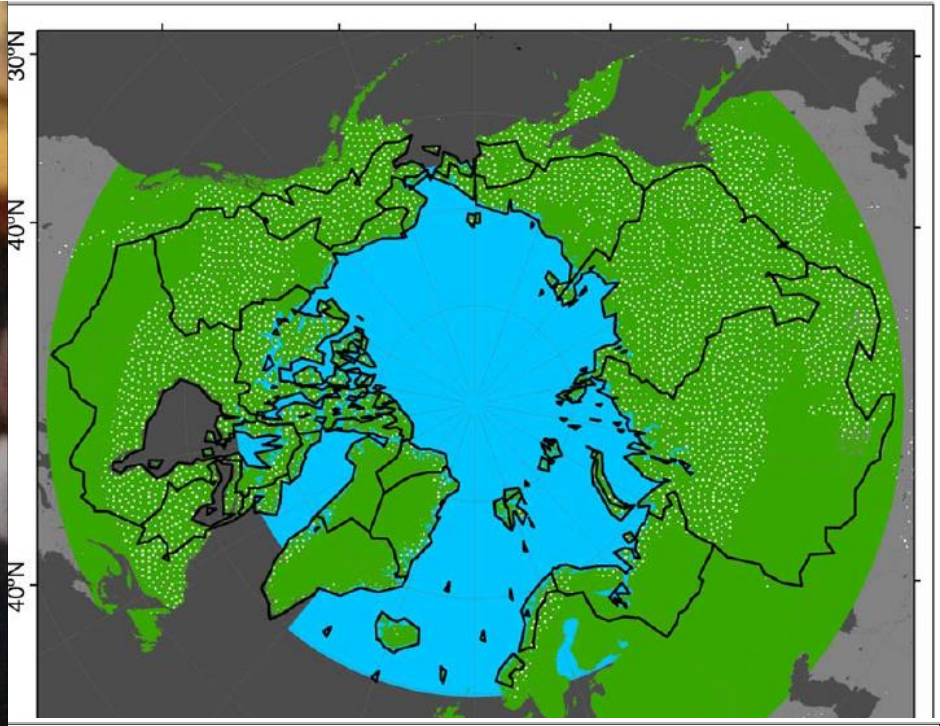
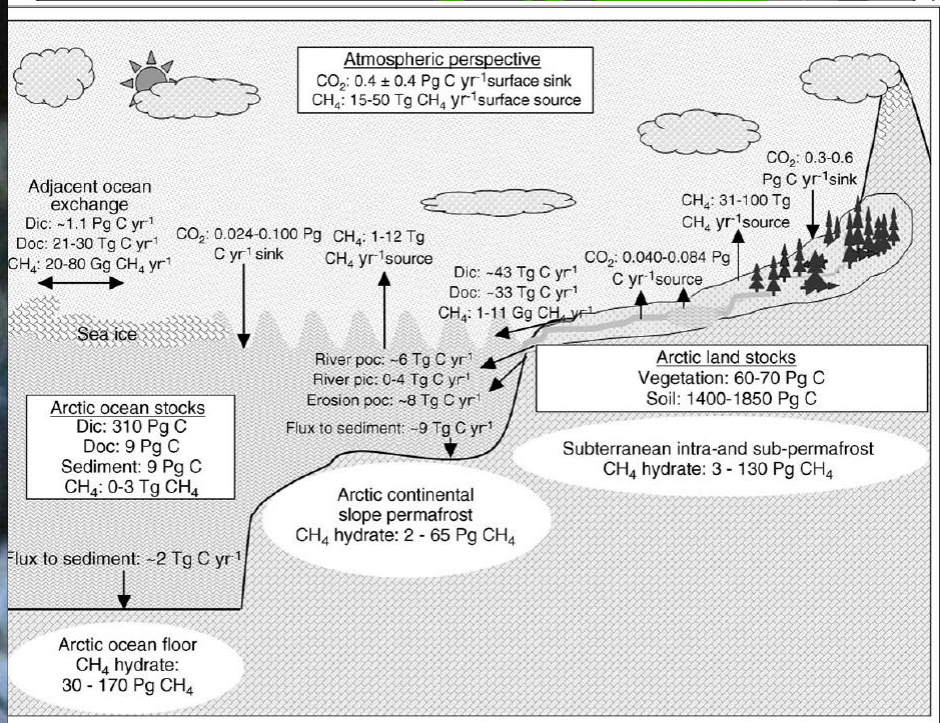

30°N
40°N
40°N


Atmospheric perspective
CO2: 0.4 ± 0.4 Pg C yr-1surface sink
CH4: 15-50 Tg CH4 yr-1surface source
Adjacent ocean exchange
Dic: ~1.1 Pg C yr-1
Doc: 21-30 Tg C yr-1
CH4: 20-80 Gg CH4 yr-1
CO2: 0.024-0.100 Pg C yr-1 sink
CH4: 1-12 Tg CH4 yr-1source
CO2: 0.3-0.6 Pg C yr-1sink
CH4: 31-100 Tg CH4 yr-1source
CO2: 0.040-0.084 Pg C yr-1source
Dic: ~43 Tg C yr-1
Doc: ~33 Tg C yr-1
CH4: 1-11 Gg CH4 yr-1
Sea ice
River poc: ~6 Tg C yr-1
River pic: 0-4 Tg C yr-1
Erosion poc: ~8 Tg C yr-1
Flux to sediment: ~9 Tg C yr-1
Arctic land stocks
Vegetation: 60-70 Pg C
Soil: 1400-1850 Pg C
Arctic ocean stocks
Dic: 310 Pg C
Doc: 9 Pg C
Sediment: 9 Pg C
CH4: 0-3 Tg CH4
Subterranean intra-and sub-permafrost
CH4 hydrate: 3 - 130 Pg CH4
Arctic continental slope permafrost
CH4 hydrate: 2 - 65 Pg CH4
Flux to sediment: ~2 Tg C yr-1
Arctic ocean floor
CH4 hydrate:
30 - 170 Pg CH4

Permafrost Carbon Network

Part of the Study for Environmental Arctic Change Program

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

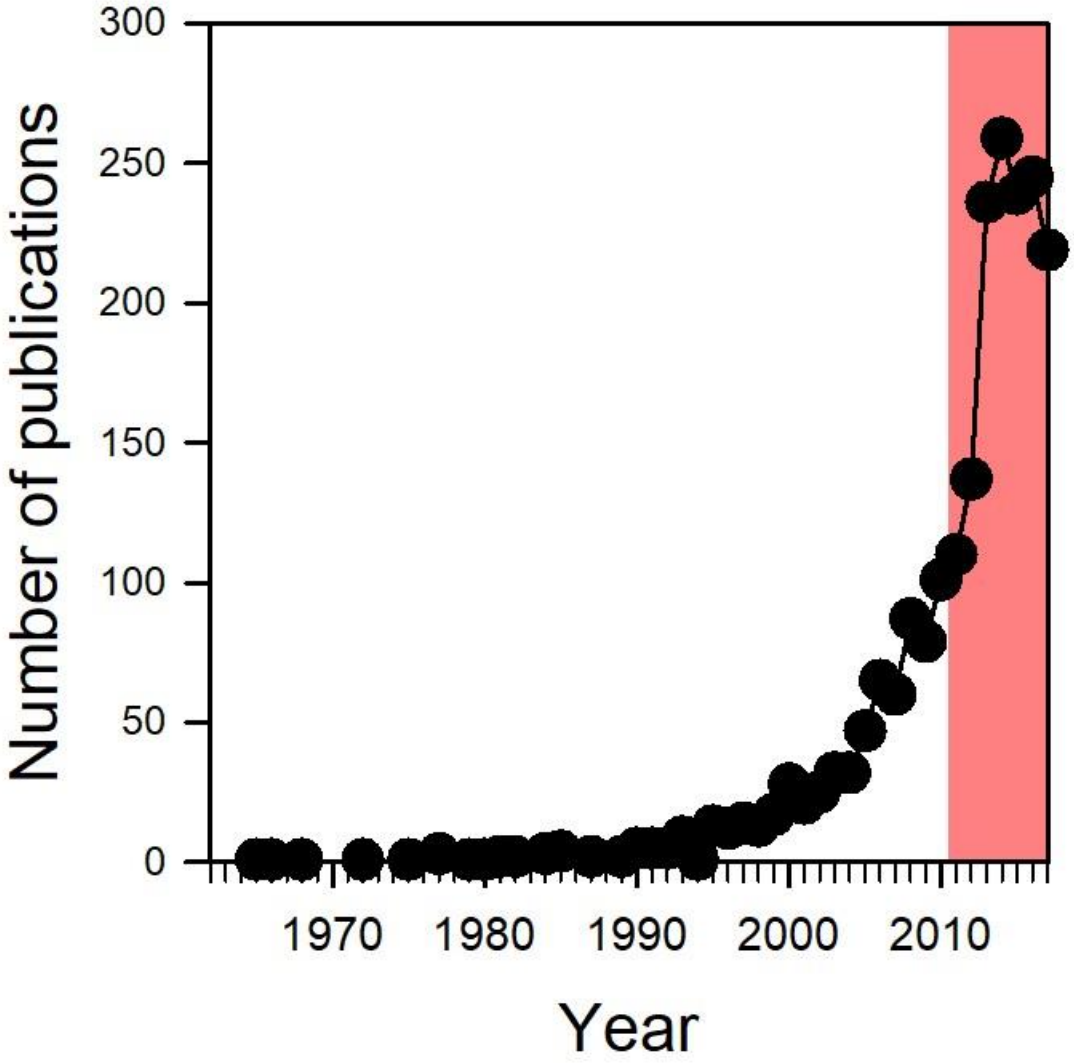
Logistics: Brit Myers, ARCUS

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

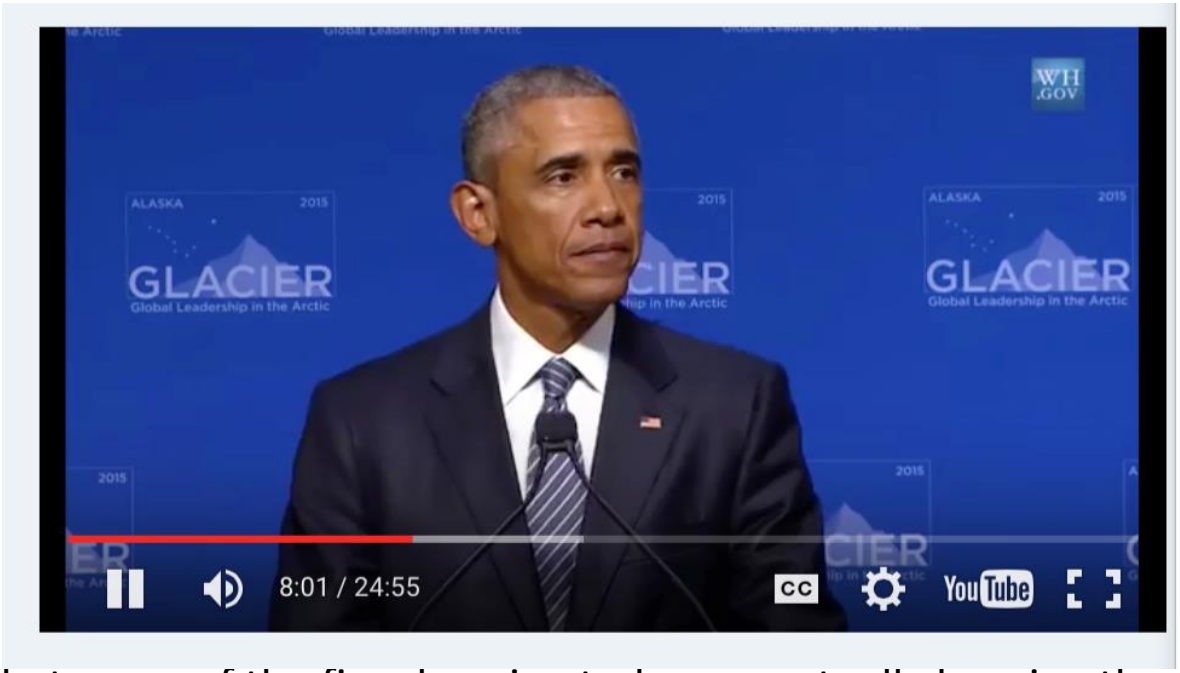
Search Terms in Science Citation Index at Web of Science (ISI)
Permafrost and Carbon in Full Text



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

Myers and Schädel 2017

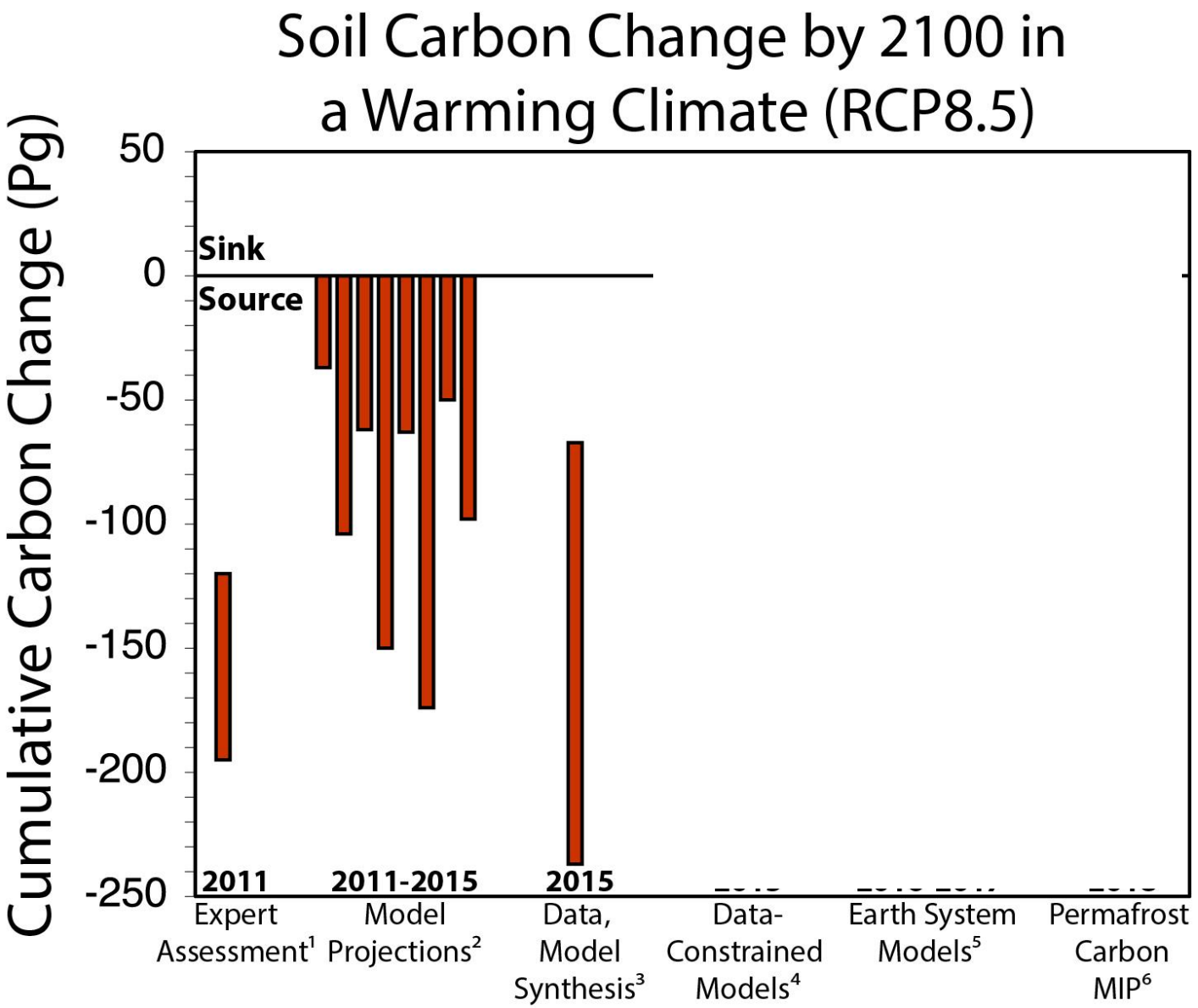
President Obama GLACIER Conference, August 2015



“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.

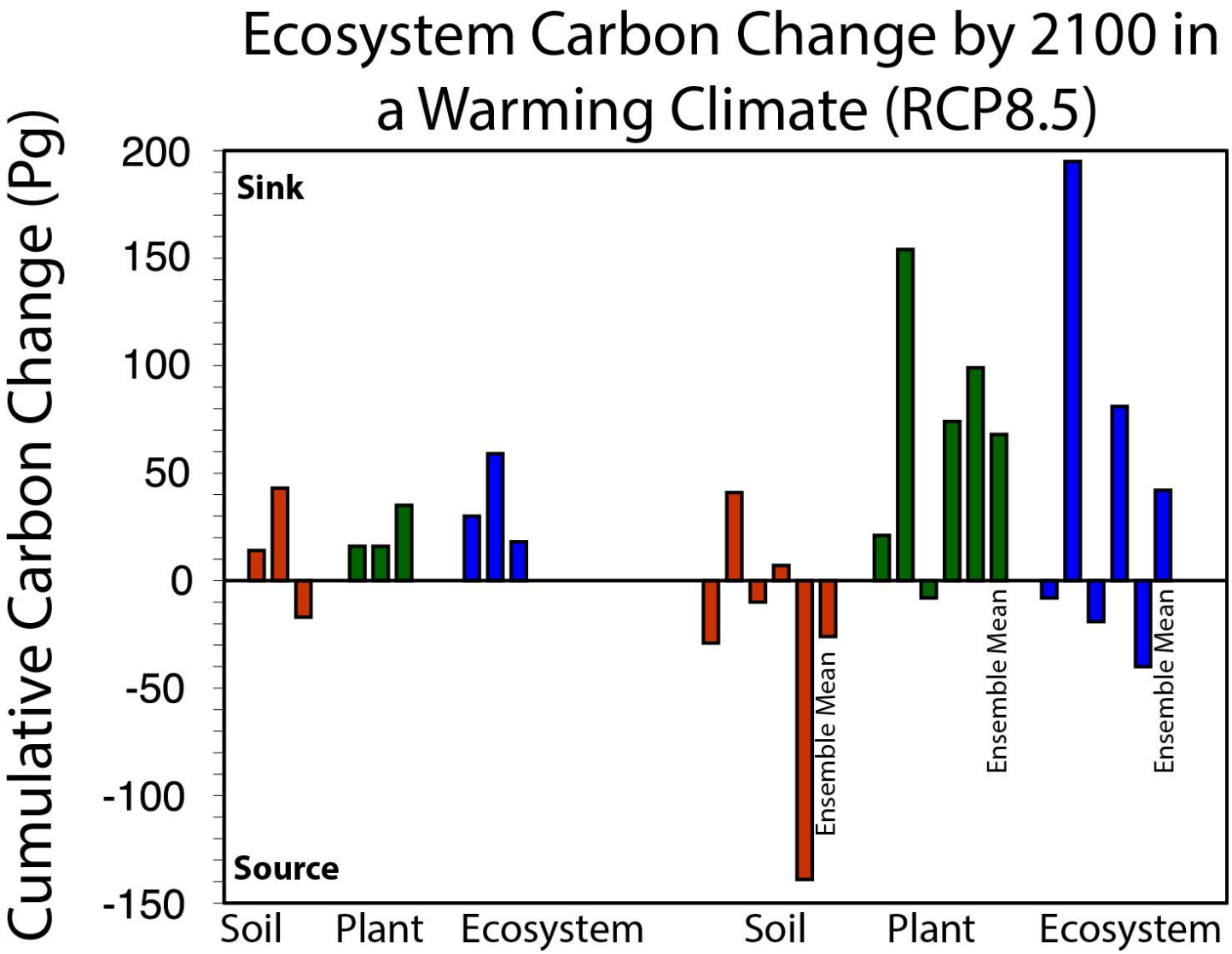
If we do nothing, temperatures in Alaska are projected to rise between six and twelve degrees by the end of the century. Triggering more melting, more fires, more thawing of the permafrost. A [positive] feedback loop. A cycle: warming leading to more warming, that we do not want to be a part of. And 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



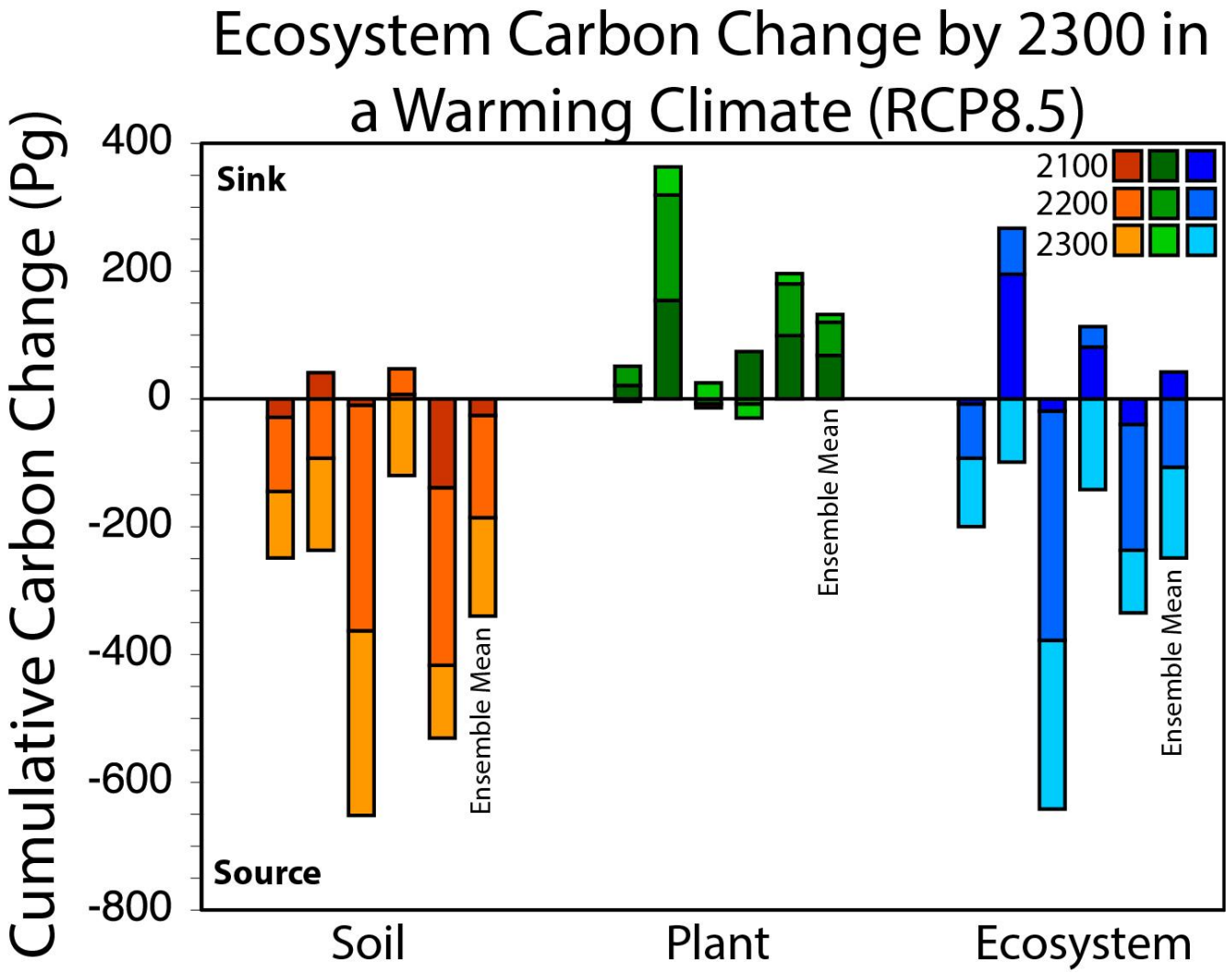
[1]Schuur et al. 2011 Nature Comment; 2013 Climatic Change; [2]Schaefer et al. 2014 Environmental Research Letters [8 models];
[3]Schuur et al. 2015 Nature; [4]Koven et al. Philosophical Transactions of the Royal Society A 2015; Schneider von Deimling et al. 2015;
[5]MacDougall al. 2016; Burke et al. 2017; [6]McGuire et al. 2018

Permafrost Carbon Emissions Synthesis



Burke et al. 2017
McGuire et al. 2018 PNAS

Permafrost Carbon Emissions Synthesis



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


CH4
V.O. Leshyk