OBJECTIVE: Produce knowledge through research synthesis to quantify the role of permafrost carbon in driving future climate change

BUILT NETWORK: Poised to ingest new observations and deliver synthesis science and outreach products on timeframe needed by decision makers

LEADERSHIP:
PI: Ted Schuur, Dave McGuire, Christina Schädel
Logistics: Brit Myers, ARCUS
Contributors: Steering committee, synthesis leads, the permafrost carbon community, SEARCH executive director & Action Team leads

Current number of Members: 380+
Institutions: 177
Countries: 24
Permafrost Carbon Published Literature

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

2000–present: 94%
2005–present: 86%
2010–present: 69%

Myers and Schädel 2017
“Consider as well that many of the fires burning today are actually burning through the permafrost in the Arctic. This permafrost stores massive amounts of carbon. When the permafrost is no longer permanent, when it thaws or burns, these gases are released into our atmosphere over time. And that could mean that the Arctic may become a new source of emissions that further accelerates global warming.

If we do nothing, temperatures in Alaska are projected to rise between six and twelve degrees by the end of the century. Triggering more melting, more fires, more thawing of the permafrost. A [positive] feedback loop. A cycle: warming leading to more warming, that we do not want to be a part of. And the fact is that climate is changing faster than our efforts to address it. That, ladies and gentlemen, must change. We’re not acting fast enough.”
Permafrost Carbon Emissions Synthesis

Soil Carbon Change by 2100 in a Warming Climate (RCP8.5)

Cumulative Carbon Change (Pg)

Sink
Source

2011
2011-2015
2015
2016
2018

Expert Assessment
Model Projections
Data, Model Synthesis
Data-Constrained Models
Earth System Models
Permafrost Carbon MIP

3Schuur et al. 2015 Nature; 4Koven et al. Philosophical Transactions of the Royal Society A 2015; Schneider von Deimling et al. 2015;
5MacDougall al. 2016; Burke et al. 2017; 6McGuire et al. 2018
Permafrost Carbon Emissions Synthesis

Ecosystem Carbon Change by 2100 in a Warming Climate (RCP8.5)

Cumulative Carbon Change (Pg)

Burke et al. 2017
McGuire et al. 2018 PNAS
Permafrost Carbon Emissions Synthesis

Ecosystem Carbon Change by 2300 in a Warming Climate (RCP8.5)

Plants offset soil C loss via increased biomass and new soil C inputs

Plant offset pushes large accelerating climate feedback into next century and beyond

IPCC scenarios; mitigation helps reduce emissions

McGuire et al. 2018 PNAS