Siberian Arctic inland waters emit mostly contemporary carbon

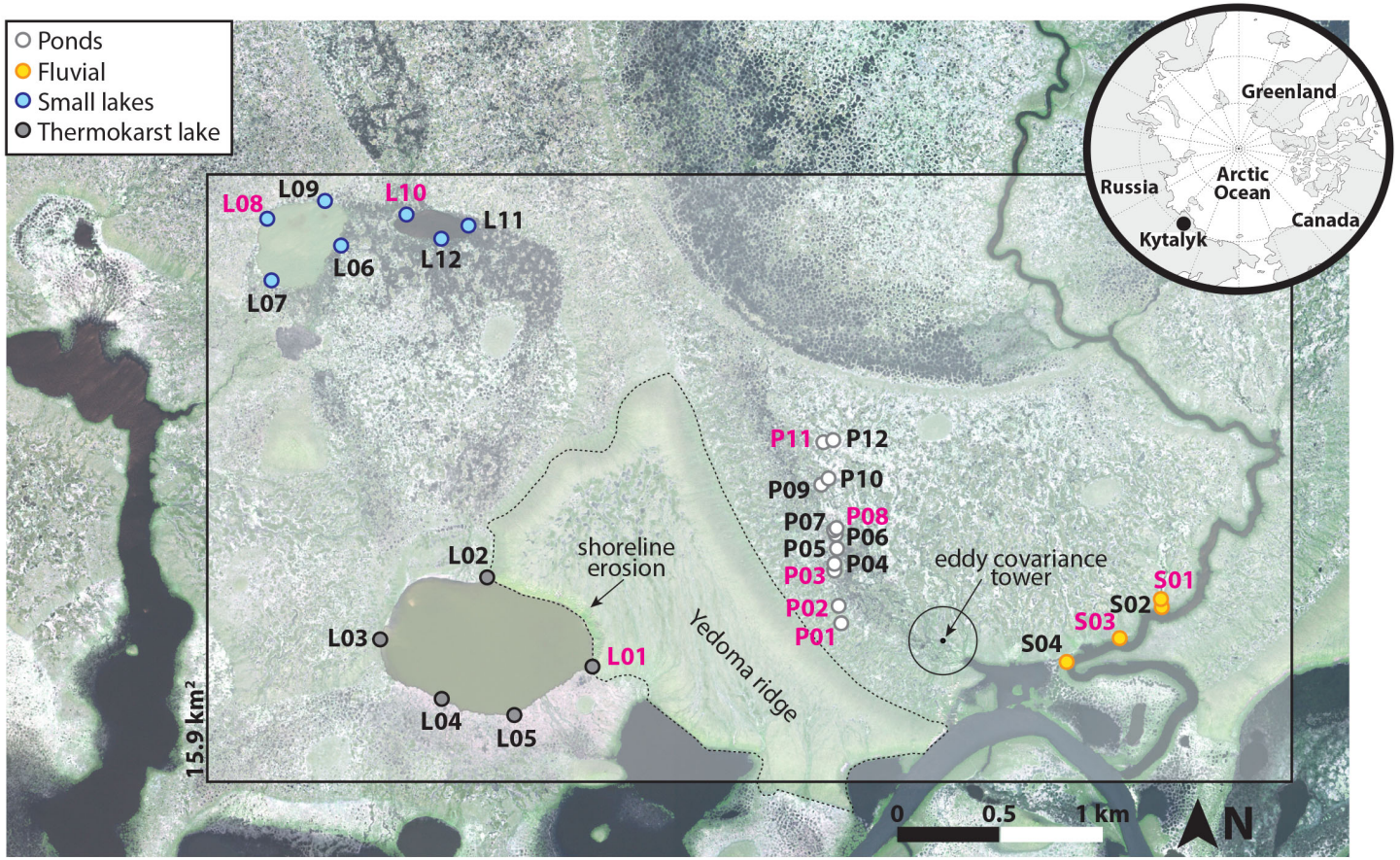
Joshua Dean
Ove Meisel
Melanie Martyn Roscoe
Luca Belelli Marchesini
Mark Garnett
Henk Lenderink
Richard van Logtestijn
Alberto Borges
Steven Bouillon
Thibault Lambert
Thomas Röckmann
Trofim Maximov
Roman Petrov
Sergei Karsanaev
Rien Aerts
Jacobus van Huissteden
Jorien Vonk
Han Dolman

East Siberian Arctic lowlands

- Inland water carbon concentrations, emissions to the atmosphere, and isotopic composition measured

- Arctic peat tundra in Yedoma region (loess deposited carbon that can be >50,000 years old)

- Radiocarbon (^{14}C) used on DOC, POC, CO_2 and CH_4 to determine contemporary vs. pre-aged carbon



Carbon = mostly contemporary

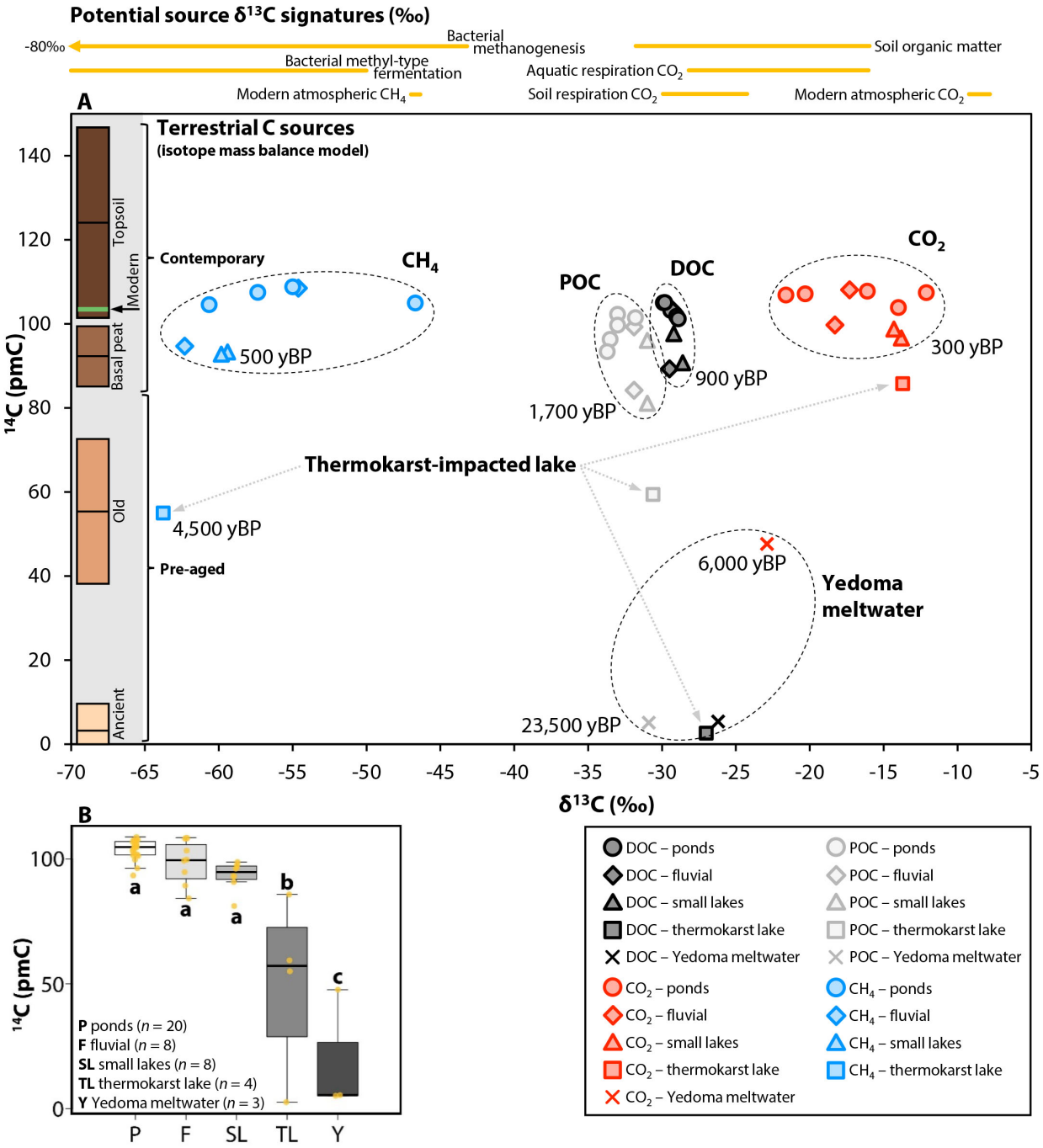
- **Age gradient from modern** (post-1950 CE) **to ancient** (29,355 ± 2967 yBP)

  ponds > fluvial > small lake > thermokarst lake > Yedoma meltwater (*youngest > oldest*)

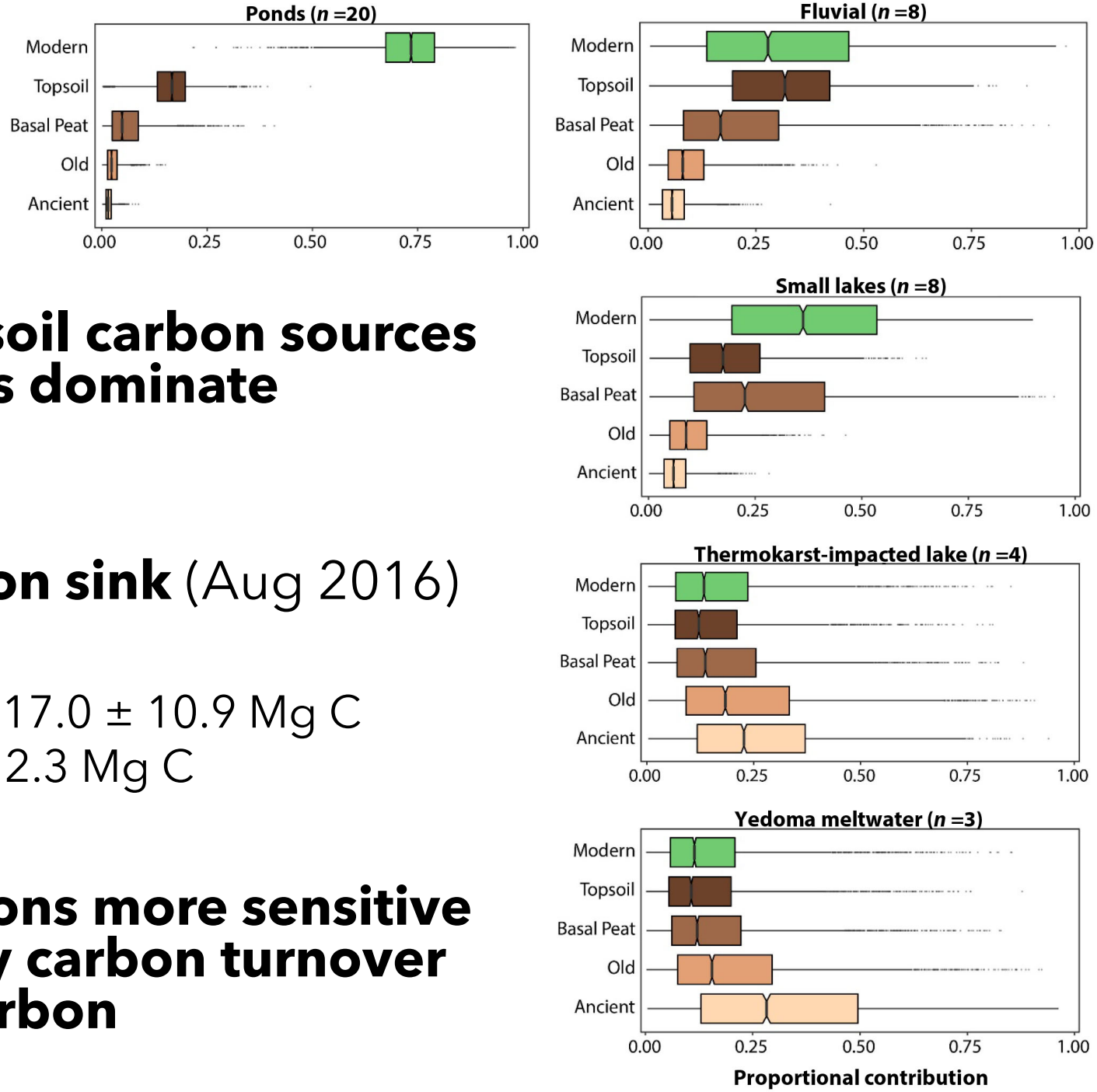
- **All ^{14}C forms correlated**

  CO_2 and CH_4 generally younger than DOC and POC

  Higher carbon concentrations tended to be younger



CO_2 and CH_4 emissions



- **Modelled contributions of soil carbon sources show contemporary sources dominate** (modern to basal peat)

- **Study landscape a net carbon sink** (Aug 2016)

  −876.9 ± 136.4 Mg C

  Contemporary inland waters = 17.0 ± 10.9 Mg C

  Pre-aged inland waters = 3.5 ± 2.3 Mg C

Inland water carbon emissions more sensitive to changes in contemporary carbon turnover than release of pre-aged carbon

Want to read further?

- **Manuscript**

Dean, J.F., Meisel, O.H., Martyn Rosco, M. *et al.* East Siberian Arctic inland waters emit mostly contemporary carbon. *Nature Communications* **11**, 1627 (2020).

https://doi.org/10.1038/s41467-020-15511-6

- **Twitter thread**

@JoshuaFDean

https://twitter.com/JoshuaFDean/status/1245711926010806273

- **Article on "The Conversation"**

Arctic climate change – it's recent carbon emissions we should fear, not ancient methane 'time bombs'

https://theconversation.com/arctic-climate-change-its-recent-carbon-emissions-we-should-fear-not-ancient-methane-time-bombs-135270