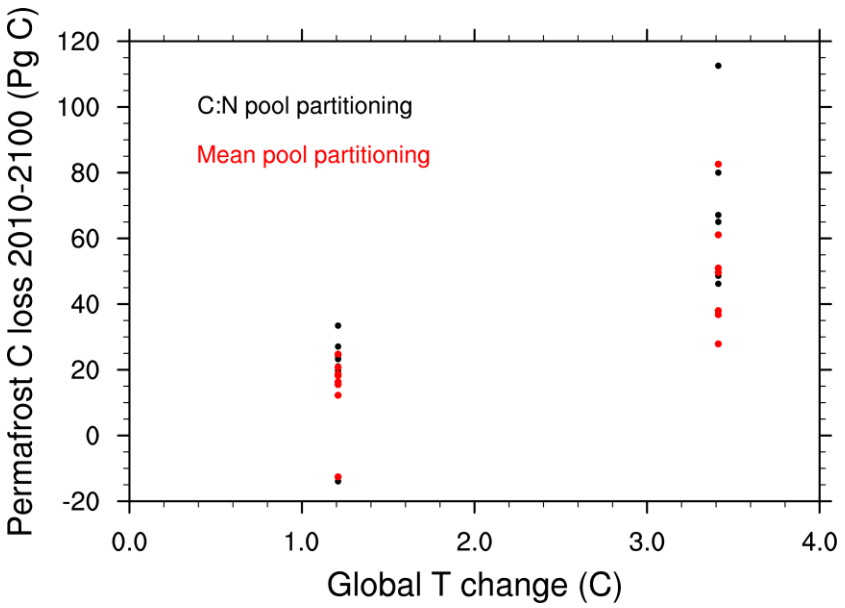
Developing a simplified, data-constrained model of permafrost C feedback

Objective:

Estimate the magnitude of the carbon-climate feedback from permafrost soils, by synthesizing data on soil C stocks, decomposability, and combining these with model estimates of permafrost warming.



Approach:

A "synthesis of syntheses" to combine meta-analyses of permafrost incubation data, an intercomparison of permafrost soil thermal models, and pan-Arctic soil C maps to generate a simplified and data constrained approach for estimating the permafrost carbon–climate feedback.

Results/Impacts:

Estimated permafrost carbon losses are roughly linear with warming, supporting the idea of a permafrost carbon–climate feedback strength. Magnitude of this feedback on the 100-year timescale is substantial, though smaller than some earlier estimates. Identify key processes that are not included, and how they may influence results.

Koven, C. D., . A. G. Schuur, C. Schädel, T. J. Bohn, E. J. Burke, G. Chen, X. Chen, P. Ciais, G. Grosse, J. W. Harden, D. J. Hayes, G. Hugelius, E. E. Jafarov, G. Krinner, P. Kuhry, **D. M. Lawrence**, A. H. MacDougall, S. S. Marchenko, A. D. McGuire, S. M. Natali, D. J. Nicolsky, D. Olefeldt, S. Peng, V. E. Romanovsky, K. M. Schaefer, J. Strauss, C. C. Treat, and M. Turetsky (2015), A simplified, data-constrained approach to estimate the permafrost carbon–climate feedback. *Phil. Trans. R. Soc. A*, 373(2054):20140423. doi:10.1098/rsta.2014.0423.