

Permafrost Action Team Activity Report

A photograph of a rocky coastline. In the foreground, there is a body of water with gentle ripples. The middle ground shows dark, jagged rock formations along the shore. Behind the rocks, a steep hillside is covered in green grass and shrubs, with a dense forest of evergreen trees at the top. The sky is filled with soft, grey clouds, suggesting an overcast day.

Dr. Ted Schuur
Dr. Christina Schädel
Northern Arizona University
November 20, 2015



SEARCH



(Study of Environmental Arctic Change)

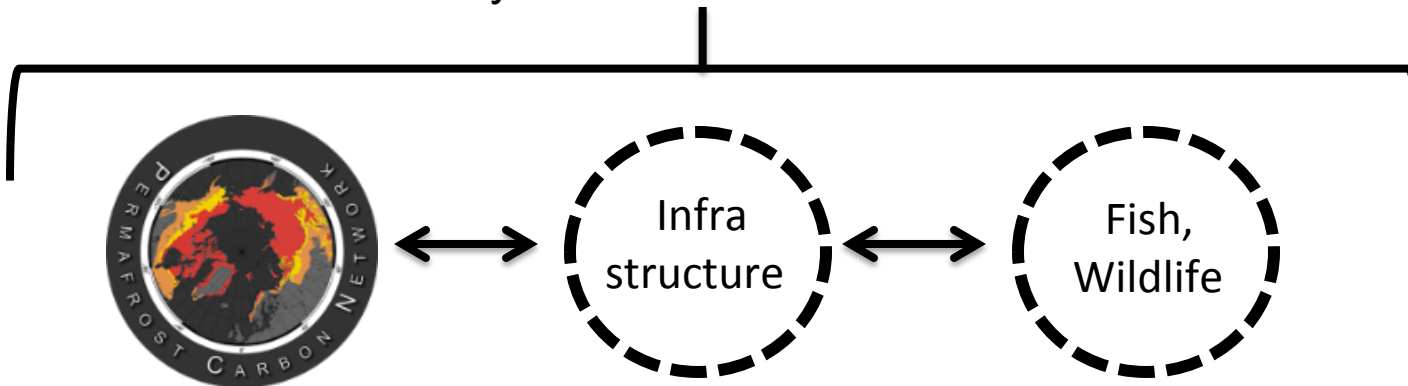


Sea Ice Action Team

Land Ice Action Team

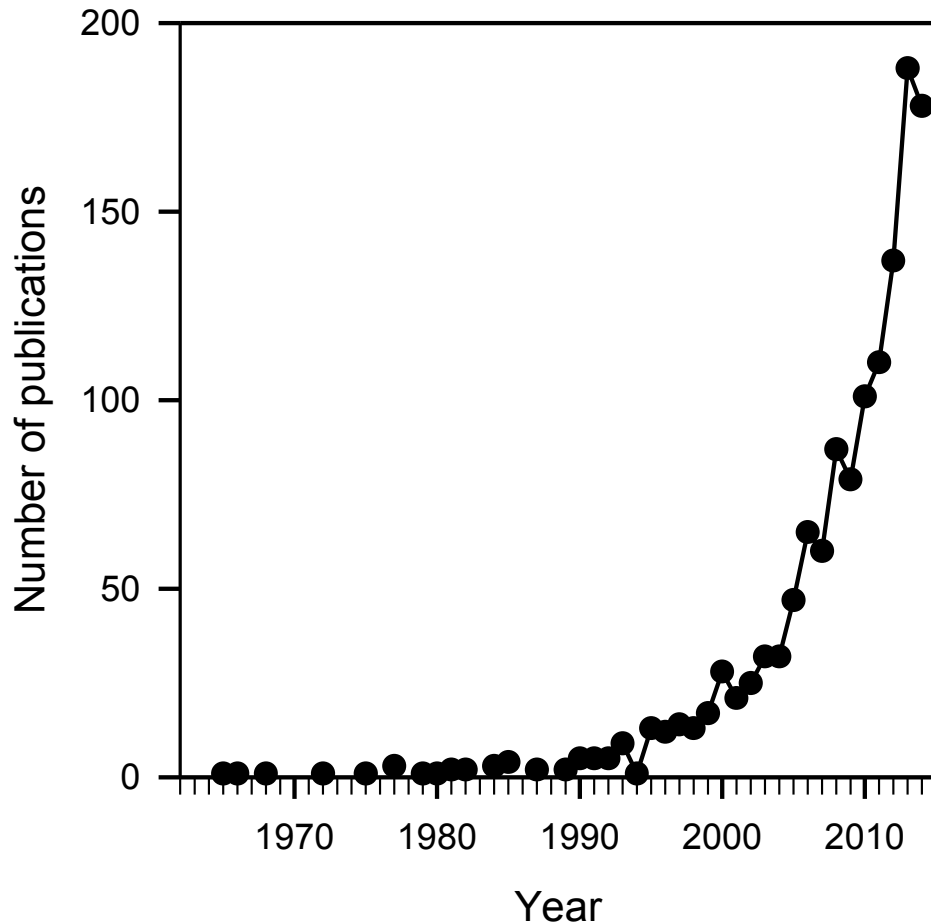
Permafrost Action Team

Document and Understand How Degradation of Near-Surface Permafrost Will Affect Arctic and Global Systems **USING SYNTHESIS SCIENCE**



Permafrost Action Team: Synthesis Science

Search Terms in Science Citation Index at Web of Science (ISI)
Permafrost and **Carbon** in Full Text



Network Goal: Use synthesis science to integrate knowledge ‘under the curve’ and distill findings for decision makers and public

Permafrost Action Team

Network Development

- **Invited Science and Action Steering Committee:**

- *Cathy Wilson (DOE Los Alamos National Lab, NGEE Arctic)

- *Erik Kasischke (NASA, ABoVE)

- *Dave McGuire (UAF/USGS, PCN)

- *Vladimir Romanovsky (UAF, GTN-P)

- *Kevin Bjella (CRREL)

- Toni Lewkowicz (U Ottawa, IPA)

- Merritt Turetsky (U Guelph, PCN)

- Dave Schirokauer (Denali NPS)

- *Michelle Walvoord (USGS Denver)

- *Scott Rupp (UAF, SNAP, Alaska Climate Center)

Permafrost Action Team

Network Development

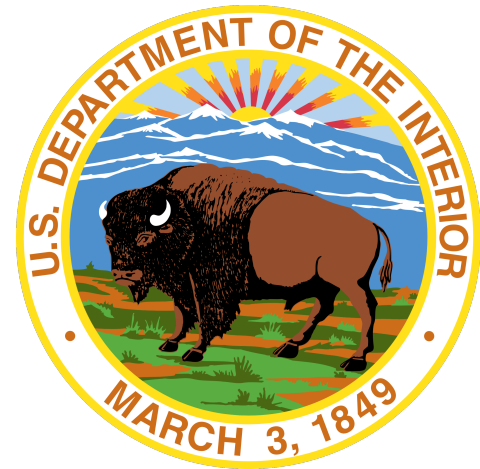
- **Synthesis Postdoctoral Researcher**

Funded by USGS Climate Science Center for 2 years (Steve Gray).

Based at UA Fairbanks / IARC.

Focused on Permafrost Impacts on **Theme 2** Infrastructure, or **Theme 3** Fish/Wildlife/Ecosystem Services.

Works with McGuire, Schuur, Eicken, others TBD.



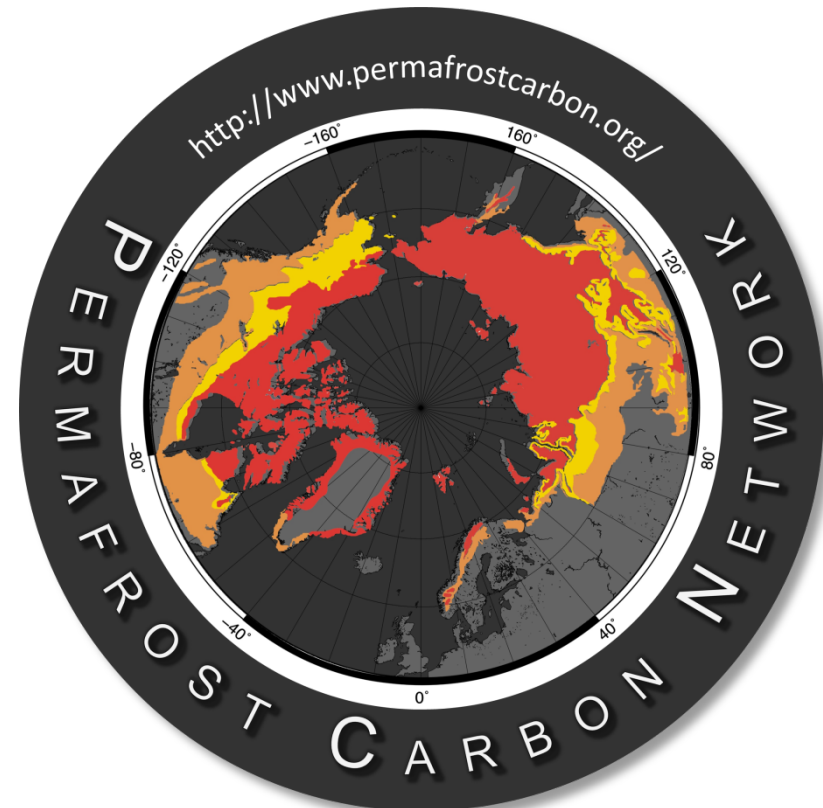
Permafrost Carbon Network

www.permafrostcarbon.org

OBJECTIVE: Produce knowledge through **research synthesis** that can be used to quantify the role of permafrost carbon in driving climate change in the 21st century and beyond

ACTIVITIES:

- 1) Organize a sequence of meetings and working groups designed to synthesize existing permafrost carbon research
- 2) Formation of a consortium of interconnected researchers to disseminate synthesis results
- 3) Permafrost carbon network website
- 4) Enhance young researcher networks



A pan-Arctic synthesis of CH₄ and CO₂ production from anoxic soil incubations.

Treat et al. GCB 2015

Climate Change and the Permafrost Carbon Feedback. **Schuur et al. Nature 2015**

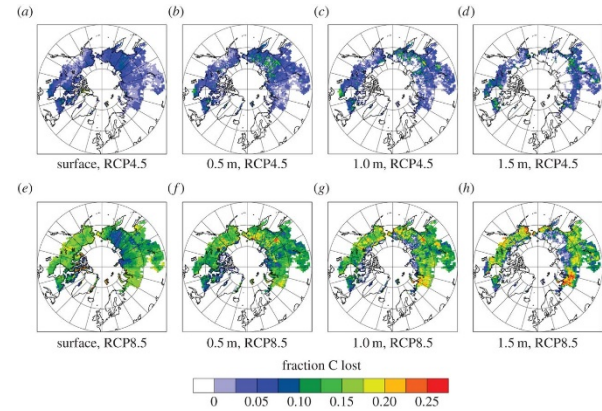
Assessment of model estimates of land-atmosphere CO₂ exchange across

Northern Eurasia. **Rawlins et al. 2015 Biogeosciences**

Permafrost thaw and resulting soil moisture changes regulate projected high-latitude CO₂ and CH₄ emissions. **Lawrence et al. 2015, ERL**

Permafrost soils and carbon cycling, **Ping et al. 2015 Soil**

A simplified, data-constrained approach to estimate the permafrost carbon-climate feedback. **Koven et al. 2015, Proc. Royal Soc.**



2015

2016

Changing environmental controls affect the strength of the permafrost carbon feedback. **Schädel et al. Nature Climate Change, in revision**

Abbott, B., et al. Can increased biomass offset carbon release from soils, streams, and wildfire across the permafrost region? **Abbott et al. Nature Communications, in review.**

Thermokarst terrain: circumpolar distribution and soil carbon vulnerability. **Olefeldt et al. Nature Geosciences, in review**

A model-based analysis of the vulnerability of carbon in the permafrost region between 1960 and 2009, **Mcguire et al. to be submitted to Global Biogeochemical Cycles.**



more at: www.permafrostcarbon.org/publications



Network: Synthesis Science

Upcoming Hosted Workshops:

- **6th Annual Open Science Meeting** of the Permafrost Carbon Network. Held prior to AGU (**Sunday Dec 13, 2015**). This network meeting draws in new participants and solicits feedback on upcoming synthesis products. [details on next slide]
- **Methane Synthesis Workshop**. (Mar/April 2016, Fairbanks, AK?) [Potential opportunities here to cross cut with sea-ice via subsea methane / interest from FAMOS group]. This workshop will focus in more detail on four methane synthesis products outlined at Open Science PCN meeting.
- **Synthesis Lead Workshop**. Held in conjunction with Eleventh International Conference of Permafrost (ICOP), Potsdam, Germany (**June 2016**). This smaller workshop brings lead / co-lead scientists of synthesis products together for cross-cutting opportunities.

Organized Sessions:

- **American Geophysical Union 2011-2015, San Francisco, CA**
Vulnerability of Permafrost Carbon to Climate Change
(3 oral sessions, 1 poster session, 1 special session)
Special session a panel discussion with the Permafrost Carbon Network, DOE NCEE Arctic, NASA CARVE, NASA ABoVE
- **XI. International Conference on Permafrost 2016, Potsdam, Germany**
Climate Change and the Permafrost Carbon Feedback: Past, Present and Future



Synthesis Science: Future Advances

1) Benchmarking and improving interactions with the Earth System Modeling Community

Lead: Charlie Koven, Dave Lawrence, Hugelius

2) Methane syntheses

Lead: Dave McGuire

3) Geospatial analyses: dynamic landscape controls on permafrost carbon vulnerability

Lead: Dan Hayes, David Olefeldt

4) Quantifying relationships between vegetation structure and permafrost thermal dynamics

Lead: Mike Loranty

5) Where and when will the Arctic become wetter or drier?

Lead: Cathy Wilson

6) Dissolved organic matter composition in waters draining permafrost landscapes

Lead: Jon O'Donnell

7) Carbon emission from the arctic during the non-growing season

Lead: Sue Natali

8) Greening versus browning of the Arctic

Lead: Christina Schädel

9) Yedoma carbon stocks and other deep permafrost C

Lead: Jens Strauss

10) Synthesizing the use of carbon isotope (^{14}C and ^{13}C) for detecting old C

Lead: Cristina Estop-Aragones

11) The depth distribution of soil carbon: quantification of northern profile datasets

Lead: Jen Harden, Claire Treat, and Charlie Koven

Public Outreach Activities 2015

Press Releases:

- **Climate Change and the Permafrost Carbon Feedback:**
71 news articles published (4pm 4/10/2015) including *Washington Post*, *The Globe and Mail*, *Sydney Morning Herald*, *The Guardian* ..
- **A Simplified, Data-Constrained Approach to Estimate the Permafrost Carbon-Climate Feedback:**
6 news articles published (4pm 4/10/2015) including *Daily Californian*, *Alaska Dispatch News*

Interviews:

- **Alaska Fire Season 2015:**
Atlantic Magazine. In Alaska, Too Many Fires, Not Enough Snow. Sept 2015
National Public Radio. Beneath Alaskan Wildfires, A Hidden Threat: Long-Frozen Carbon's Thaw. July 2015
Washington Post. Alaska's Terrifying Wildfire Season and What it Says About Climate Change. July 2015
BBC. Permafrost Warming in Parts of Alaska 'Is Accelerating'. Oct 2015

Authored Public Articles:

- *World Wildlife Foundation*. The Circle. Permafrost Carbon and Climate Change. Oct 2015.
- *The CarbonBrief*: What the latest science says about thawing permafrost. April 2015

The Washington Post
Energy and Environment
Scientists confirm that the Arctic could become a major new source of carbon emissions

By Chris Mooney April 8, 2015

Most Read

- 1 Marriott to buy Starwood, creating the world's largest hotel company
- 2 Marriott becomes world's largest hotelier, buying Starwood
- 3 How Muslims around the world condemned the Paris attacks: 'Terrorism has NO religion'
- 4 Why the Paris attacks could mark the beginning of the end for ISIS

The Atlantic
SUBSCRIBE SEARCH MENU

In Alaska: Too Many Fires, Not Enough Snow
The state nearly set a record for number of acres burned this year, while the kiltarod once more had to be moved north.

ALASKA SPECIALS | SEP. 1, 2015 | BUSINESS

WILLOW, Alaska—The strange and changing weather in the northernmost state in the union has given Bob Chispach one hell of a year.

THE CIRCLE
Climate effects 6
Living on shifting sands 20
Impact of forest fires 24

PERMAFROST SLOW-MOTION MELTDOWN

Decision Maker Support

National & International Synthesis Science Reports:

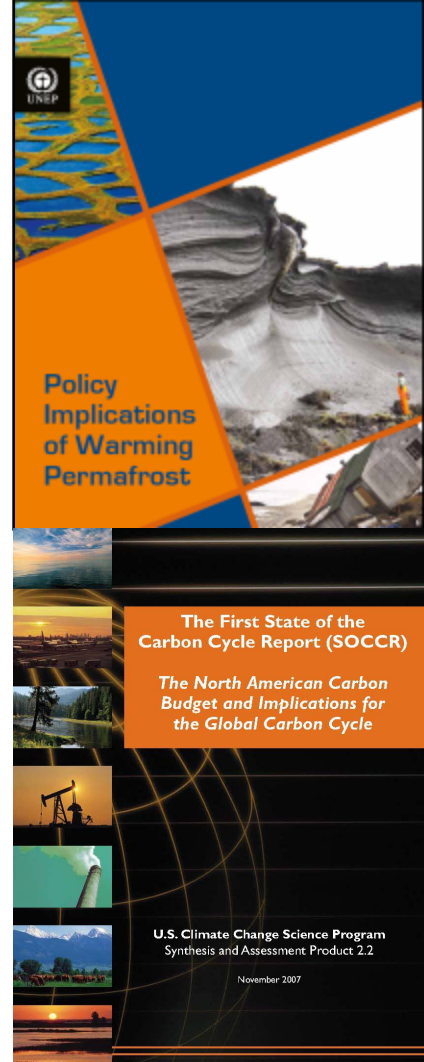
- **Snow, Ice, Water, and Permafrost in the Arctic**
Arctic Monitoring and Assessment Program, Arctic Council
- **Second State of the Carbon Cycle Report (SOCCR)**
Carbon Cycle Science Interagency Working Group

Briefing Reports:

- **International Permafrost Association. 2015.**
SEARCH and the Permafrost Carbon Network
- **National Academies Polar Research Board. 2015.**
Rapid Change at the Poles.
- **Interagency Arctic Research Policy Committee. 2015.**
Permafrost Carbon Research Coordination Network Progress on Milestone 3.2.3.

Other Decision Maker Support:

- Materials provided to USGCRP and State Department in Advance of President Obama's presentation at the GLACIER conference. August 2015.
<https://www.whitehouse.gov/2015-alaska-trip?sid=123>



Opportunities Enabled Within SEARCH

Workshop Support:

- **ARCUS Support Office**
Permafrost AT Contact: Brit Myers

Network Development:

- **Permafrost AT Steering Committee**
Input from SEARCH SSC

Synthesis Science:

- **Alaska Climate Science Center Synthesis Postdoctoral Researcher**
Contacts: H. Eicken (IARC) & Steve Gray (USGS)

Outreach:

- **Arctic Encounter Symposium**
Seattle WA, January 2016; SEARCH Contact: B. Kelly

Action Teams:

- ? Potential for theme intersection

