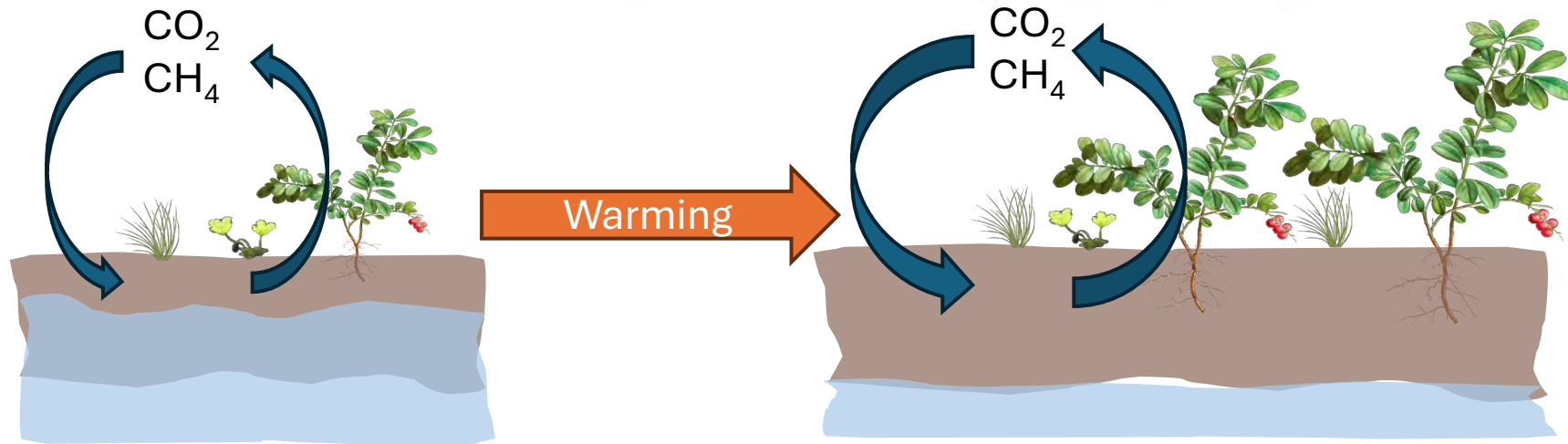
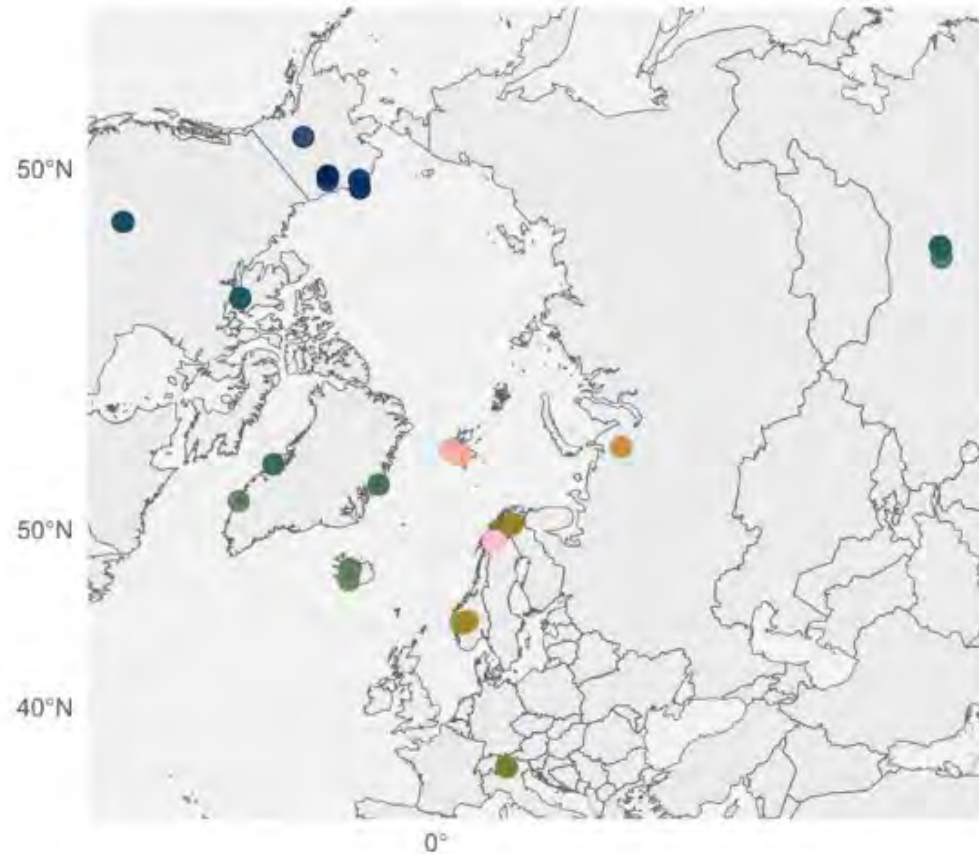


The hare and tortoise of arctic methane



ITEX 2025
Jan Dietrich

Synthesis of Carbon flux data
from OTC experiments

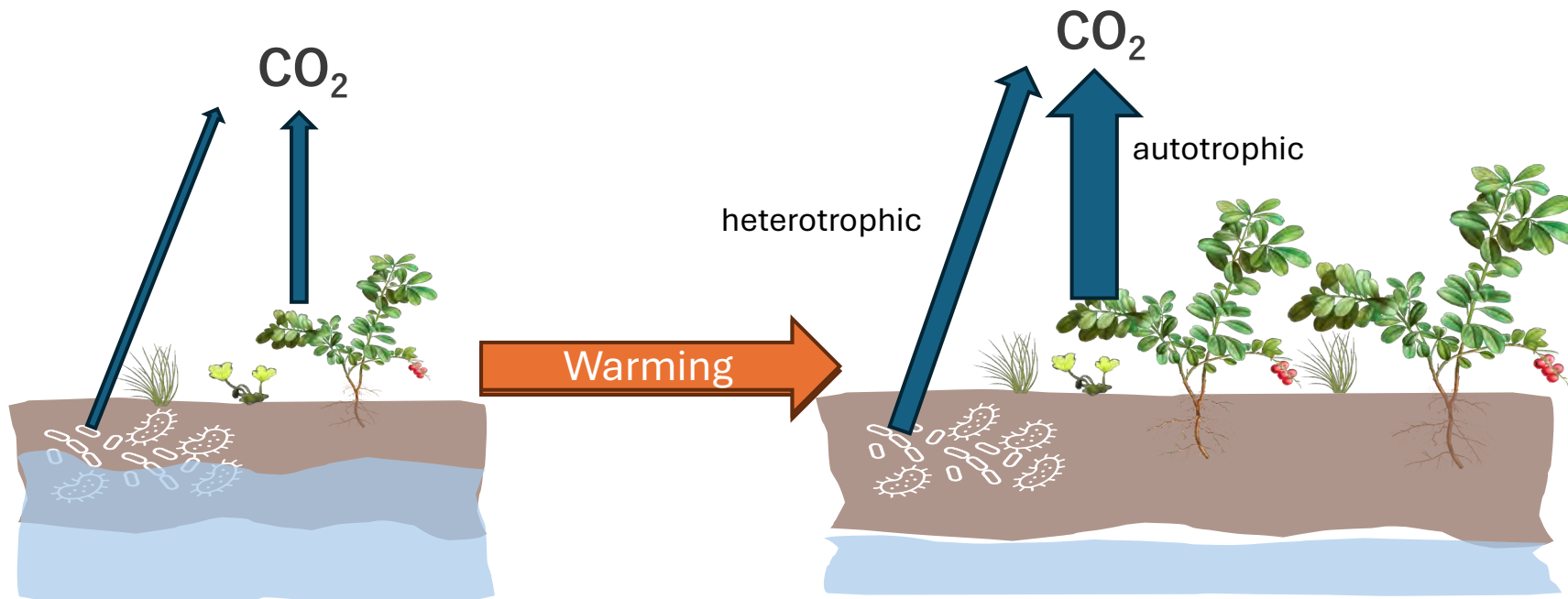


Ecosystem Respiration - CO₂ growing season

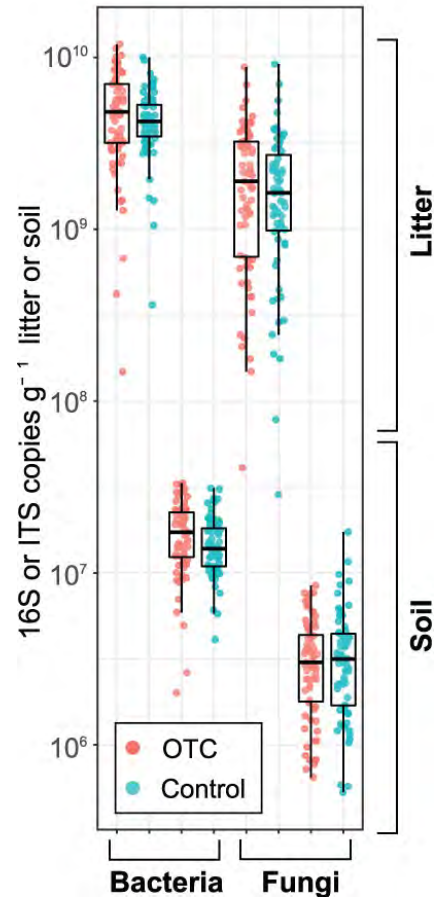
Increase in ecosystem respiration

Increased autotrophic **and** heterotrophic respiration

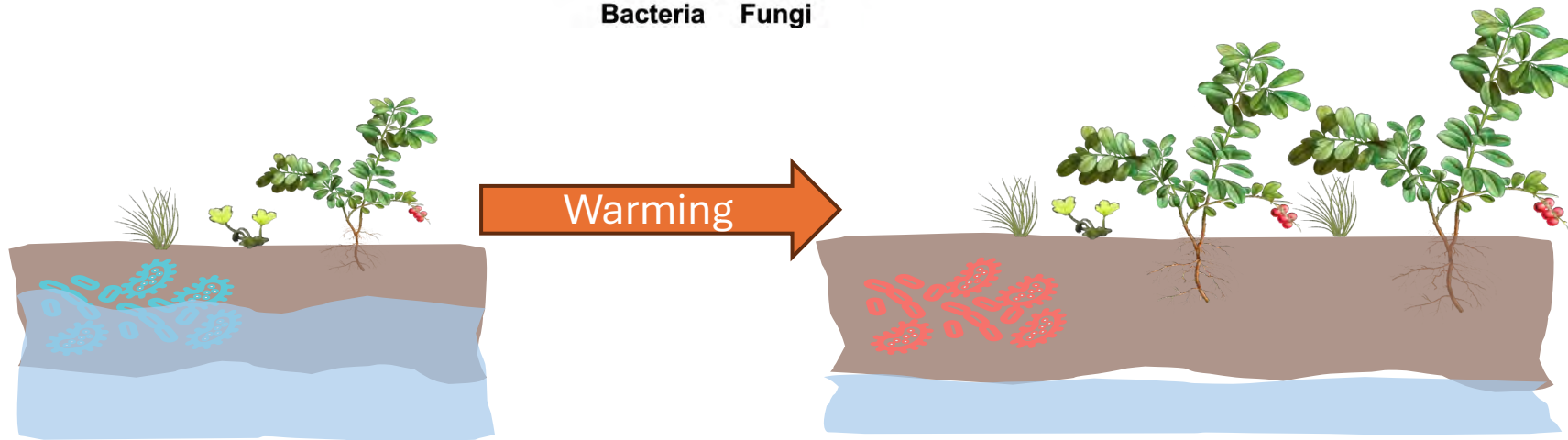
Maes et al 2024



Soil Microbes

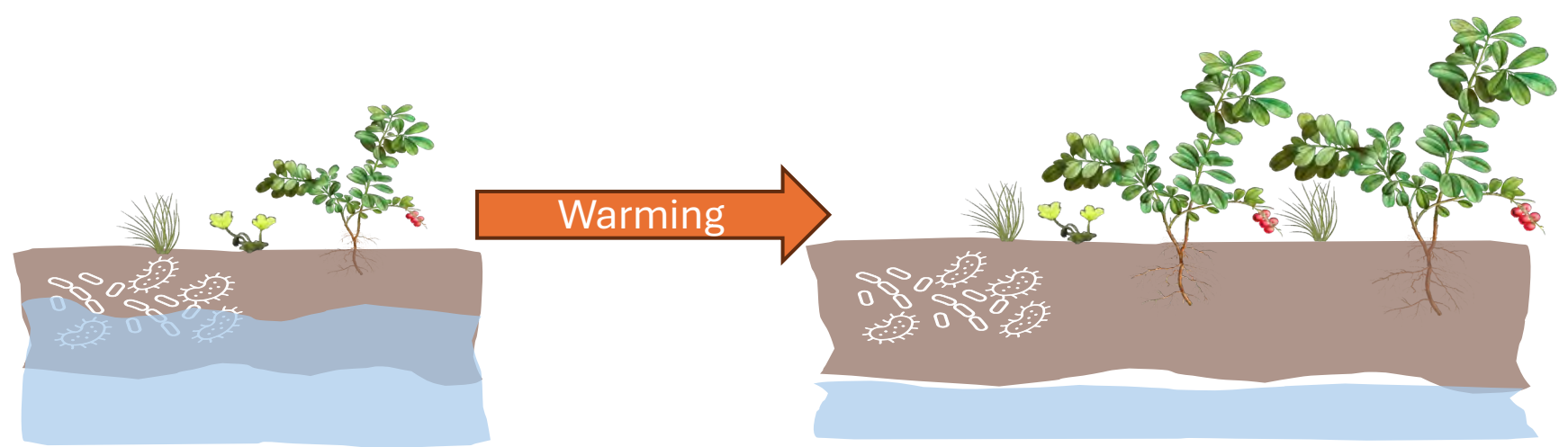


Jeanbille et al 2021



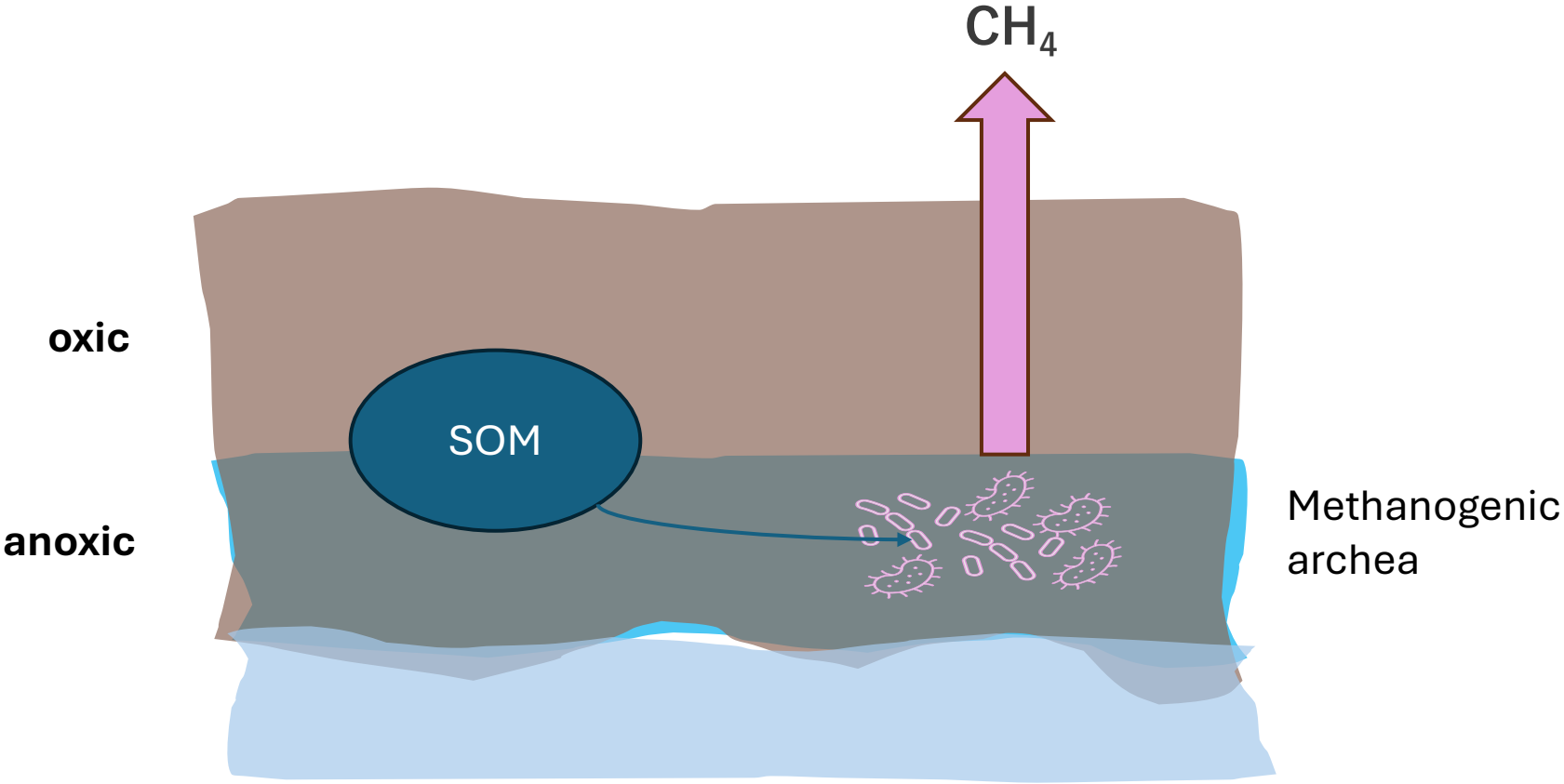
Methane

CH₄ ?



Methane Emissions

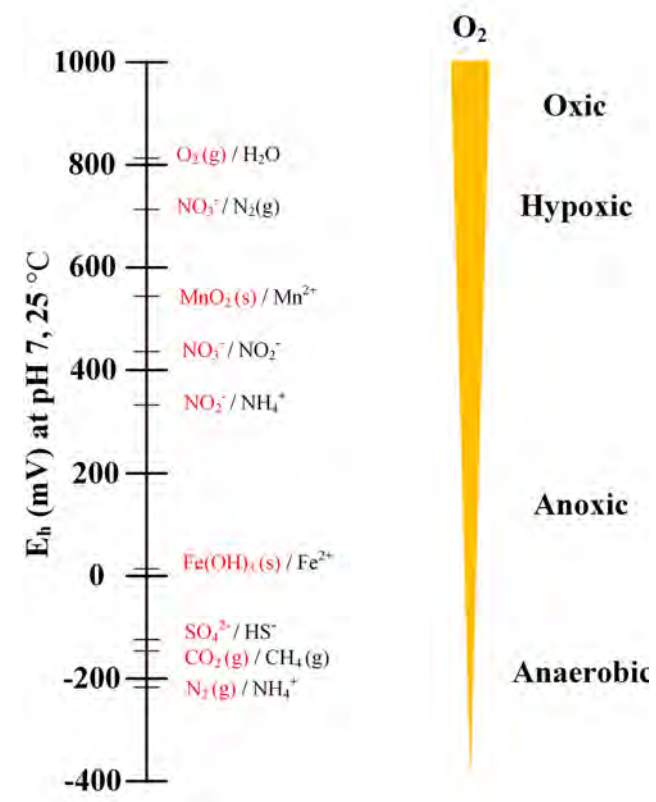
Methanogenesis
(Production of CH₄)



Methane Emissions

Methanogenesis

(Production of CH₄)

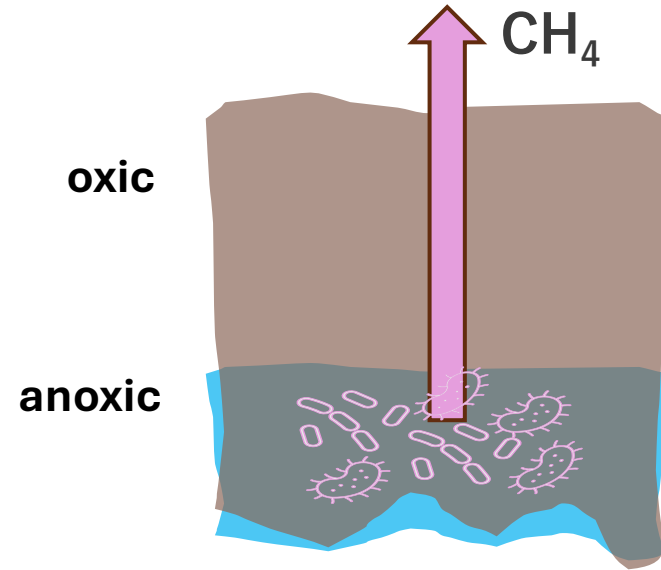


(Zhang 2021)



Methane Uptake

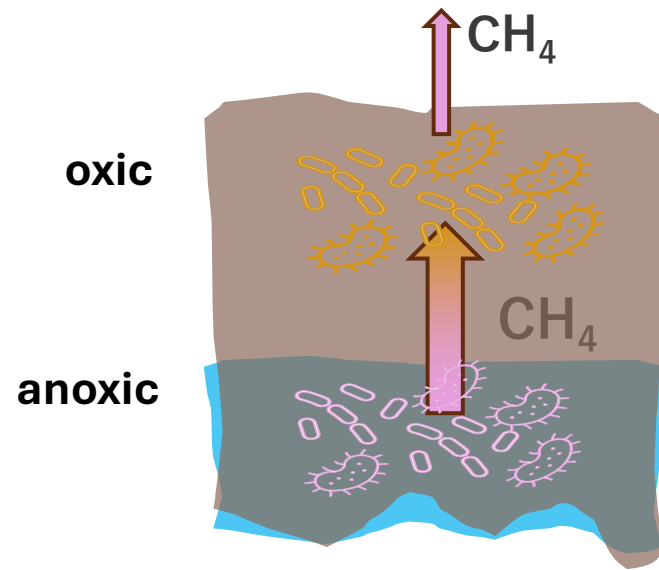
Methane oxidation (Consumption of CH_4)



Methane Uptake

Methane oxidation (Consumption of CH₄)

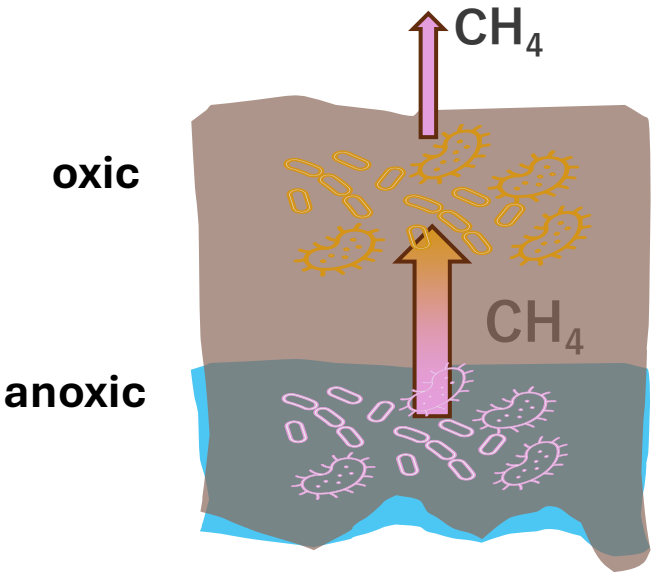
Low-affinity
Methanotrophic bacteria
LAM



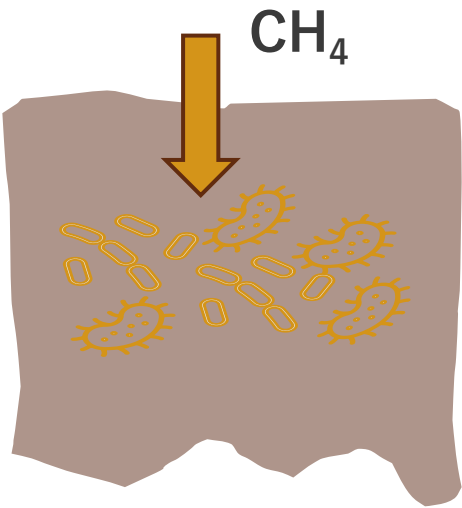
Methane Uptake

Methane oxidation (Consumption of CH₄)

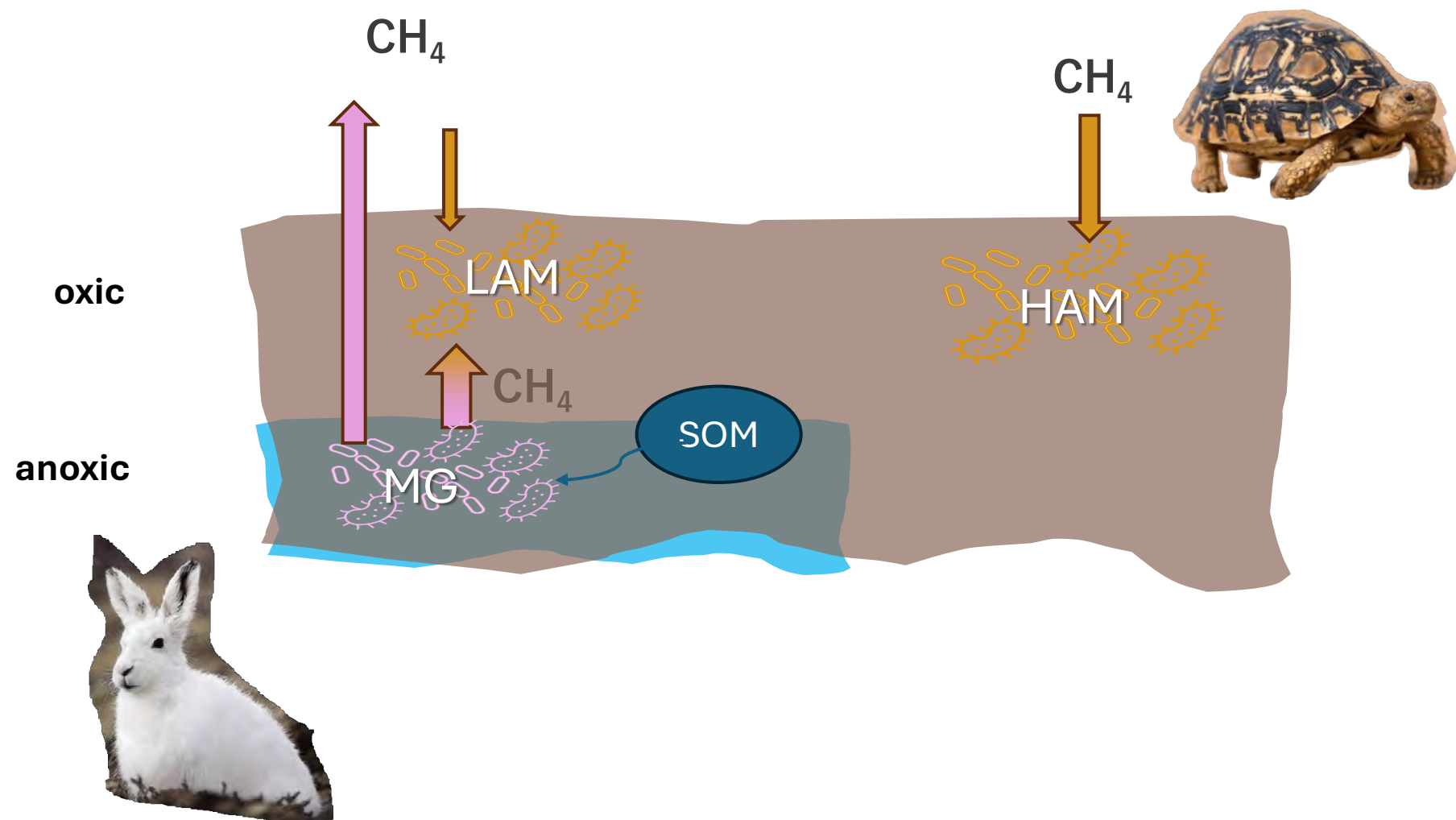
Low-affinity
Methanotrophic bacteria
LAM



High-affinity
Methanotrophic bacteria
HAM



Hare and Tortoise Methane Dynamics



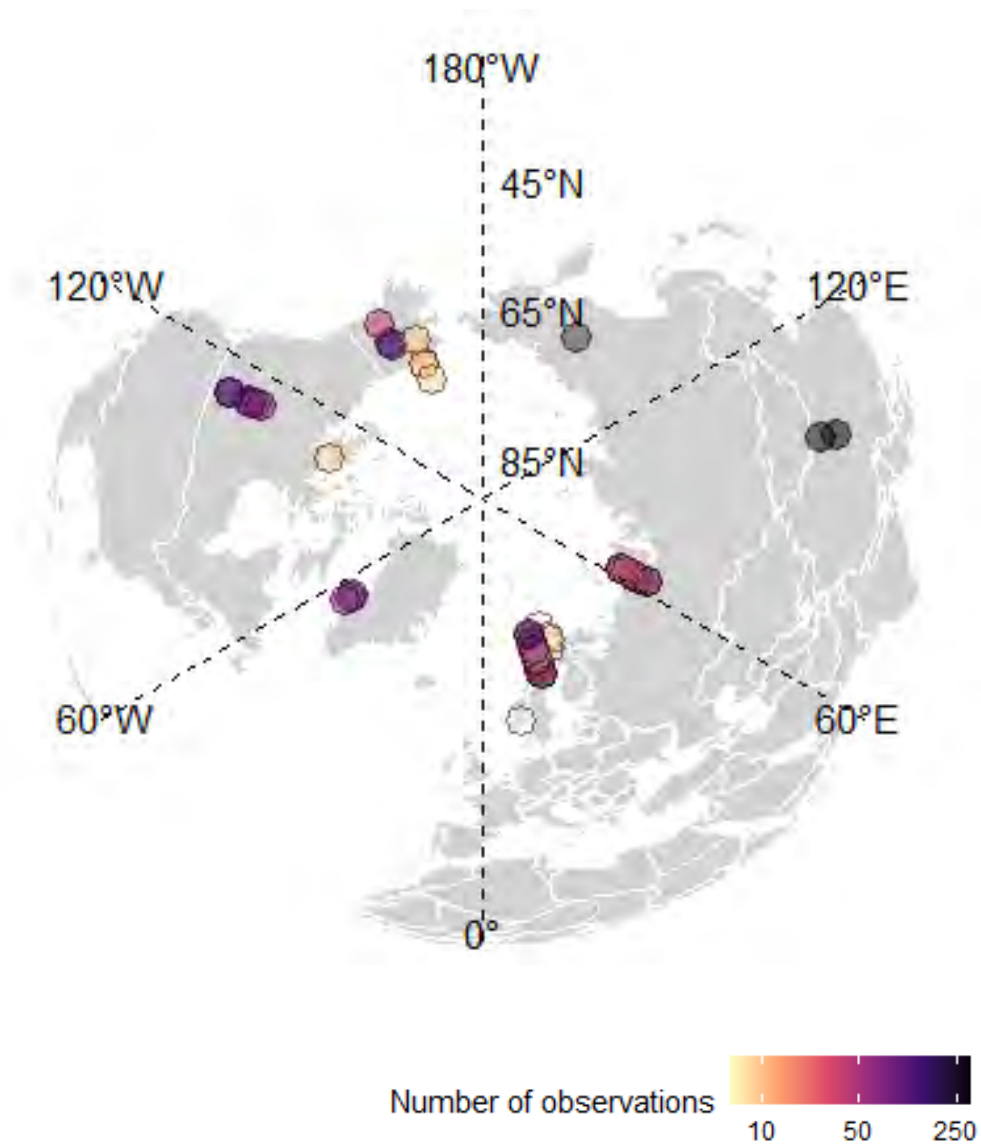
ITEX Data

5159 measurements

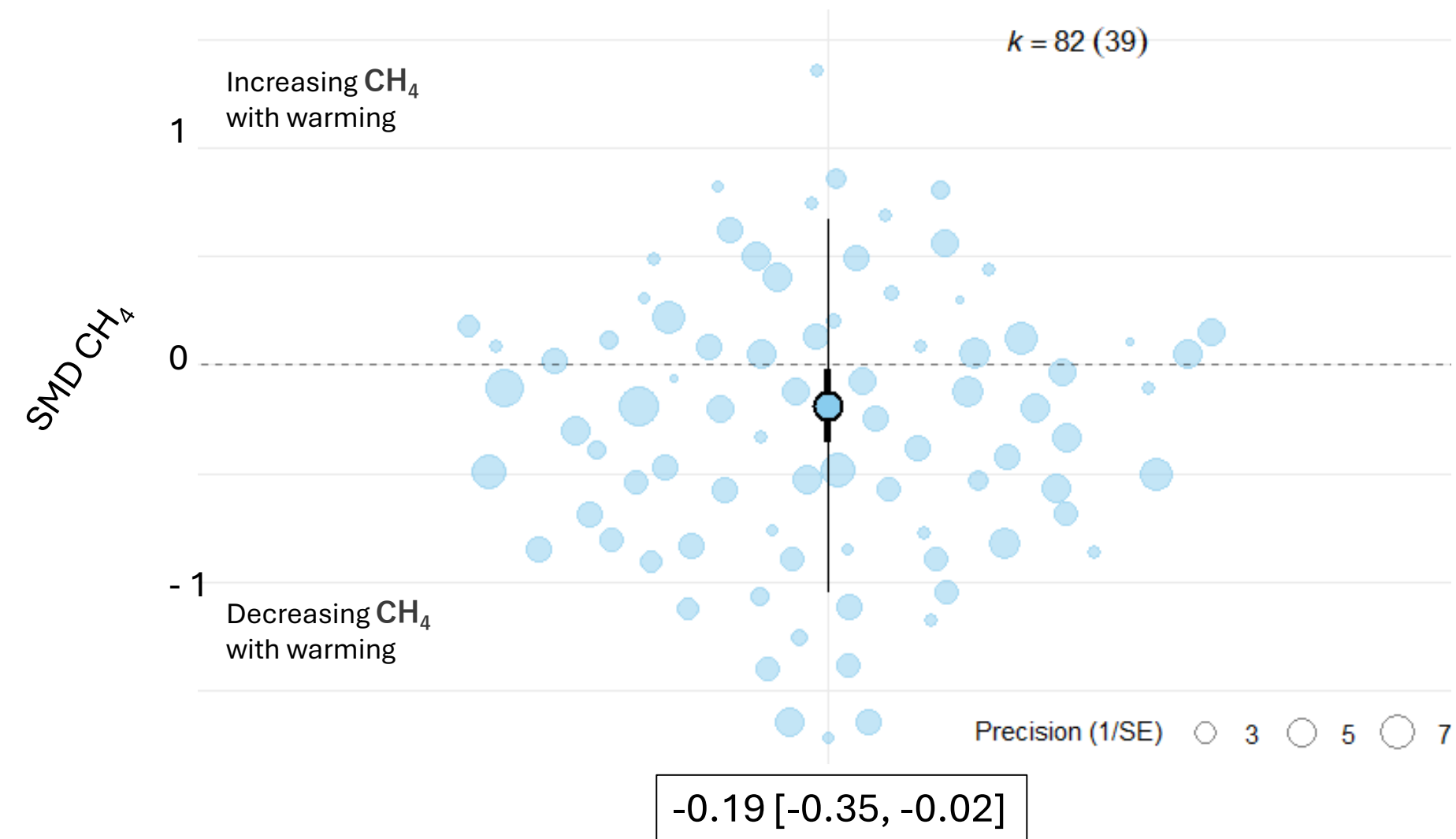
24 Sites

82 Sub sites

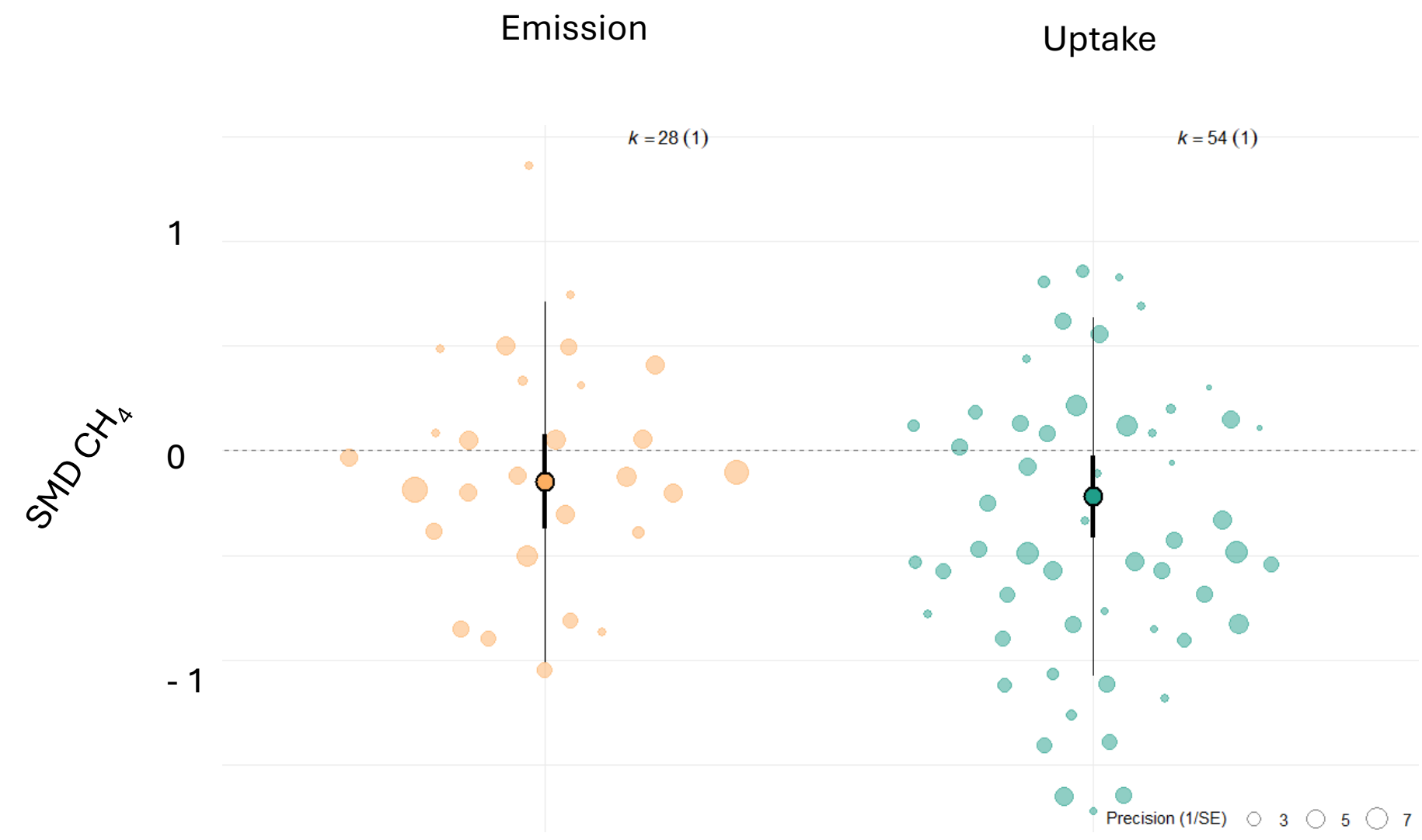
0 – 32 years of experimental warming



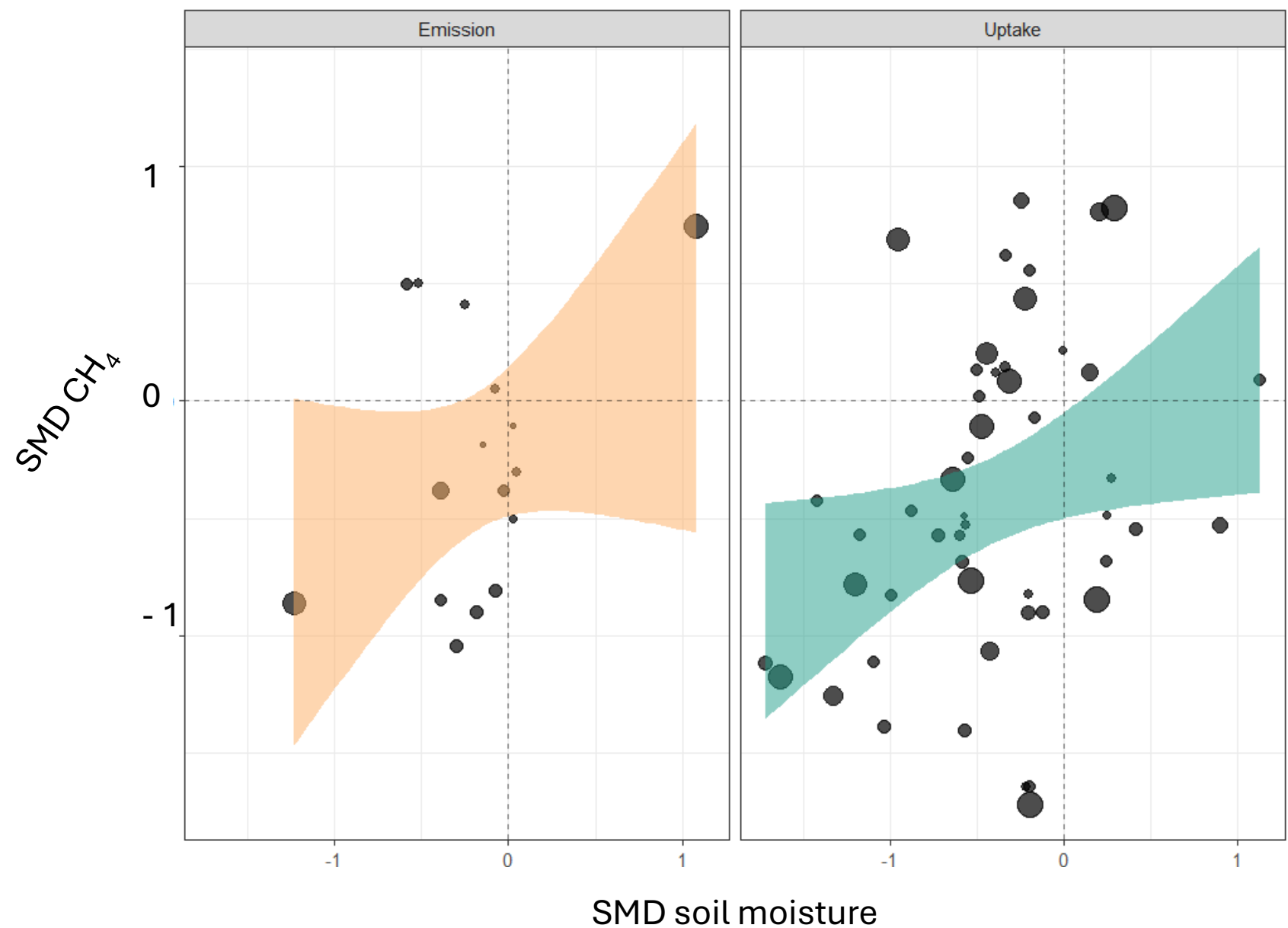
Summary



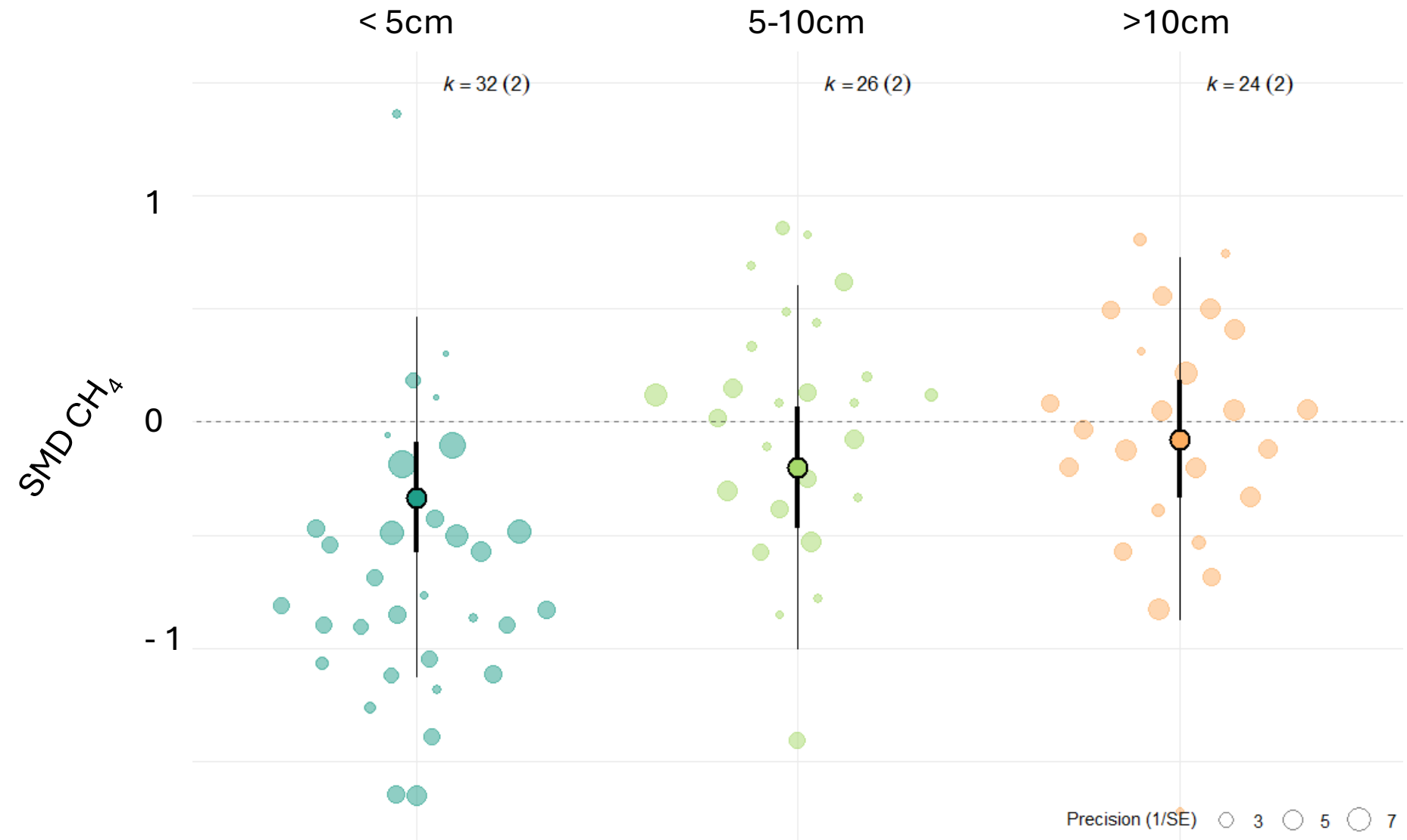
Summary



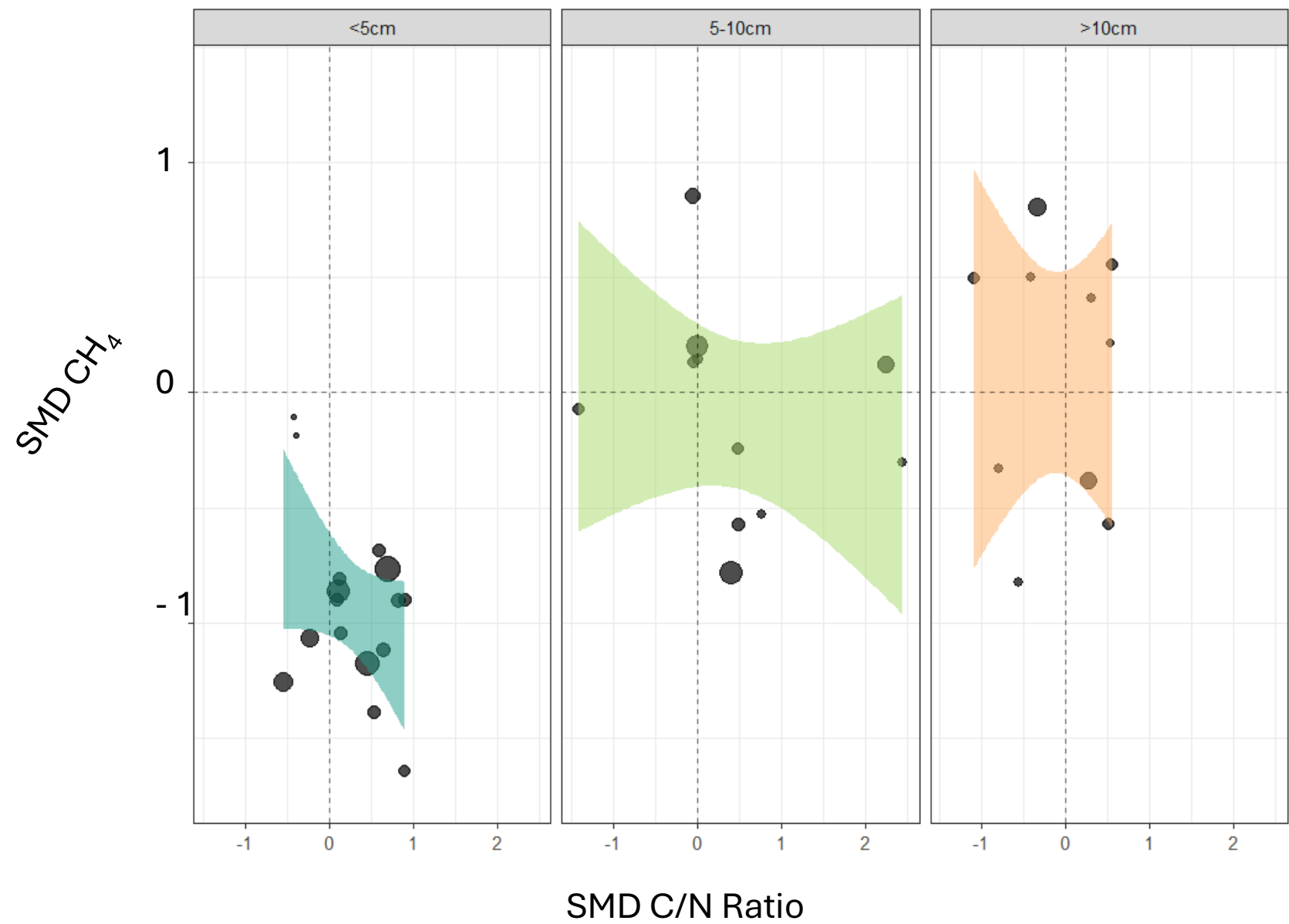
Emission and Uptake



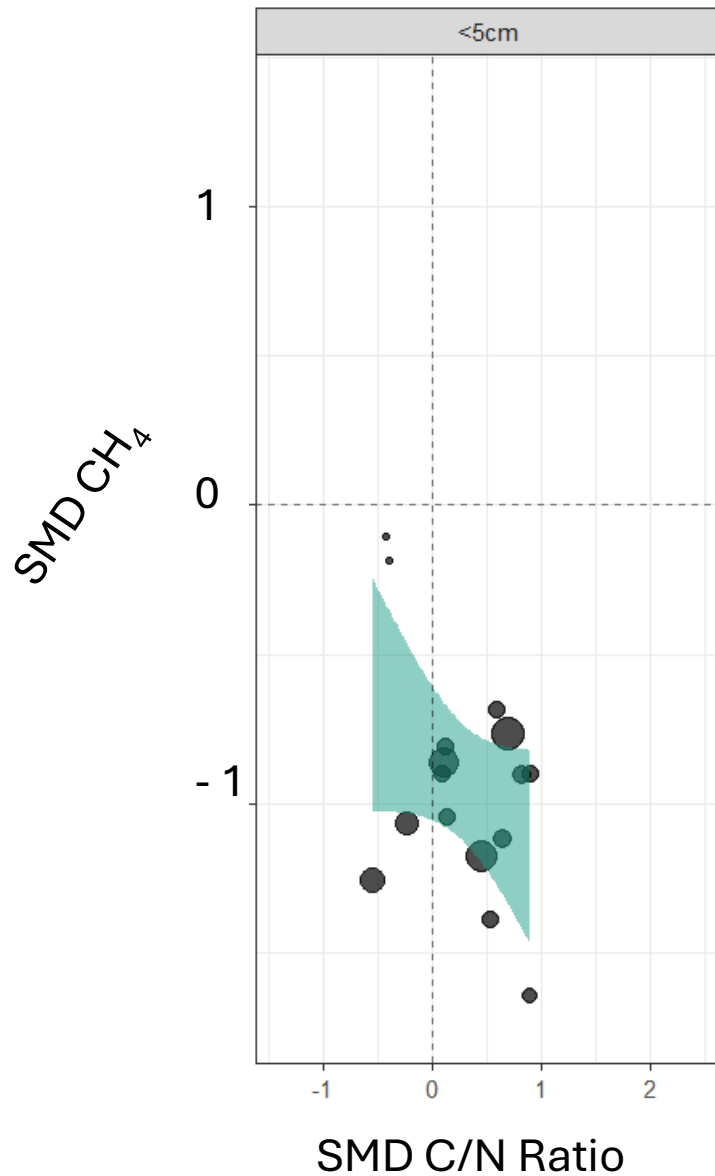
Organic Layer Depth



SOM and Methane



SOM and Methane



Potential link between:

- > Carbon quality
- > Nitrogen availability

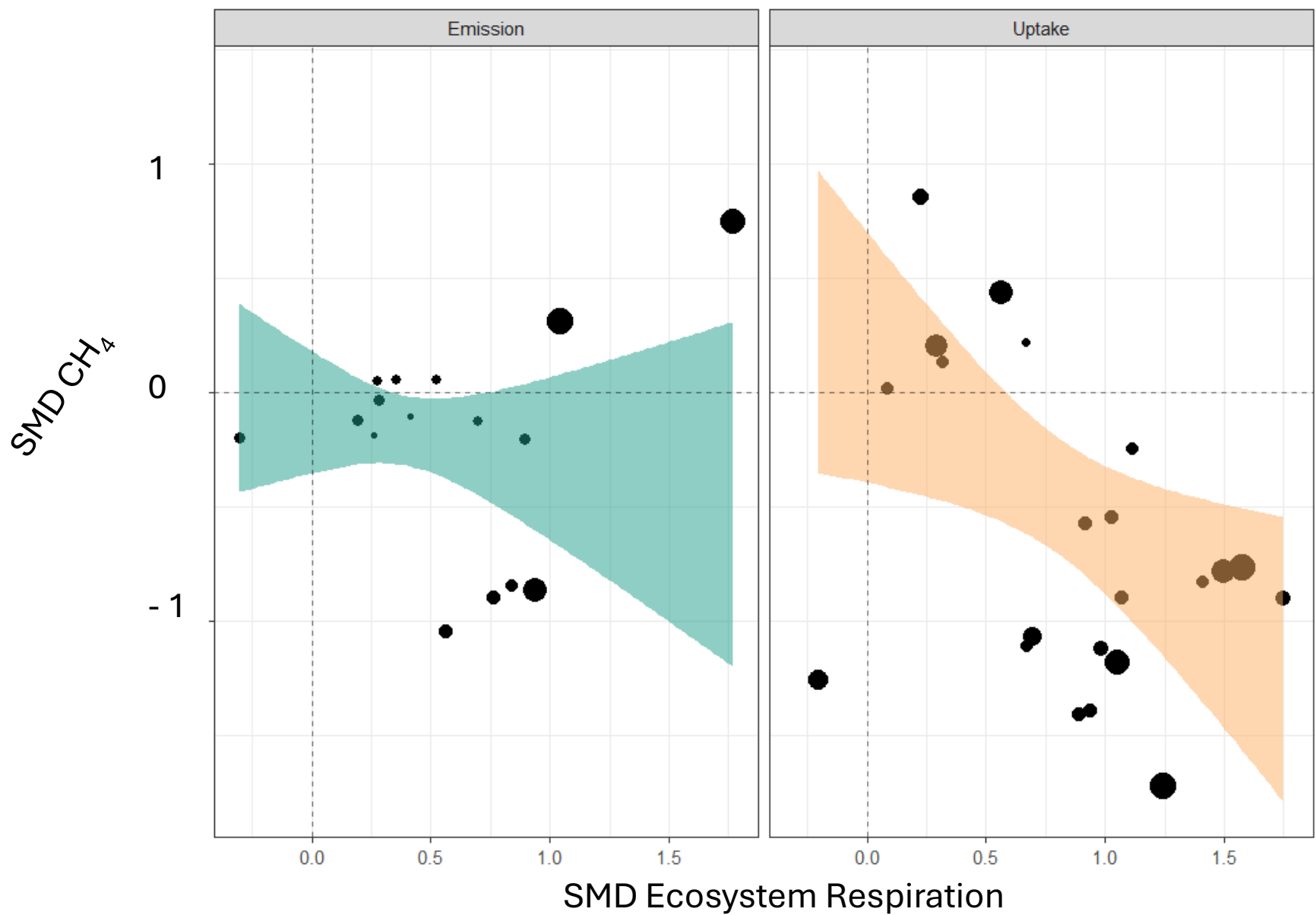
Structural & evolutionary similarity
between
Methane Monooxygenase and
Ammonia Monooxygenase

Ammonia can inhibit methane oxidation

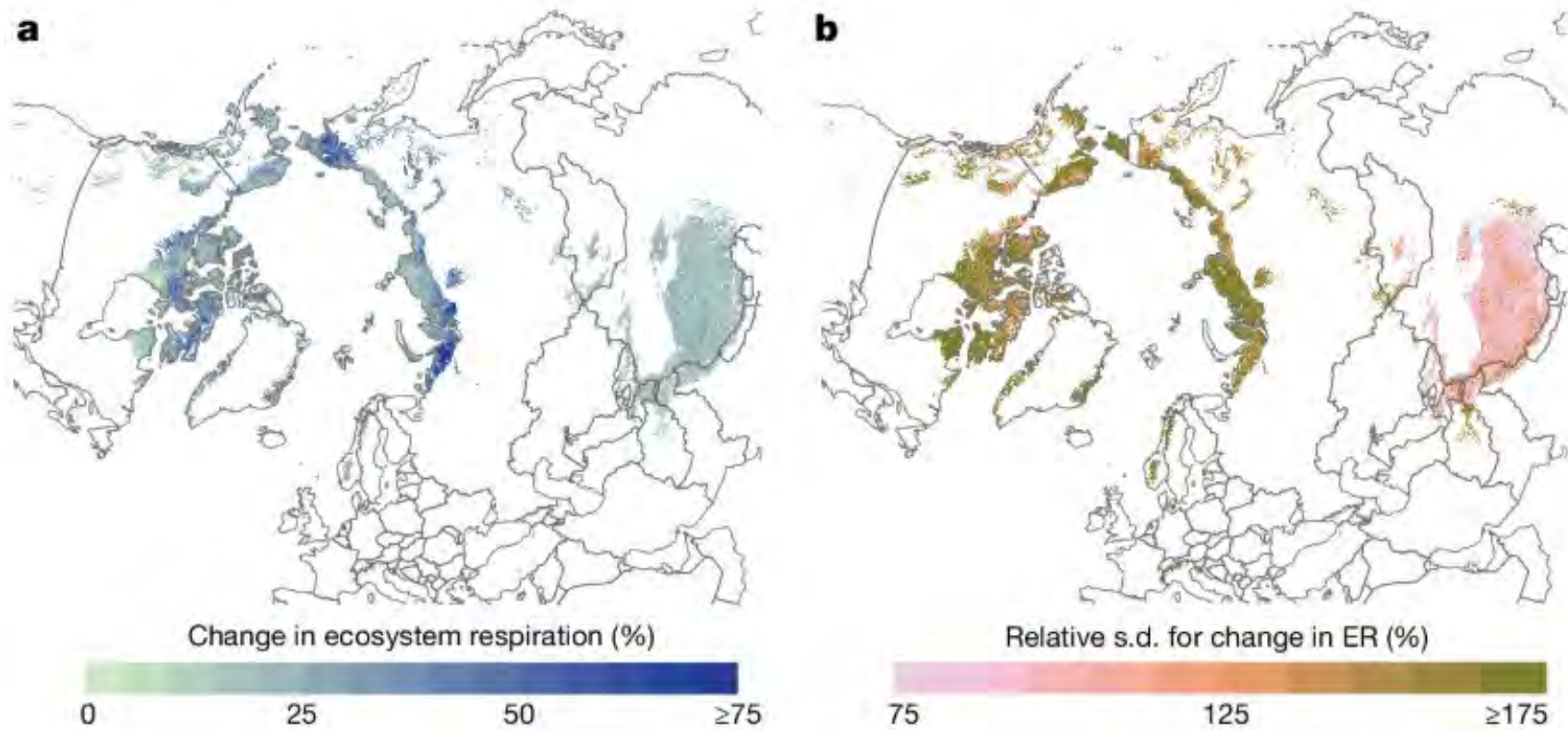
MMO and AMO Cu^{2+} dependent
-> Availability influenced by SOM



Ecosystem Respiration



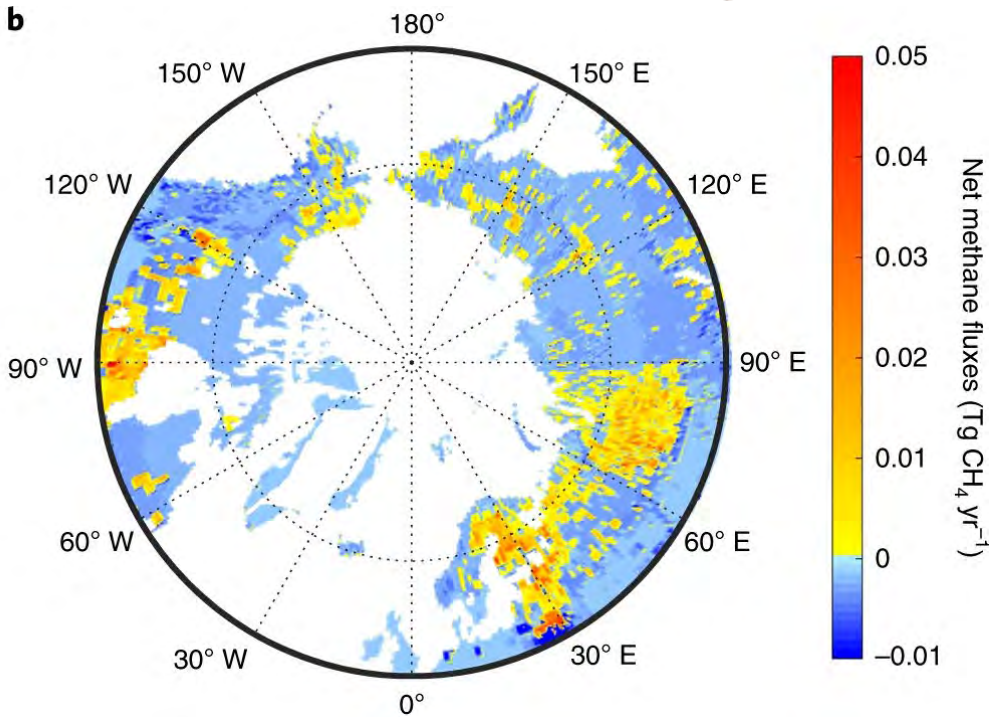
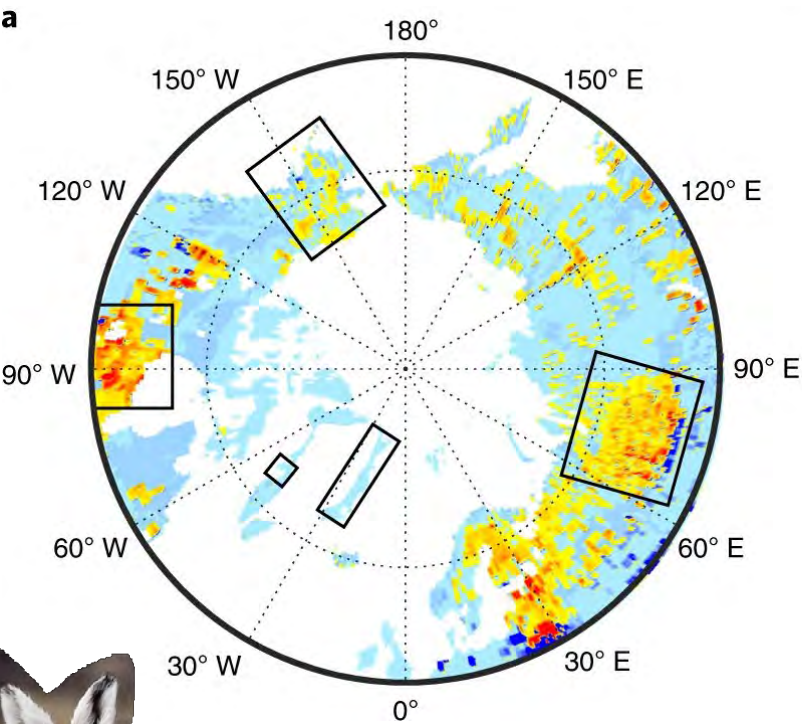
Potential methane oxidation?



Maes et al 2024



Spatial Methane Dynamics



Oh et al 2023





„Study of the ecology and niche adaptation of methanotrophs/methanogens is still in its infancy”

Nazaries 2013



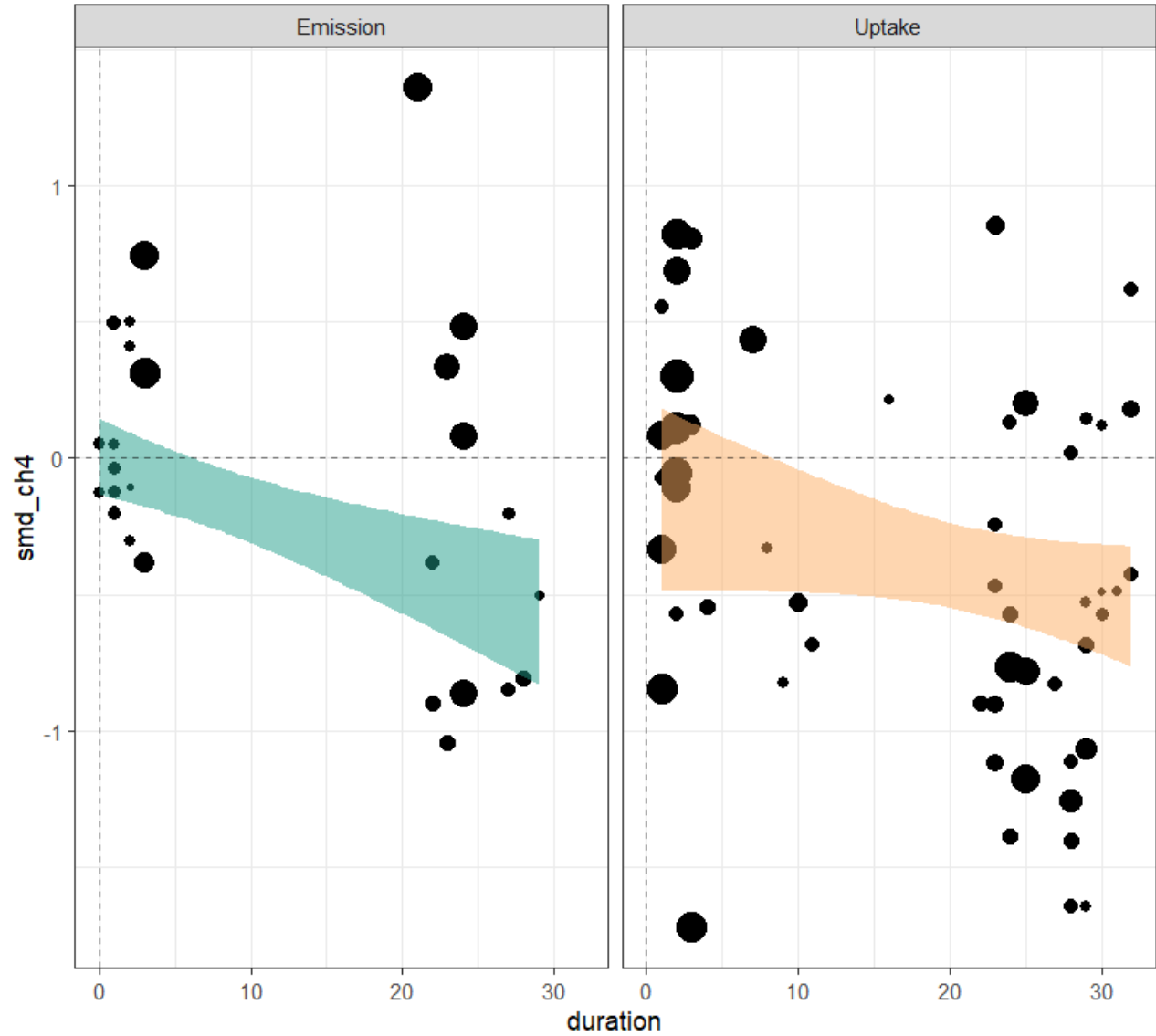
KU LEUVEN

Sybryn Maes
Mats P. Björkman
Joel White
Judith Sarneel
Ellen Dorrepaal
Sarah Schwieger
Niki Leblans

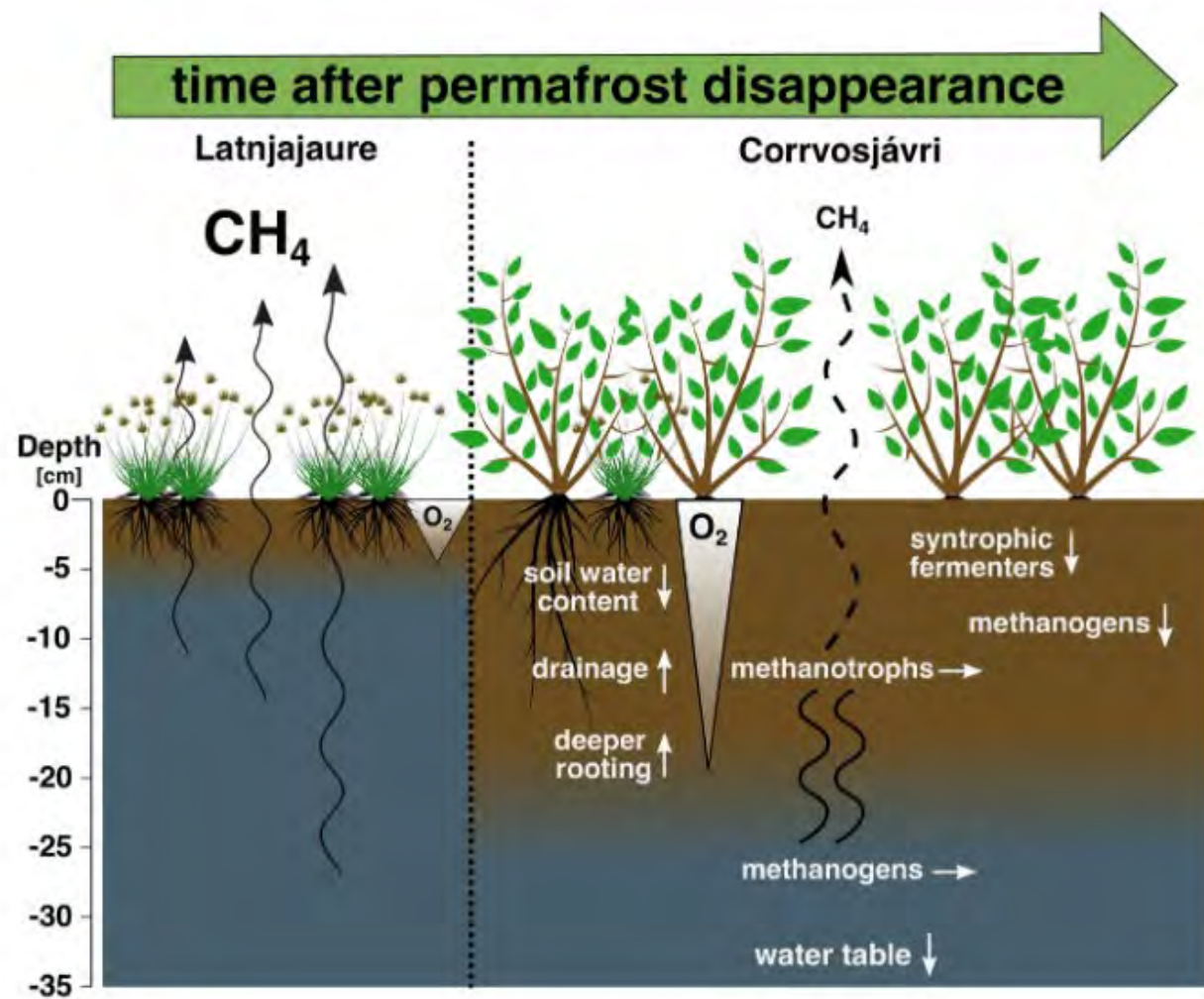
R. Aerts, I.H.J. Althuisen, C. Biasi, R.G.B. Björk, H. Böhner, M. Carbognani, G. Chiari, C.T. Christiansen, K.E. Clemmensen, E.J. Cooper, J.H.C. Cornelissen, B. Elberling, P. Faubert, N. Fetcher, T.G.W. Forte, J. Gaudard, K. Gavazov, Z.-H. Guan, J. Guðmundsson, R. Gya, S. Hallin, B.B. Hansen, S.V. Haugum, J.-S. He, C. Hicks Pries, M.J. Hovenden, M. Jalava, I.S. Jónsdóttir, J. Juhanson, J.Y. Jung, E. Kaarlejärvi, M.J. Kwon, R.E. Lamprecht, M. Le Moulllec, H. Lee, M.E. Marushchak, A. Michelsen, T.M. Munir, E. Myrsky, C.S. Nielsen, M. Nyberg, J. Olofsson, H. Óskarsson, T.C. Parker, E.P. Pedersen, M. Petit Bon, A. Petraglia, K. Raundrup, N.M.R. Ravn, R. Rinnan, H. Rodenhizer, I. Ryde, N.M. Schmidt, E.A.G. Schuur, S. Sjogersten, S. Stark, M. Strack, J. Tang, A. Tolvanen, J.P. Töpper, M.K. Väisänen, V. Vandvik, R.S. van Logtestijn, C. Voigt, J. Walz, J.T. Weedon, Y. Yang, H. Yläne

+ probably a lot of assistants

Time Effect



Time Effect



Keuschnig 2022

