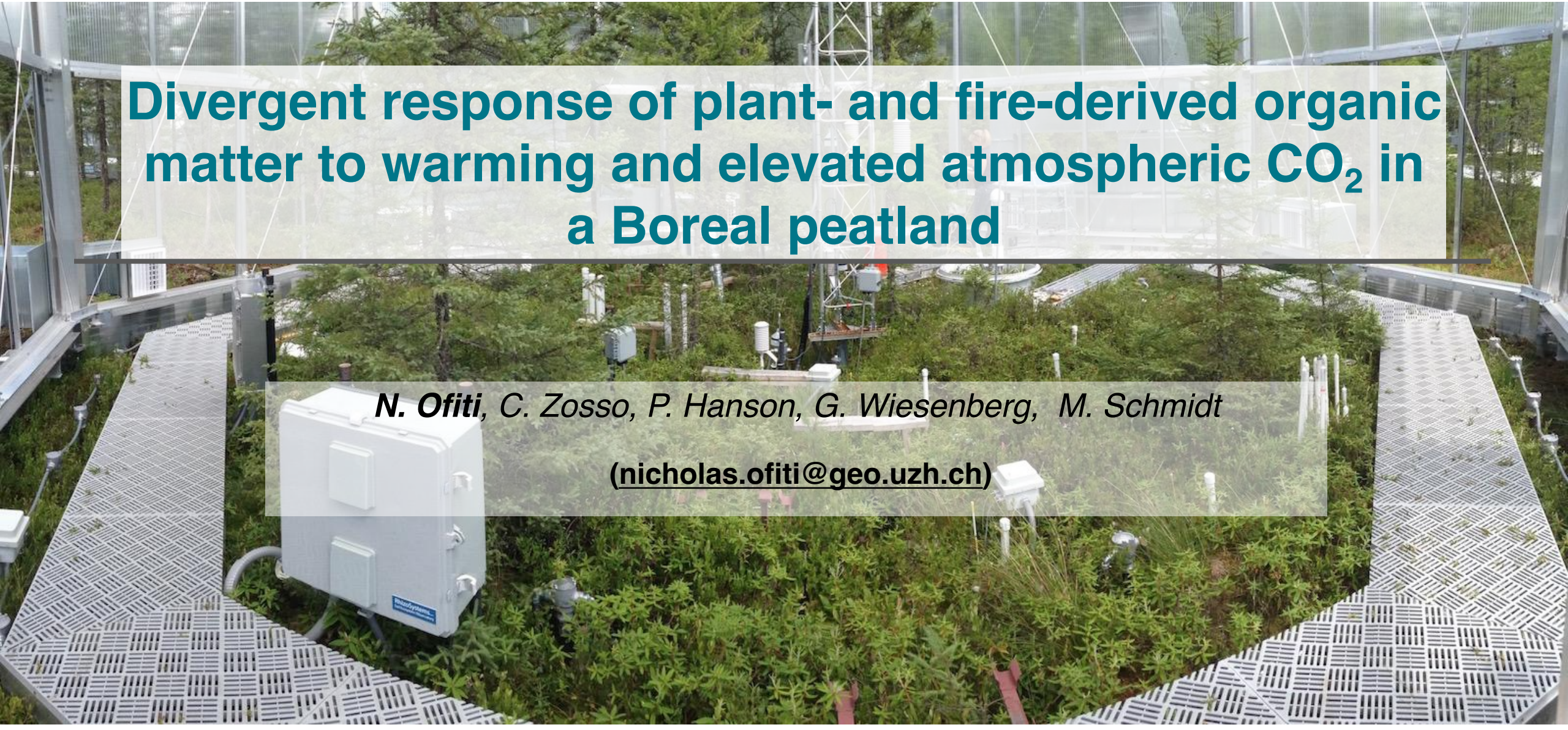
University of Zurich[UZH]

SPRUCE

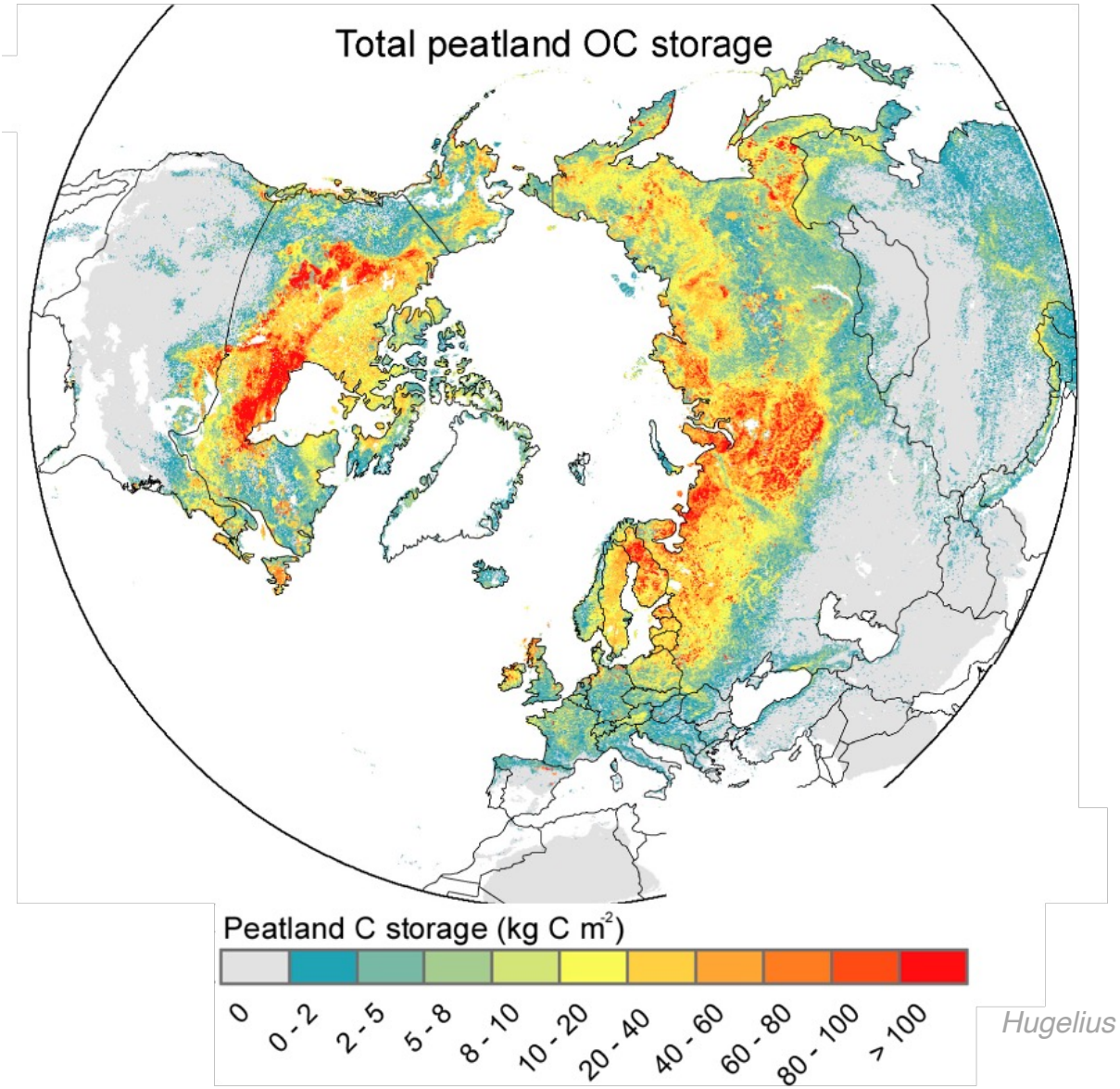
Divergent response of plant- and fire-derived organic matter to warming and elevated atmospheric CO_2 in a Boreal peatland



N. Ofiti, *C. Zosso, P. Hanson, G. Wiesenberg, M. Schmidt*

(nicholas.ofiti@geo.uzh.ch)

Carbon stocks in peatlands



Peatlands carbon and global change:

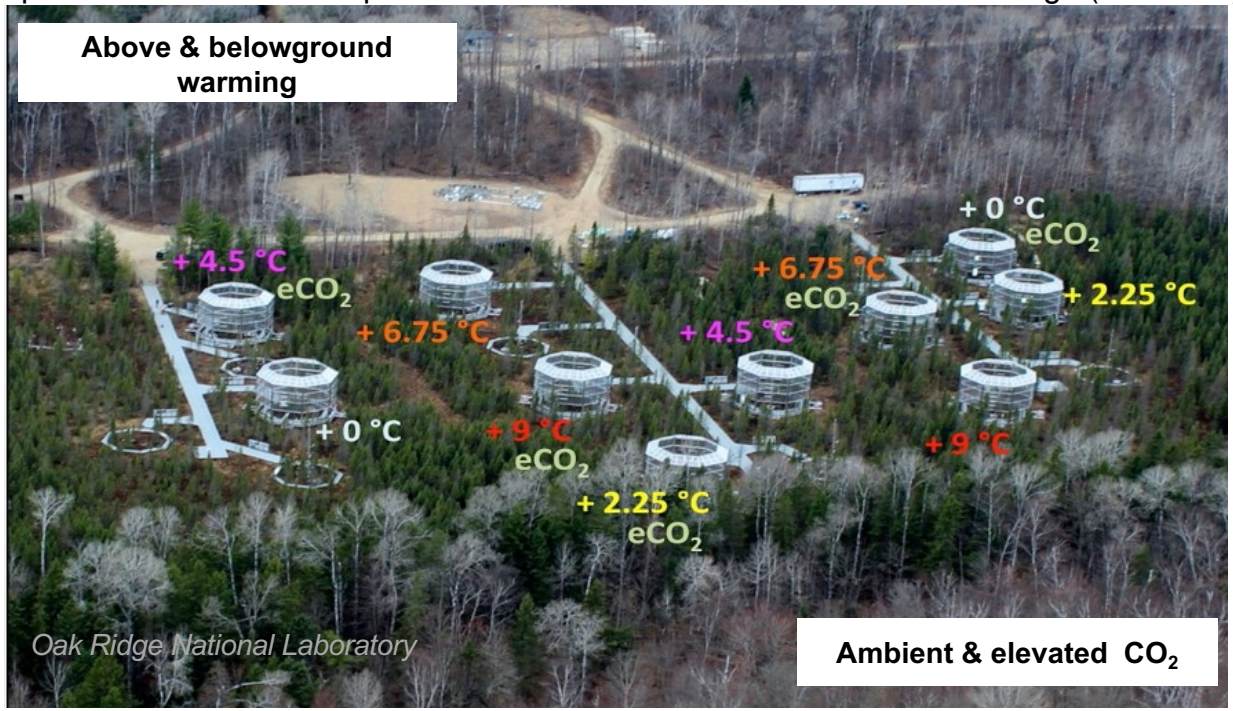
What is the fate of one-third of the world's soil carbon?

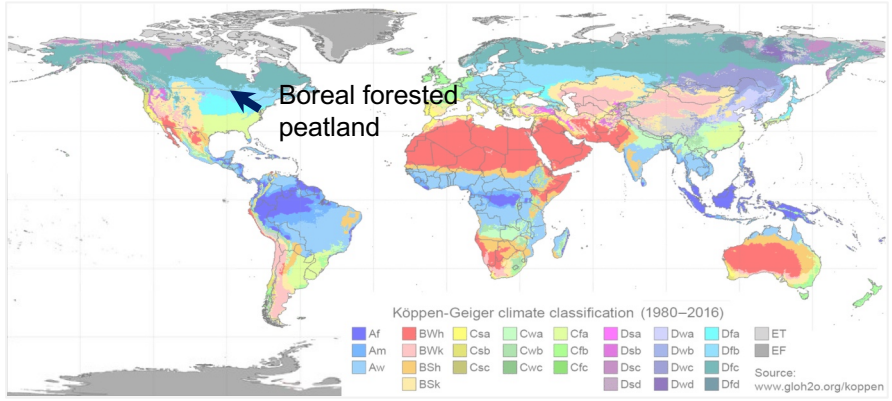
Hugelius et al., 2020, PNAS, 34

Field experiment: Boreal forested peatland

- Experimental design: 10 open-top enclosures, 12 m diameter and 7 m high.
- 5 warming levels: +0, +2.25, +4.5, +6.75, +9 ºC.
- Duplicate warming plots receive ambient or elevated CO_2 concentration (+500 ppm).
- Results: 4 years of warming; 2 years of CO_2 addition

Spruce and Peatland Responses Under Climatic and Environmental Change (SPRUCE)

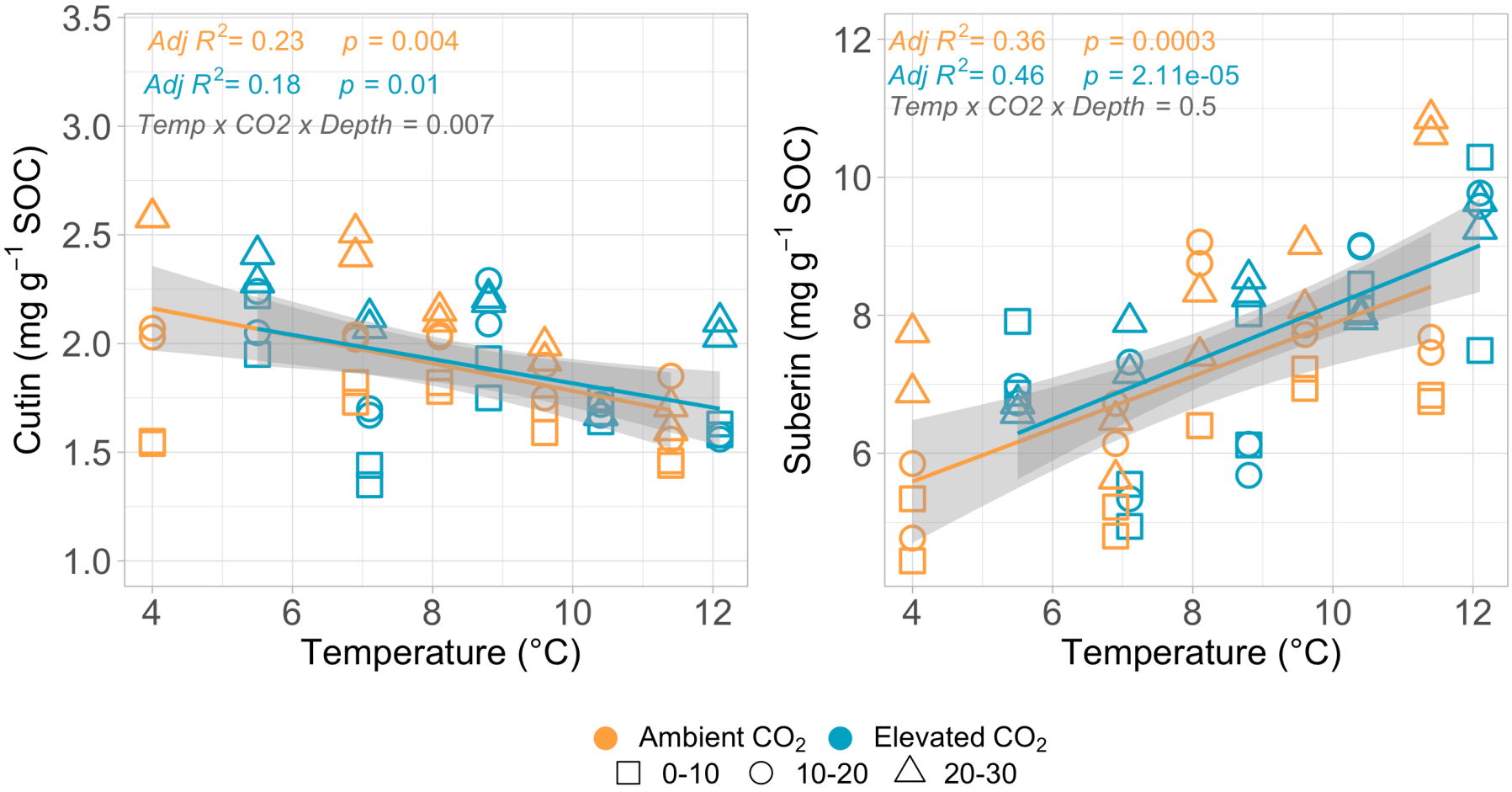




Hanson et al., 2017, Biogeosciences, 14

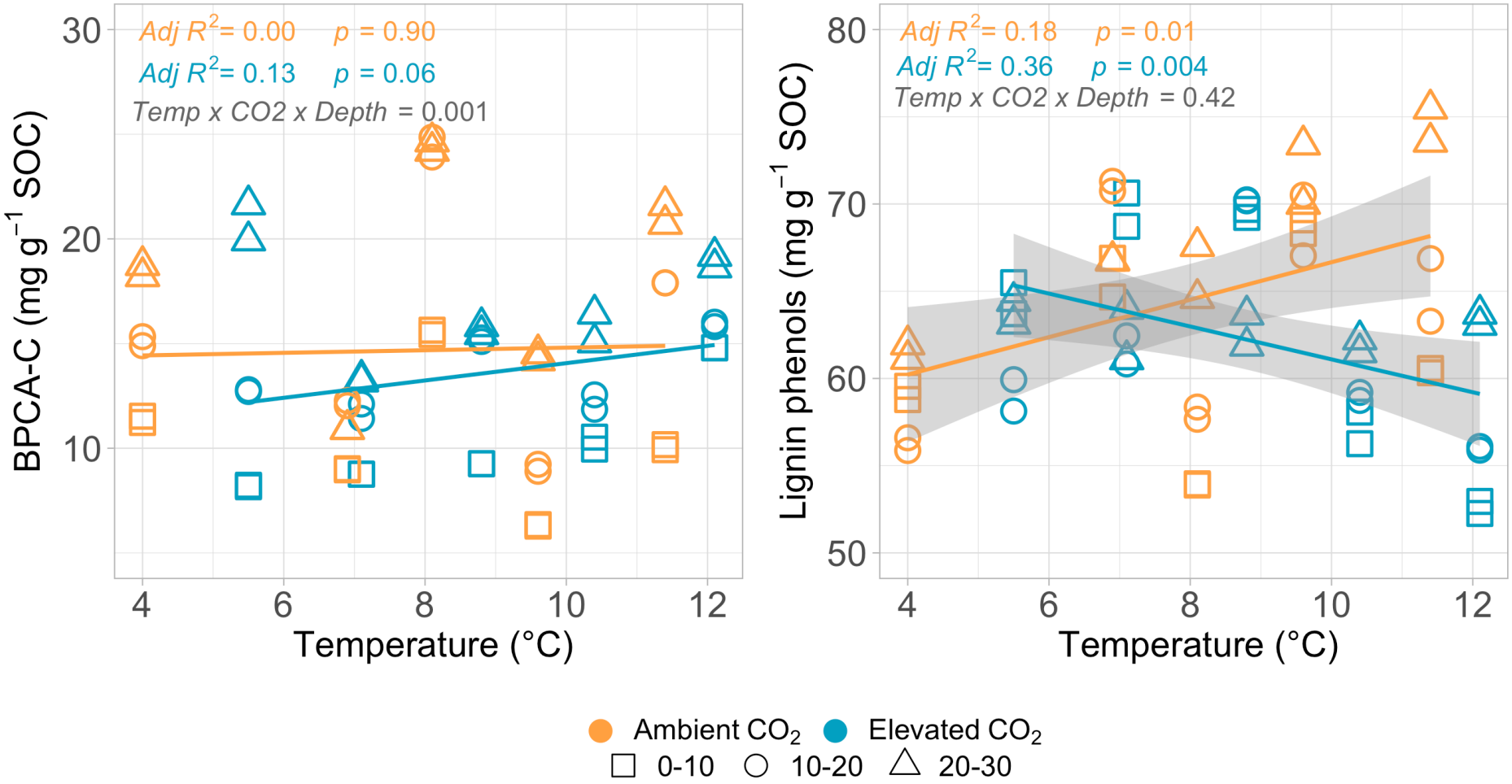
Beck et al., 2018, Sci Data, 5

How does cutin- and suberin-derived organic matter respond to warming and elevated atmospheric CO_2?



Warming accelerated new carbon incorporation from roots at the expense of leaf-derived inputs, implying dynamic alterations in carbon incorporation and sequestration with environmental changes

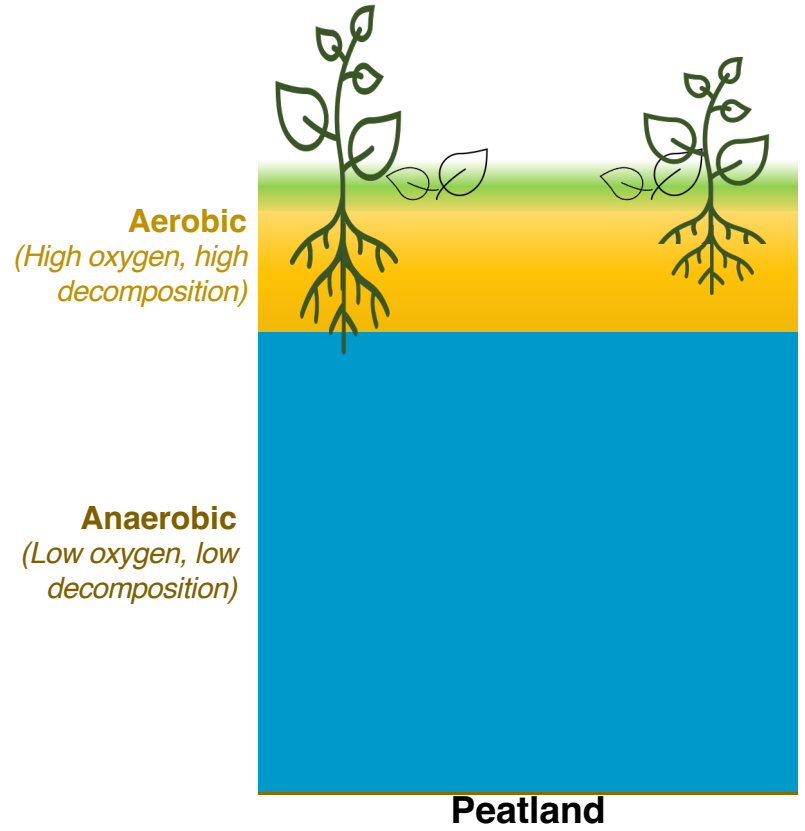
How does lignin- and fire-derived organic matter respond to warming and elevated atmospheric CO_2?



Warming enhanced the accumulation of lignin phenols under ambient CO_2 but promoted their loss under elevated CO_2 treatments.

Take home messages

- Warming led to enhanced accumulation of suberin-derived compounds and lignin phenols.
- Lignin phenols decreased at the expense of lipids under elevated atmospheric CO_2.
- Likely through:
  - Root-driven accrual of OM
  - Preferential degradation of OM.



From: Avni Malhotra

Ofiti et al., 2022, GCB, 28


Many thanks for your attention
Questions and comments: nicholas.ofiti@geo.uzh.ch