



# Permafrost Coastal Systems Network (PerCS-Net)

The Permafrost Coastal Systems Network accelerates the process of scientific discovery, facilitates public access to scientific data, and promotes convergence through an international, transdisciplinary network focused on science, engineering, and societal issues associated with permafrost-affected coasts and communities in the Arctic.

## Spring/Summer 2023

### Arctic Coastal Observations, Research, and Networking Series

The ACORN series is a monthly online seminar series by PerCS-Net members on topics related to Arctic coastal research. During the first half of 2023, we launched the series and hosted five excellent presentations. The zoom recording of each is available on the PerCS-Net webpage. Please click the image flier below for more information. Many thanks to Cansu Demir and Sasha Peterson for coordinating the ACORN series!

#### ACORN Presenters:

- Roger Creel, Columbia University
- Ashley Stanek, USGS
- David Nielsen, Max Planck Institute for Meteorology
- Julia Guimond, WHOI
- Josef Elster, University of South Bohemia

**ARCTIC COASTAL OBSERVATIONS, RESEARCH, AND NETWORKING SERIES**

**ACORN**

**ROGER CREEL**  
PHD candidate, Columbia University  
rcree1@alum.columbia.edu

Wednesday, January 25  
9 AM AKST/7 PM EST

Zoom Link:  
<https://alaska.zoom.us/j/8155299015>

**GLACIAL ISOSTATIC ADJUSTMENT SPEEDS PAST & FUTURE ARCTIC SUBSEA PERMAFROST THAW**

Subsea permafrost forms when sea-level rise submerges terrestrial permafrost in the Arctic. Although permafrost soil has used recently, broader measurement of subsea permafrost distribution, best estimates indicate that over 2.5 million km<sup>2</sup> of permafrost exists under the Arctic continental shelf with some areas at the top and deep seas isolated by permafrost that is more than 700 meters thick. Understanding subsea permafrost is important because it stores organic carbon and methane, which, if thawed, may reach the atmosphere as greenhouse gases. Sea-level variations control subsea permafrost distribution. Yet, to date, no subsea permafrost model has included local sea level that differs from the global mean due to glacial isostatic adjustment (GIA). Here we present the first model of entire sea level for permafrost evolution. Additionally, we extend the subsea permafrost simulation 1000 years into the future for the emissions scenarios outlined in the International Panel on Climate Change's sixth assessment report. Our future projections enable us to map the vulnerability of Arctic subsea permafrost to climate warming.

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**ACORN**

**ASHLEY STANEK**  
Biologist, Fish and Aquatic Ecology Program USGS Alaska Science Center  
astanek@usgs.gov

Wednesday, February 22  
9 AM AKST/7 PM EST

Zoom Link:  
<https://alaska.zoom.us/j/8155299015>

**Barrier islands influence the assimilation of terrestrial energy in nearshore fishes**

The influence of physical landscape features such as barrier islands and rivers on nearshore fish food webs has not been examined in the Arctic. In this seminar, Ashley will share the findings from a recent paper in which she and coauthors investigated variation in fish trophic structure and dependence on terrestrial organic matter (OMter) in four barrier island lagoon systems along the Alaskan Beaufort Sea coast. Differences between lagoon systems (exposed vs. protected) provided insight into how fish food webs may be affected by changes to barrier island structure that may occur with erosion and sea level rise. Building on the investigation of OMter use, they also analyzed fish for radiocarbon to assess whether aged carbon, potentially from permafrost, is an important component of the nearshore food web.

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**ACORN**

**DAVID NIELSEN**  
Postdoc, Max Planck Institute for Meteorology  
david.nielsen@mpi-met.uni-bonn.de

Wednesday, March 29  
9 AM AKST/7 PM EST

Zoom Link:  
<https://alaska.zoom.us/j/8155299015>

**How could coastal erosion change the Arctic Ocean's uptake of atmospheric CO<sub>2</sub> in the future? - an Earth system modelling perspective**

Coastal erosion releases organic matter (OM) from the permafrost into the Arctic Ocean, transporting about 3 to 5 Tg of organic carbon every year. Recent projections show that such rates could increase by a factor of 2 to 3 by the end of the century due to anthropogenic climate change. However, the Arctic Ocean is a net sink of atmospheric CO<sub>2</sub> and the release of OM may alter this sink. In this seminar, we explore the potential for OM to be mineralized in situ or in the ocean, producing CO<sub>2</sub> that enters the atmosphere. Using a coupled Earth system model, we investigate the Arctic Ocean in the high CO<sub>2</sub> future (SSP5-8.5) and investigate the potential for OM to be mineralized in situ or in the ocean, producing CO<sub>2</sub> that enters the atmosphere. We investigate the potential for OM to be mineralized in situ or in the ocean, producing CO<sub>2</sub> that enters the atmosphere. We investigate the potential for OM to be mineralized in situ or in the ocean, producing CO<sub>2</sub> that enters the atmosphere.

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**ACORN**

**JULIA A. GUIMOND**  
Visiting Scientist, Woods Hole Oceanographic Institution  
jguimond@whoi.edu

Wednesday, April 26  
9 AM AKST/7 PM EST

Zoom Link:  
<https://alaska.zoom.us/j/8155299015>

**The impact of wind on groundwater dynamics along a microtidal Arctic lagoon**

Along coasts, wind-driven groundwater transports dissolved constituents to the coastal ocean, where they impinge on coastal carbon budgets and water quality. The magnitude and direction of exchange along coasts are not well understood, limiting assessments of present and projected coastal ecosystem health and function. In this seminar, I will discuss a recent field study focused on better understanding the drivers and magnitude of groundwater discharge along the Beaufort Sea coast of Alaska during the open-water period from July through September. Field data reveal that wind direction and speed drive fluctuations in sea level that exceed the tidal variance, impacting nearshore land-sea hydrologic gradients. In addition to diurnal fluctuations in hydrologic gradients that occur in locally dominated environments, we find that elevated groundwater discharge was maintained for multiple days during periods of easterly winds. Our data reveal that wind is the dominant factor impacting the magnitude of coastal groundwater discharge and local circulation along Arctic coasts and suggest that wind can be used for first-order estimates of groundwater discharge along the Beaufort Sea coast.

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**ACORN**

**JOSEF ELSTER**  
Professor, University of South Bohemia, Institute of Botany of the Czech Academy of Sciences  
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Wednesday, May 24  
9 AM AKST/7 PM EST

Zoom Link:  
<https://alaska.zoom.us/j/8155299015>

**Invasive *Voucheria* off. compacta (Xanthophyceae) and its distribution over a high Arctic tidal flat in Svalbard**

The high Arctic Svalbard tidal flat ecosystem is impacted by global warming, which could allow invasion by additional species with changes in the environment supporting their growth. The transport of additional species to Svalbard could be aided by an increase in the number of people traveling there. Anthropogenic activities related with global warming create opportunities for organisms to move across previously isolated regions, thus advancing biotic homogenization and extinctions. Our study focused on essential quantitative and qualitative information about the microphytobenthic community. Phylogenetic analysis based on rbcL genes confirmed that *V. off. compacta* is closely related to *V. off. compacta* inside the genus *Phaeoactinon*. With the help of a drone mapping survey, we estimated that *V. off. compacta* area cover was about 220 km<sup>2</sup> in 2021, a 100% increase from the drone mapped total flat area of 2475 m<sup>2</sup>. We confirmed that invasive *V. off. compacta* is a coastal cosmopolitan species widely distributed on shores in both hemispheres. Invasive *V. off. compacta* is an important component of the Adventfjordens sea-land ecotone, which affects large-scale changes within the terrestrial system, redistributes the sediment coming in with the marine tides and protects the sea-land ecotone against erosion. As a result of global warming in the Arctic, invasive *V. off. compacta* facilitates the greening of the Arctic.

### Upcoming Conference Sessions at AGU and OSM!

There are two upcoming international conferences featuring sessions on Arctic Coastal Dynamics and Processes.

The American Geophysical Union (AGU) Annual Fall Meeting, 11-15 December 2023, San Francisco, CA:

- Session Title: C011 - Arctic Coastal Dynamics
- Conveners: Louise Farquharson, Anna Irrgang, Melissa Ward Jones, and Benjamin Jones
- Abstracts Due: 02 August 2023
- Weblink: <https://agu.confex.com/agu/fm23/prelim.cgi/Session/191778>

The Ocean Sciences Meeting (OSM), 18-23 February 2024, New Orleans, LA

- Session Title: HE001 - Arctic coastal dynamics
- Conveners: Emily Eidam, Madison Smith, Julia Guimond, Roger Creel, and Benjamin Jones
- Abstracts Due: 13 September 2023
- Weblink: <https://agu.confex.com/agu/OSM24/prelim.cgi/Session/198163>

### 12th International Conference on Permafrost - Integrating Perspectives of Permafrost Thaw, Change, and Adaptation

The 12th ICOP Conference is coming up next summer from 16-20 June 2024! The conference will address the most recent developments and stimulate engaging technical and scientific discussions among academics, professionals, contractors, suppliers, and students. The impacts of climate change and economic development have significantly changed the Arctic, in recent decades, resulting in a wealth of research initiatives and challenging engineering projects. The City of Whitehorse, Yukon, is the ideal place to showcase these recent developments and the current challenges firsthand.

#### Important Dates:

- Deadline for Full Paper Submissions - 31 August 2023
- Deadline for Extended Abstract Submissions - Early 2024
- Early Bird Registration is already open!

Check Out Session 3!

Currently, PerCS-Net includes 232 members from 22 countries, with nearly half of the network consisting of early career researchers! Please help us continue to bring together the international coastal permafrost community by providing material for future quarterly newsletters and by spreading the word through your own networks.

## Vision Statement

PerCS-Net envisions building:

A sustainable, pan-Arctic permafrost coastal observatory network providing coordinated and timely information to researchers, managers, indigenous stakeholders, and the general public

A transdisciplinary research network that fosters linkages in order to amplify the broader impacts of each individual network and maintain a circumpolar alliance for Arctic coastal community information exchange

An international community that fosters and empowers the next generation of students, early-career researchers, and indigenous communities faced with the known and unknown challenges of the future Arctic System.

## PerCS-Net Member Spotlight:

### Sasha Peterson

**Hometown:** Las Cruces, NM

**Affiliation:** Environmental Science & Engineering, University of Texas at El Paso / Beaufort Lagoon Ecosystems Long Term Ecological Research

**Research focus:** Permafrost coastal erosion - understanding patterns, drivers, and biogeochemical impacts  
**Geographic focus:** Elson Lagoon (near Point Barrow), Utqiagvik, Alaska

**Current challenge:** To better understand the spatiotemporal patterns and drivers of erosion in Beaufort Lagoons, across the North Slope of Alaska. Within the Elson Lagoon, I study the distribution of soil organic carbon in coastal permafrost, its fate into nearshore ecosystems, and to the atmosphere in the form of CO<sub>2</sub> and CH<sub>4</sub>.

**Recommended reading:** Doering et al. 2022 | Improving the relationships between Indigenous rights holders and researchers in the Arctic (DOI: 10.1088/1748-9326/ac72b5)

**Finding balance:** rock climbing, pottery, and reading



## New Network Member Publications

Buzard, R.M., Kinsman, N.E., Maio, C.V., Erikson, L.H., Jones, B.M., Anderson, S., Glenn, R.J. and Overbeck, J.R., 2023. Barrier Island Reconfiguration Leads to Rapid Erosion and Relocation of a Rural Alaska Community. *Journal of Coastal Research*.

Catipovic, L., Longnecker, K., Okkonen, S.R., Koestner, D. and Laney, S.R., 2023. Optical insight into riverine influences on dissolved and particulate organic carbon in a coastal Arctic lagoon system. *Journal of Geophysical Research: Oceans*, p.e2022JC019453.

Hauser, D.D., Glenn, R.T., Lindley, E.D., Pikok, K.K., Heeringa, K., Jones, J., Adams, B., Leavitt, J.M., Omnik, G.N., Schaeffer, R. and SimsKayotuk, C., 2023. Nunaaqqit Savaqatigivlugich—working with communities: evolving collaborations around an Alaska Arctic observatory and knowledge hub. *Arctic Science*.

Kavan, J. and Strzelecki, M.C., 2023. Glacier decay boosts the formation of new Arctic coastal environments—Perspectives from Svalbard. *Land Degradation & Development*, 34, 3467-3474.

Kislov, A., Alyautdinov, A., Baranskaya, A., Belova, N., Bogatova, D., Vikulina, M., Zheleznova, I. and Surkova, G., 2023. A Spatially Detailed Projection of Environmental Conditions in the Arctic Initiated by Climate Change. *Atmosphere*, 14(6).

Kizyakov, A.I., Ermolov, A.A., Baranskaya, A.V. and Grigoriev, M.N., 2023. Morphodynamic Types of the Laptev Sea Coast: A Review. *Land*, 12(6), p.1141.

Luetzenburg, G., Townsend, D., Svennevig, K., Bendixen, M., Bjørk, A.A., Eidam, E.F. and Kroon, A., 2023. Sedimentary coastal cliff erosion in Greenland. *Journal of Geophysical Research: Earth Surface*, p.e2022JF007026.

Ogorodov, S., Badina, S. and Bogatova, D., 2023. Sea Coast of the Western Part of the Russian Arctic under Climate Change: Dynamics, Technogenic Influence and Potential Economic Damage. *Climate*, 11(7), p.143.

von Biela, V.R., Laske, S.M., Stanek, A.E., Brown, R.J. and Dunton, K.H., 2023. Borealization of nearshore fishes on an interior Arctic shelf over multiple decades. *Global Change Biology*, 29(7), pp.1822-1838.

Vonk, J.E., Speetjens, N.J. and Poste, A.E., 2023. Small watersheds may play a disproportionate role in arctic land-ocean fluxes. *nature communications*, 14(1), p.3442.

Zhang, Y., Jafarov, E., Piliouras, A., Jones, B., Rowland, J.C. and Moulton, J.D., 2023. The thermal response of permafrost to coastal floodplain flooding. *Environmental Research Letters*, 18(3), p.035004.