine, know secretary@uspermafrost.org

Check out these by our Student Members!

Nathan Blais (UNH) on Microbial Responses
Rachel Harris (Appalachian St.) on Ice Wedges
Sean Schaefer (UNH) on Rhizosphere Communities Extra congrats to Sean for submitting his PhD. Dissertation in September!!

Check out these by our Life Members!

Ben Jones, Billy Connor on Infrastructure Development
Torre Jorgenson, Tom Doulgas on Vulnerability Central AK
Chris Burn, Ted Shuur, Ed Yarmak, Ben Jones on Developments 2019-2024
(Wow, a big group of lifers!)

A Huge Thanks to Our Institutional Members!