ICOS-AnaEE connections aid understanding climate change impacts on soil microbial diversity

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ICOS AnaEE

AnaEE ERIC / Belgium: infrastructure for experimental research about environmental change impacts



Universiteit Antwerpen

UHASSELT

LIÈGE université

OUTLOOK INTO THE FUTURE

Experimental research platforms to simulate global environmental change

Terrestrial: macro-scale Ecotron

Terrestrial: meso-scale Ecotron

Terra Ecotron Liege

Terrestrial: Free Air T Increase

Aquatic: River simulator

Aquatic: Pond simulator

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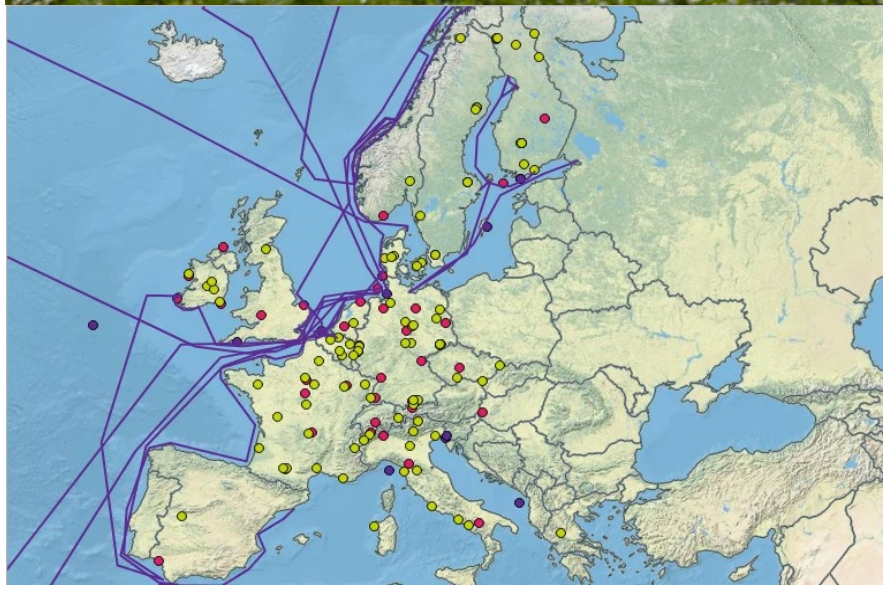
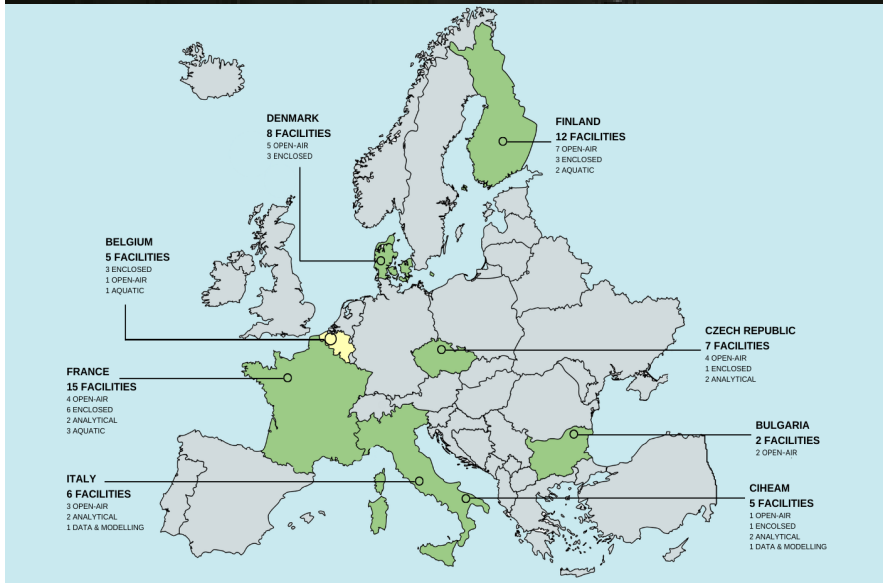


Atmospheric CO_2
N_2O emissions
Site H_2O balance
VOC exchange
Plant-Soil interactions
Soil respiration
Site H_2O balance
Soil N cycle
Plant physiology
Biodiversity



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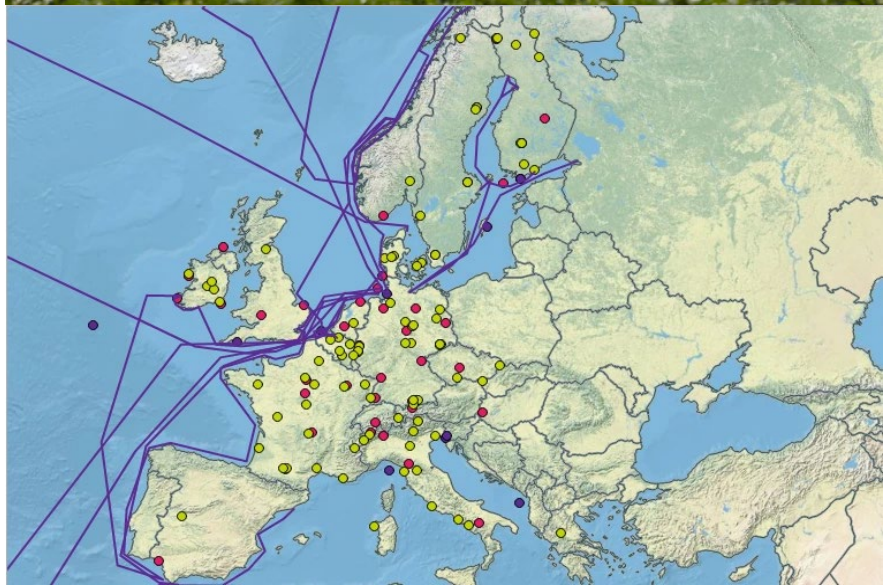
Measurements / Observations



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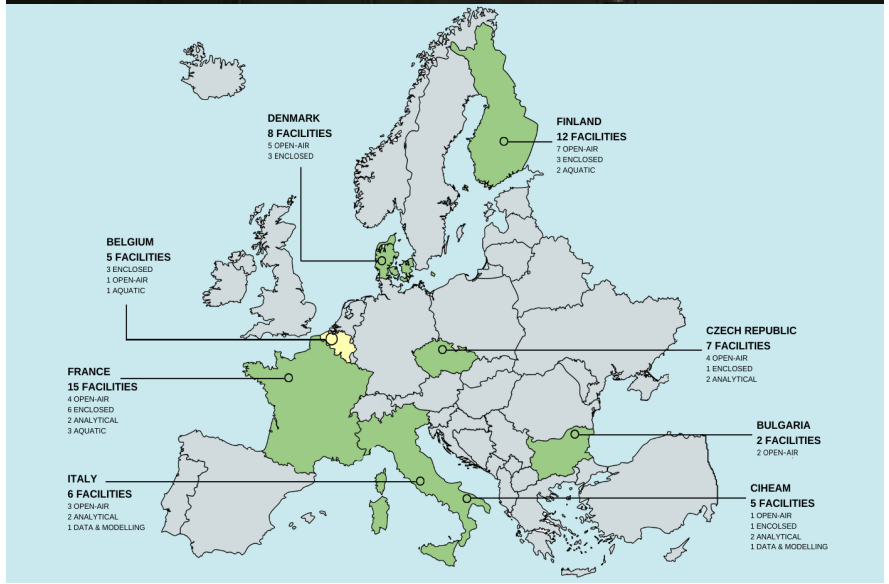
Experimentation



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Measurements / Observations  **Experimentation**

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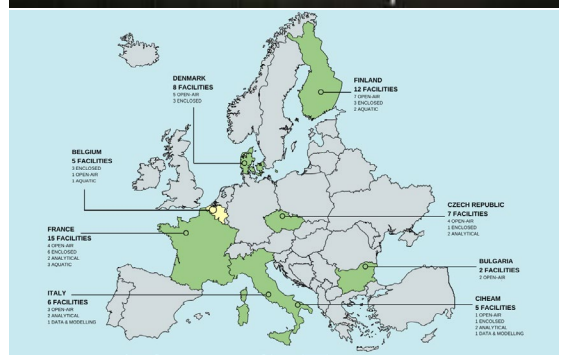


ICOS AnaEE

SITES Denmark

INAR
Institute for Atmospheric and Earth System Research

cnrs CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE

AnaEE
Analysis and Experimentation on Ecosystems
France

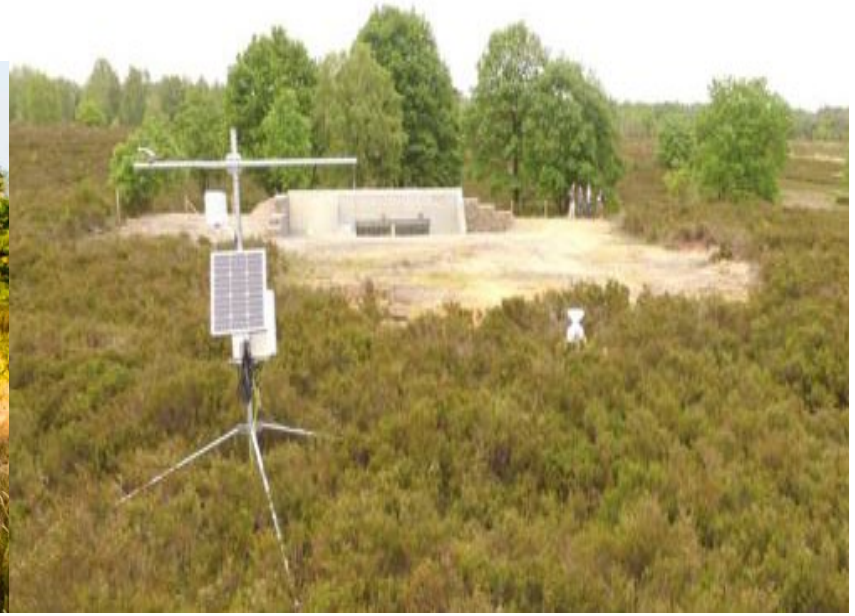
ICOS National Network France

ICOS AnaEE

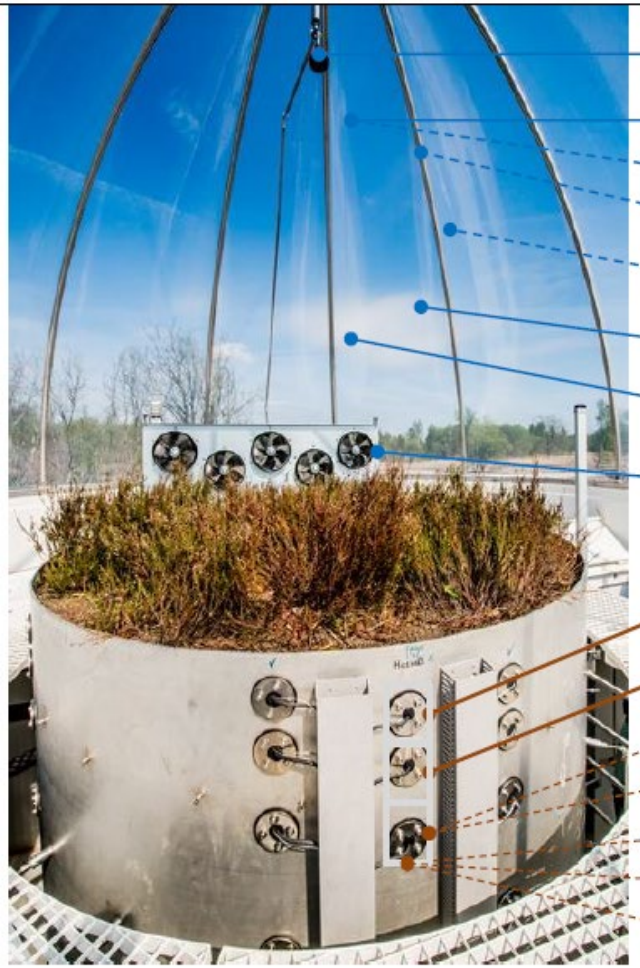
AnaEE
Analysis and Experimentation on Ecosystems
Belgium

Data exchange

ICOS National Network Belgium



Ecotron Hasselt University: heathland in future climate

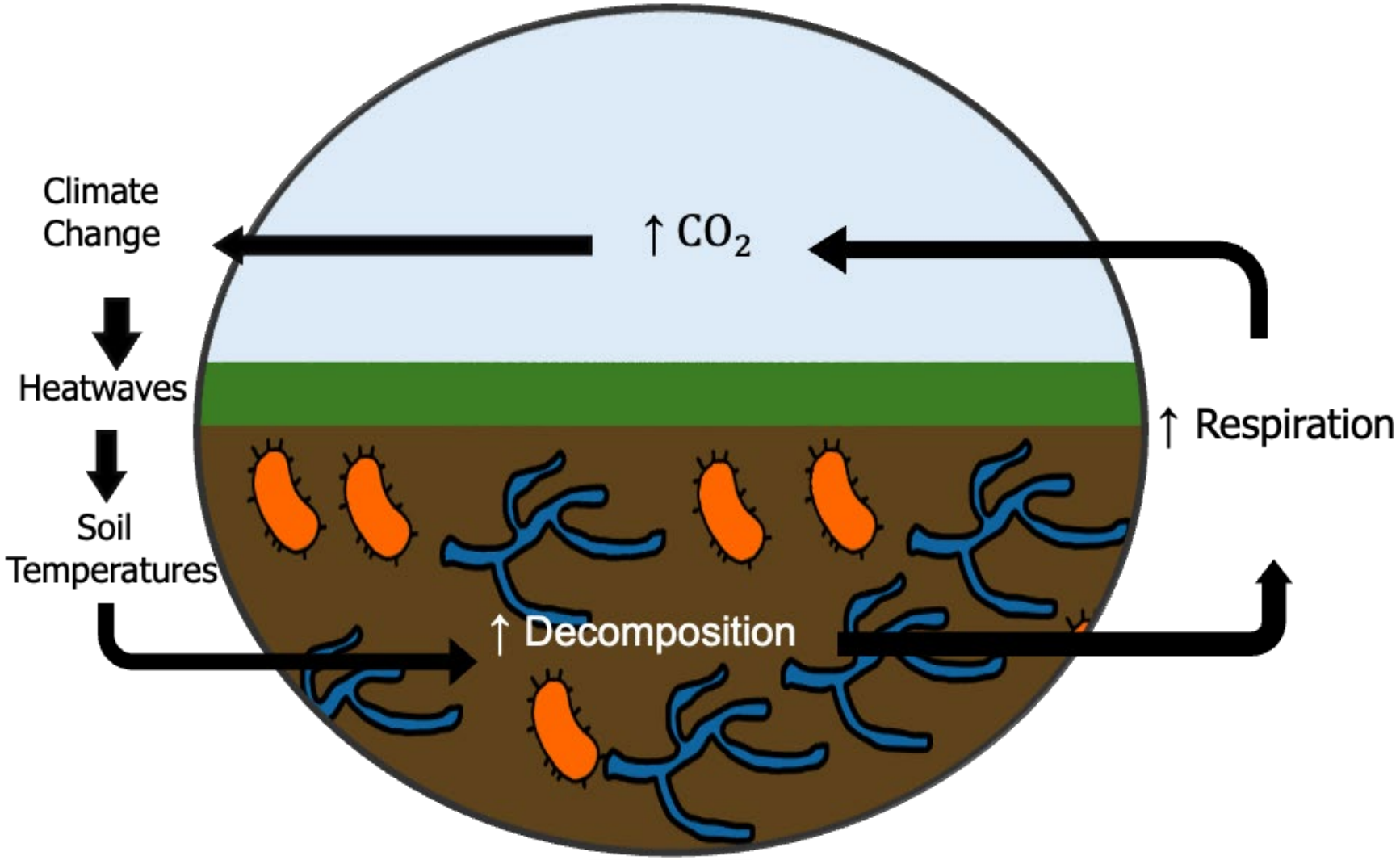


Measurement	Frequency
Precipitation	10′
CO_2 concentration	30′
CH_4, N_2O concentration	30′
Air pressure	30′
Incoming/outgoing radiation	30′
Air temperature	1′
Relative humidity	1′
Wind speed	10′
Soil temperature	10′
Soil water tension	10′
Water content	10′
Soil electrical conductivity	10′
X2 CO_2	10′
Lysimeter weight	1′
Water sampling suction cups	2 weeks

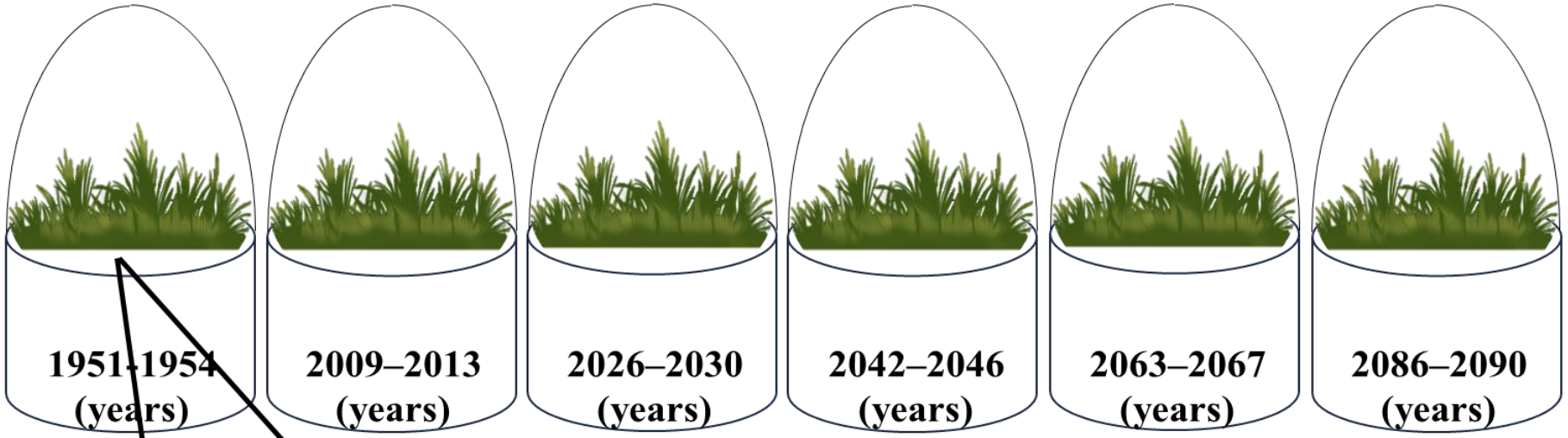
Atmospheric CO_2 fluctuations

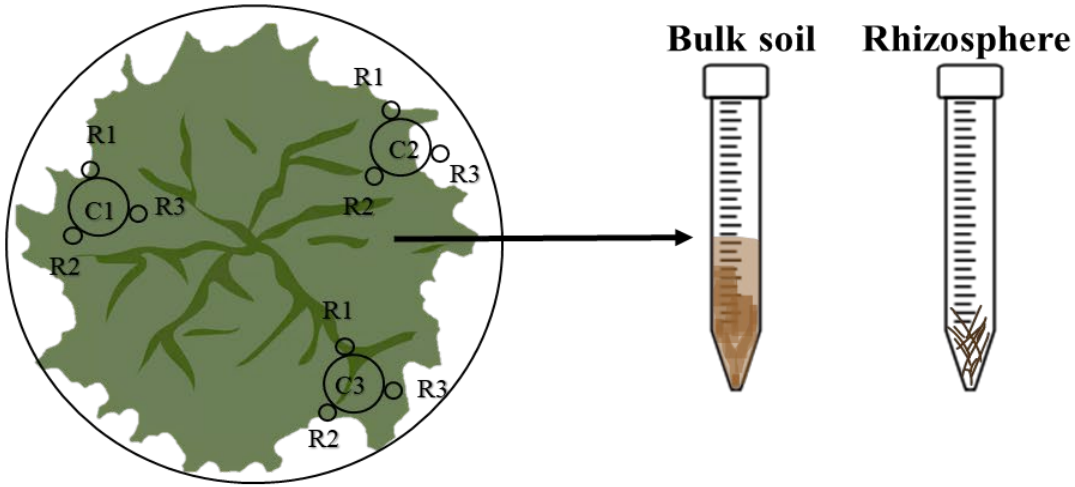
Soil temperature
Soil water tension

How climate change affects soil microbiota?

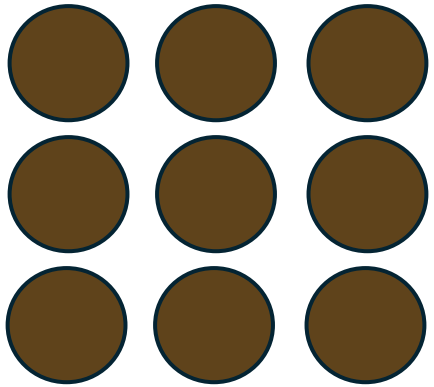


How climate change affects soil microbiota?



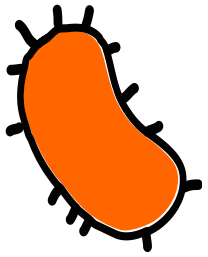


3 (3) nested replicates



Climate change alters microbial communities, mostly in rhizosphere

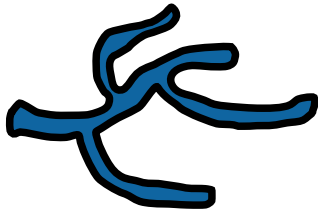
Bacteria

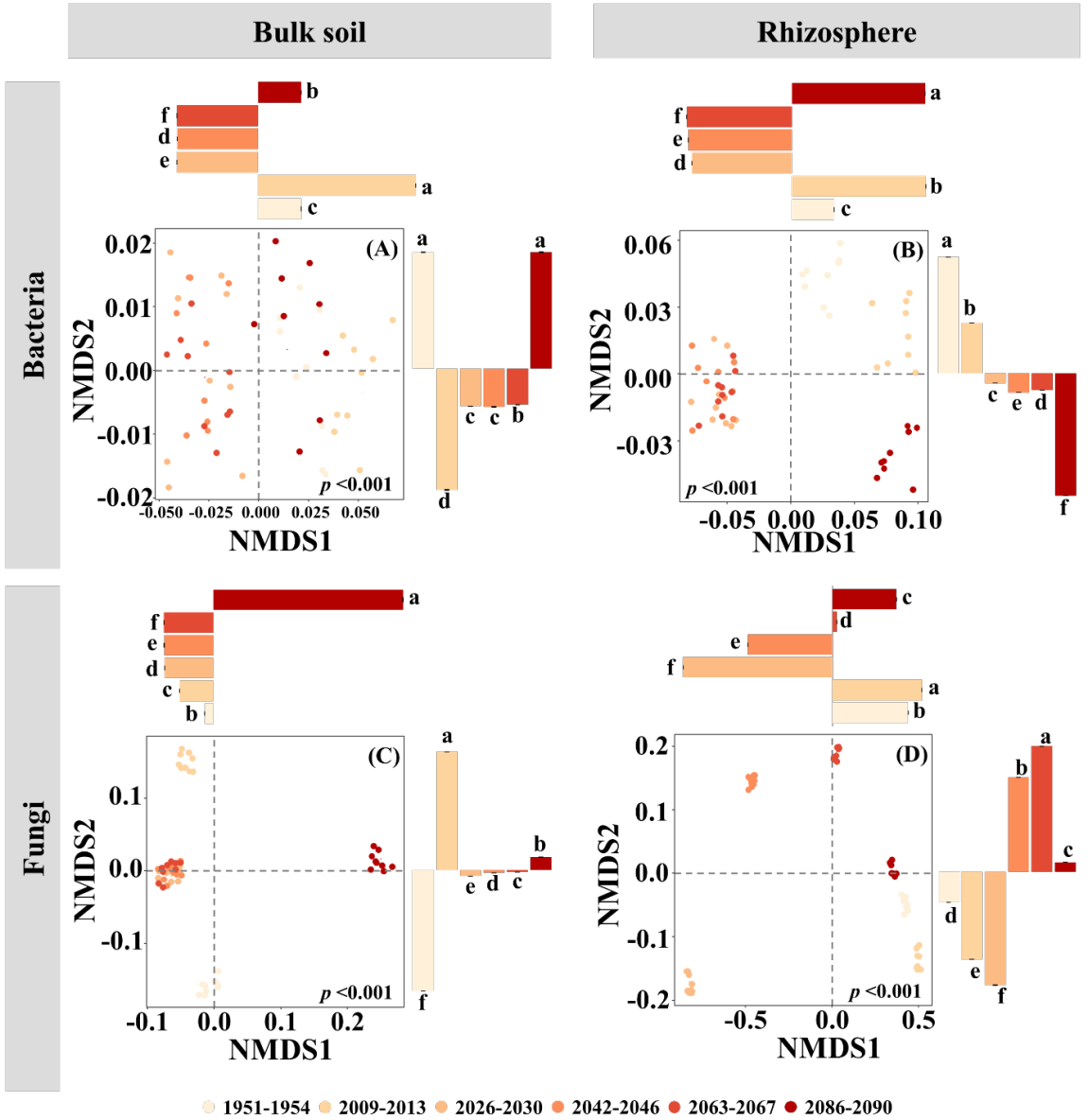


Non-Metric Multidimensional Scaling

PERMANOVA; p <0.001

Fungi





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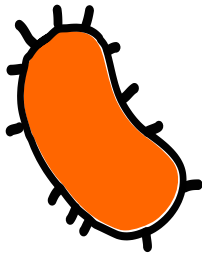

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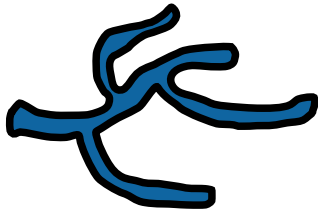
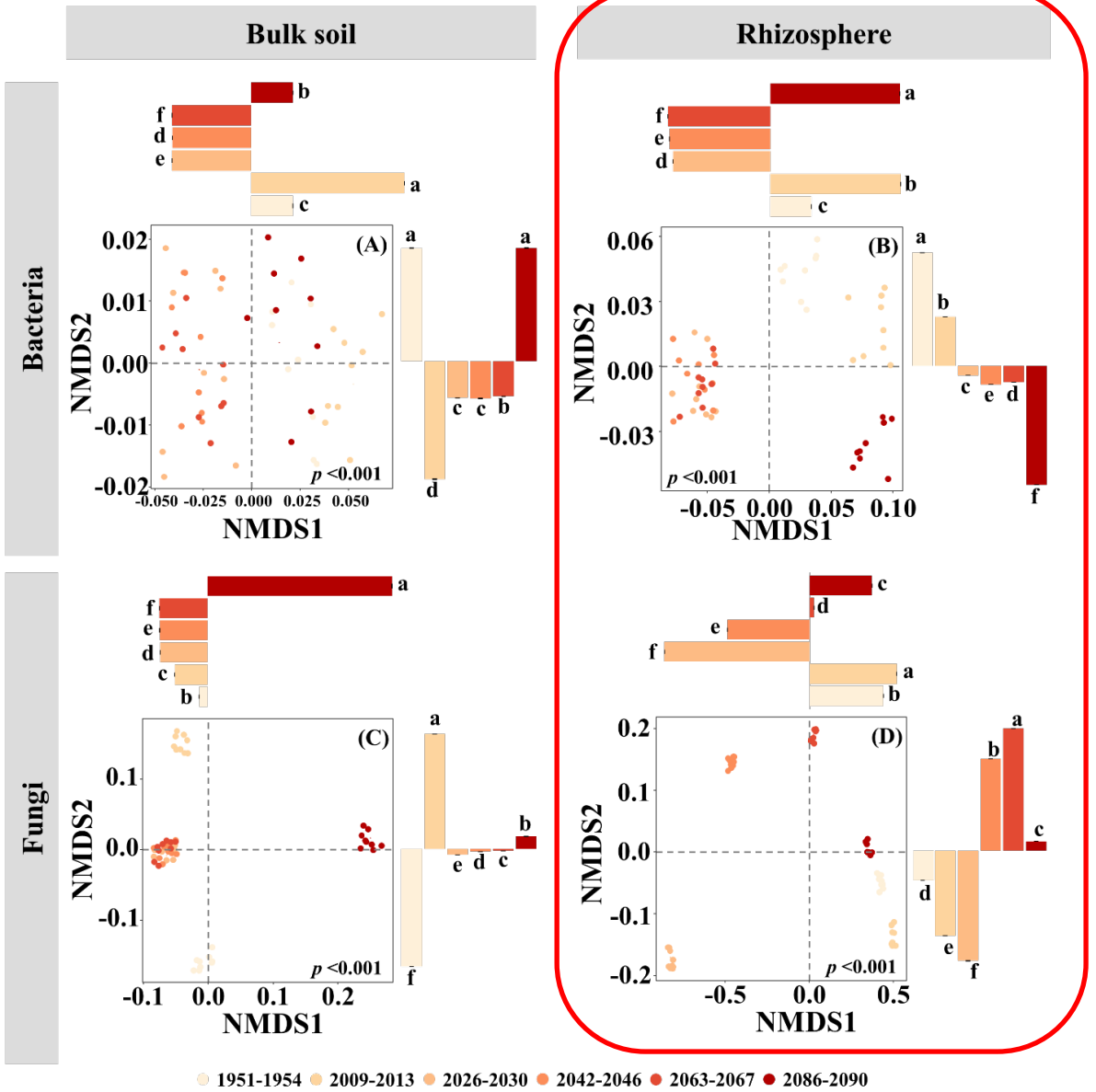
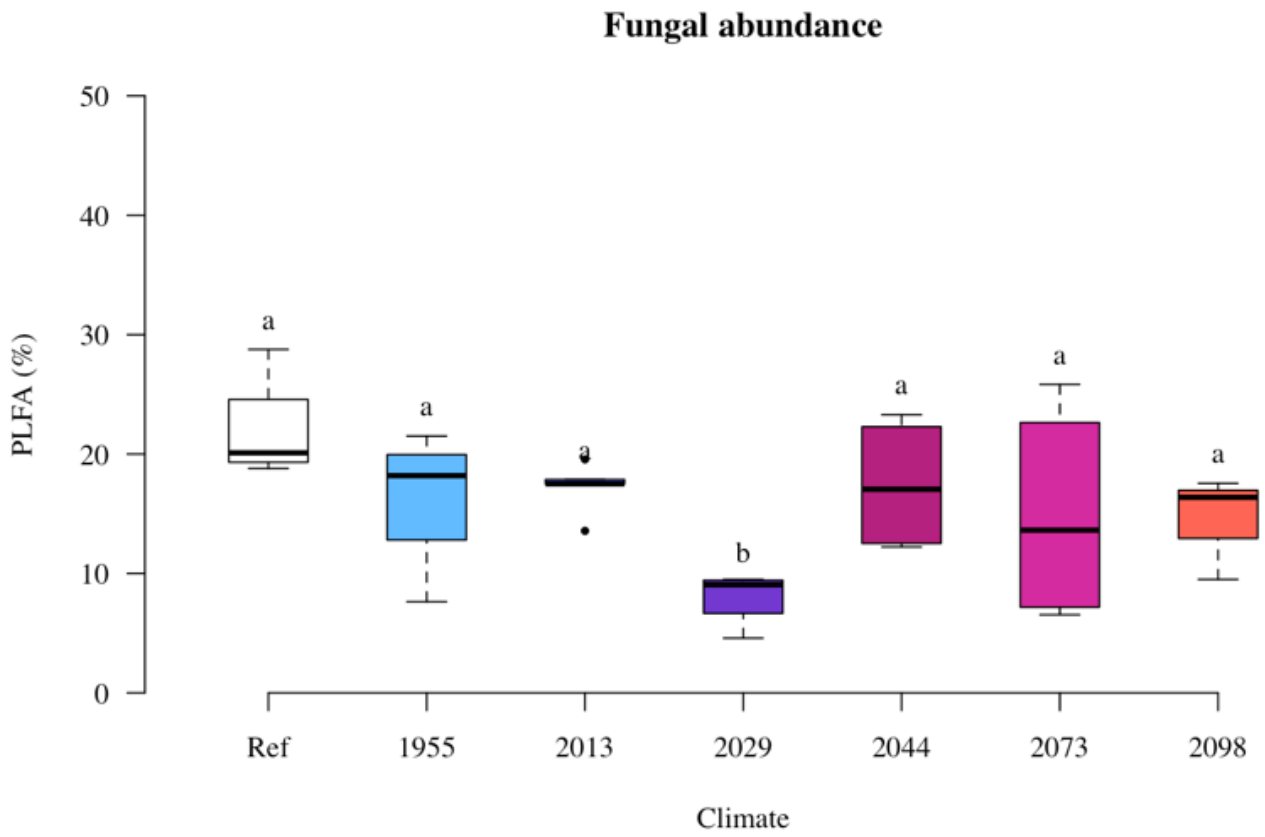
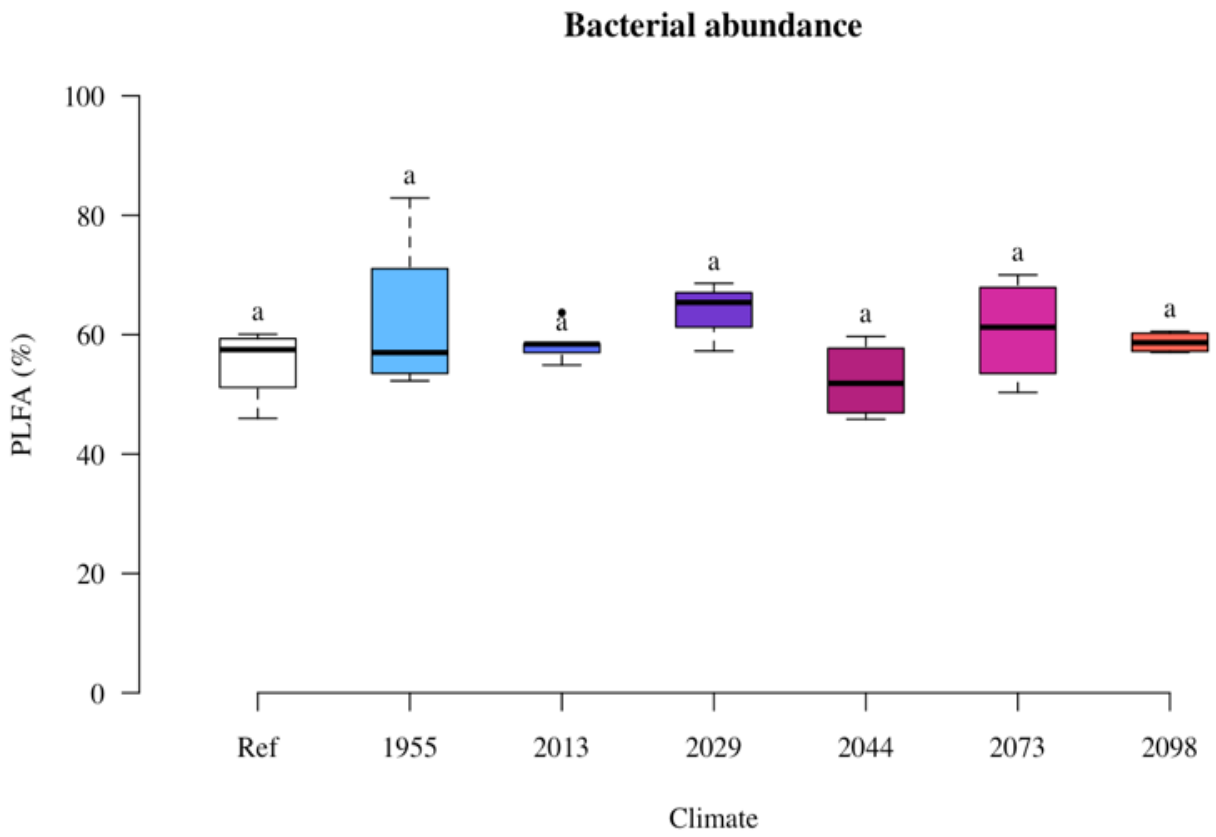


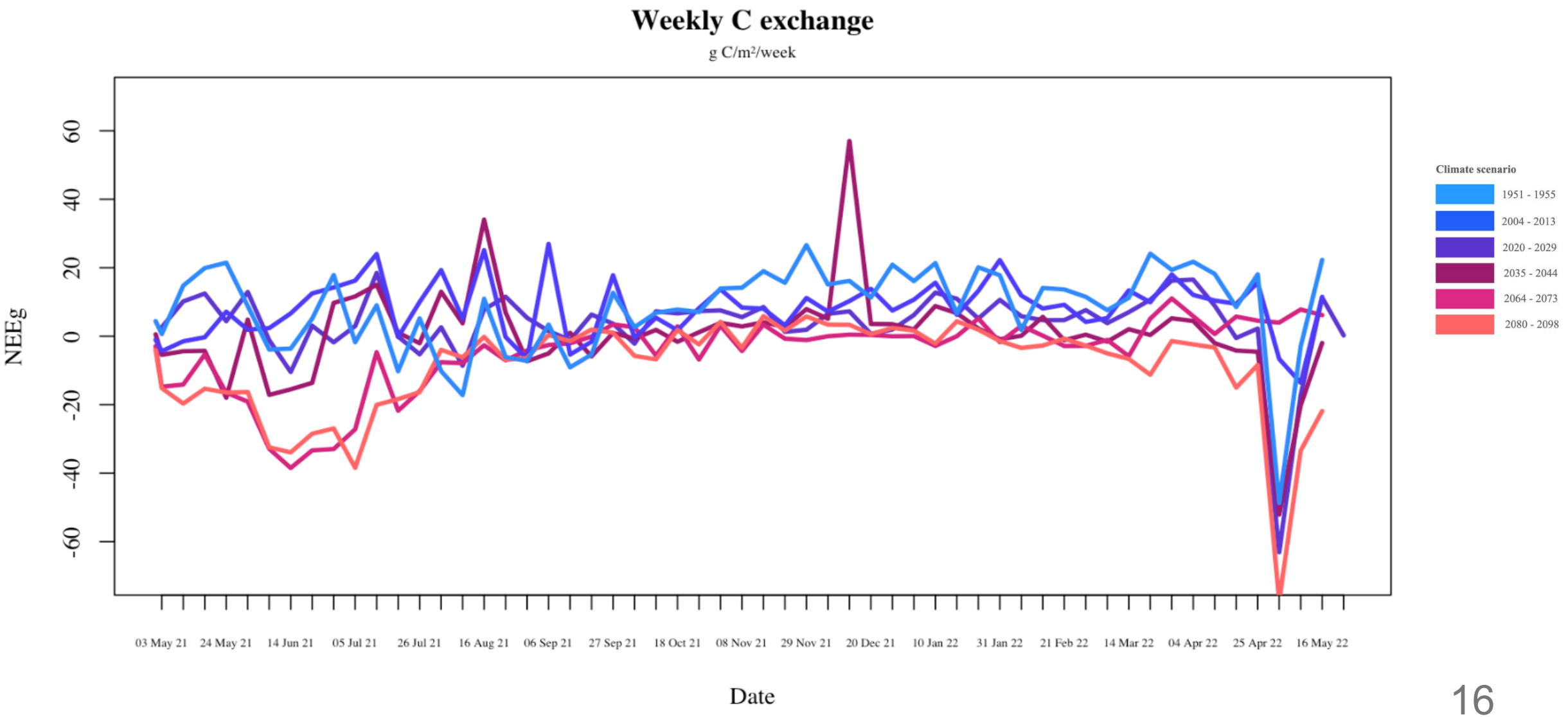


No microbial biomass change

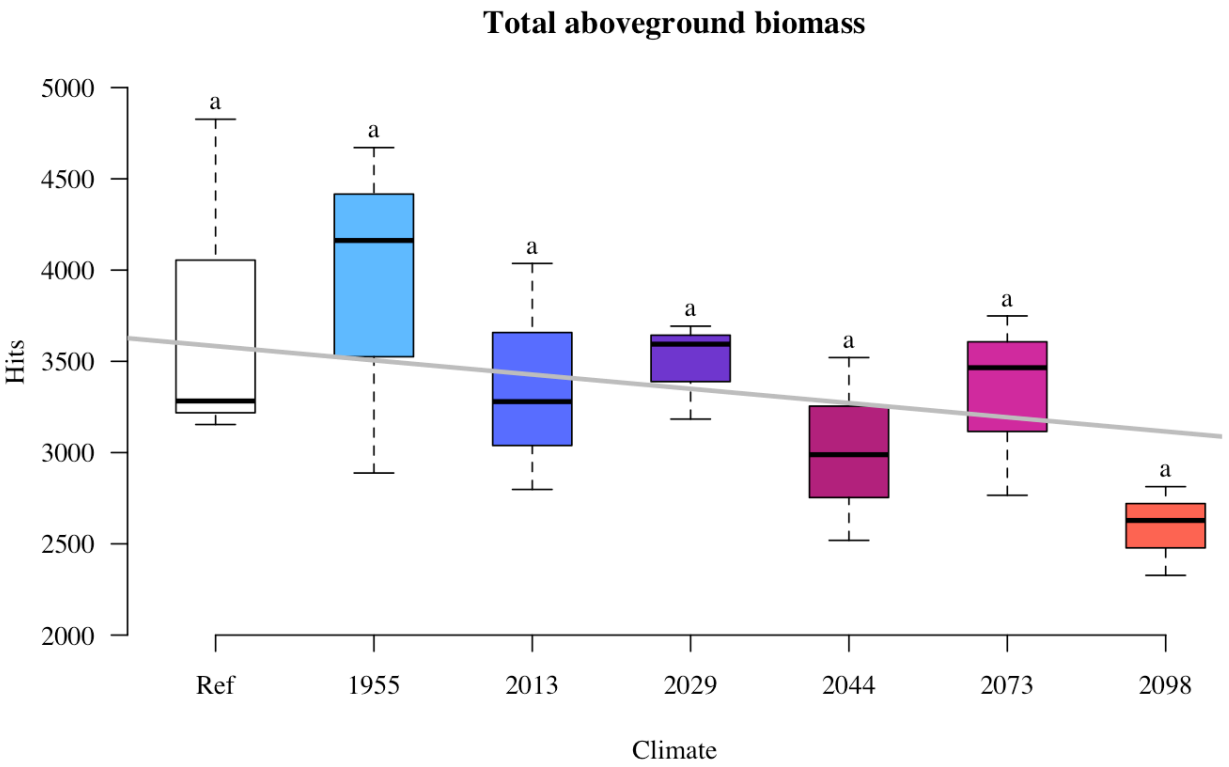


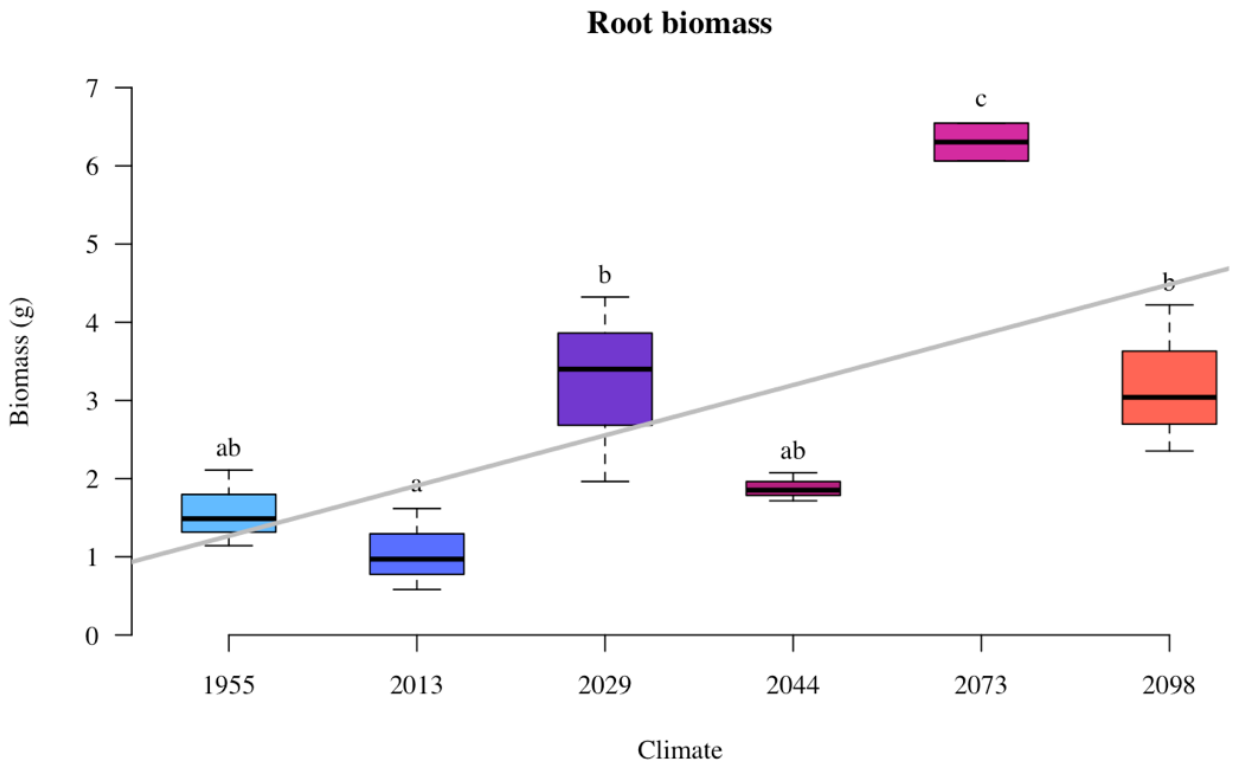


Potential driver: NEE shift from C source to C sink



Potential driver: plant biomass change? (maybe…)

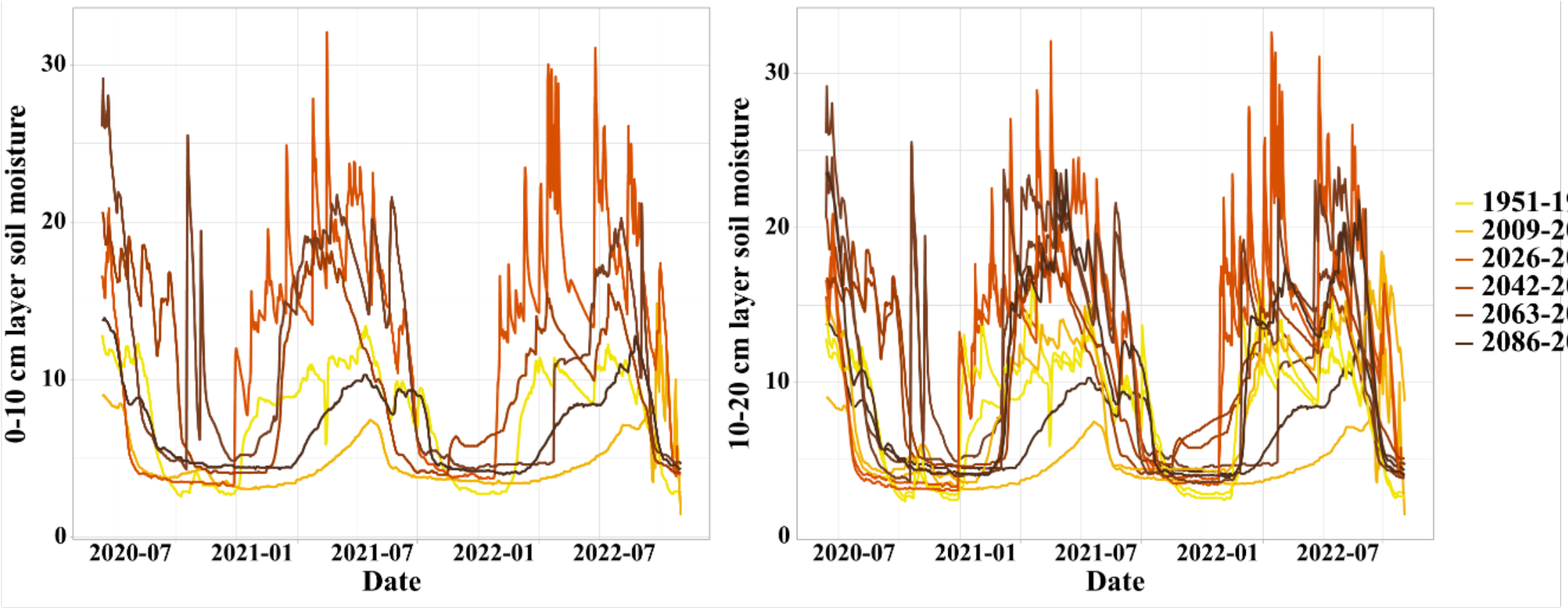




Potential driver: plant community change? NO!

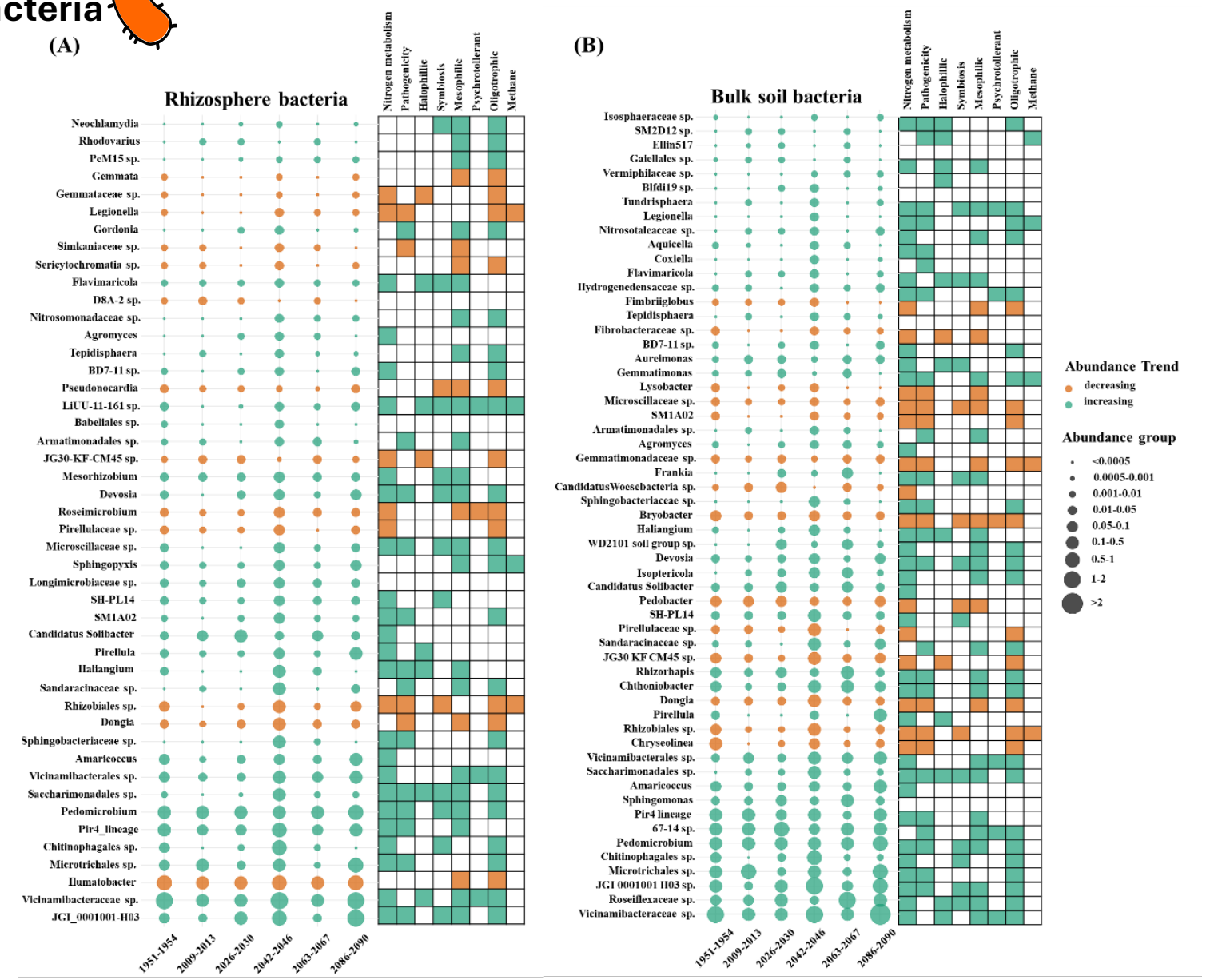
Potential driver: climate impacts on soil moisture

Volumetric water content (%) in top soil layers



Looking deeper: changes in functional groups

Bacteria



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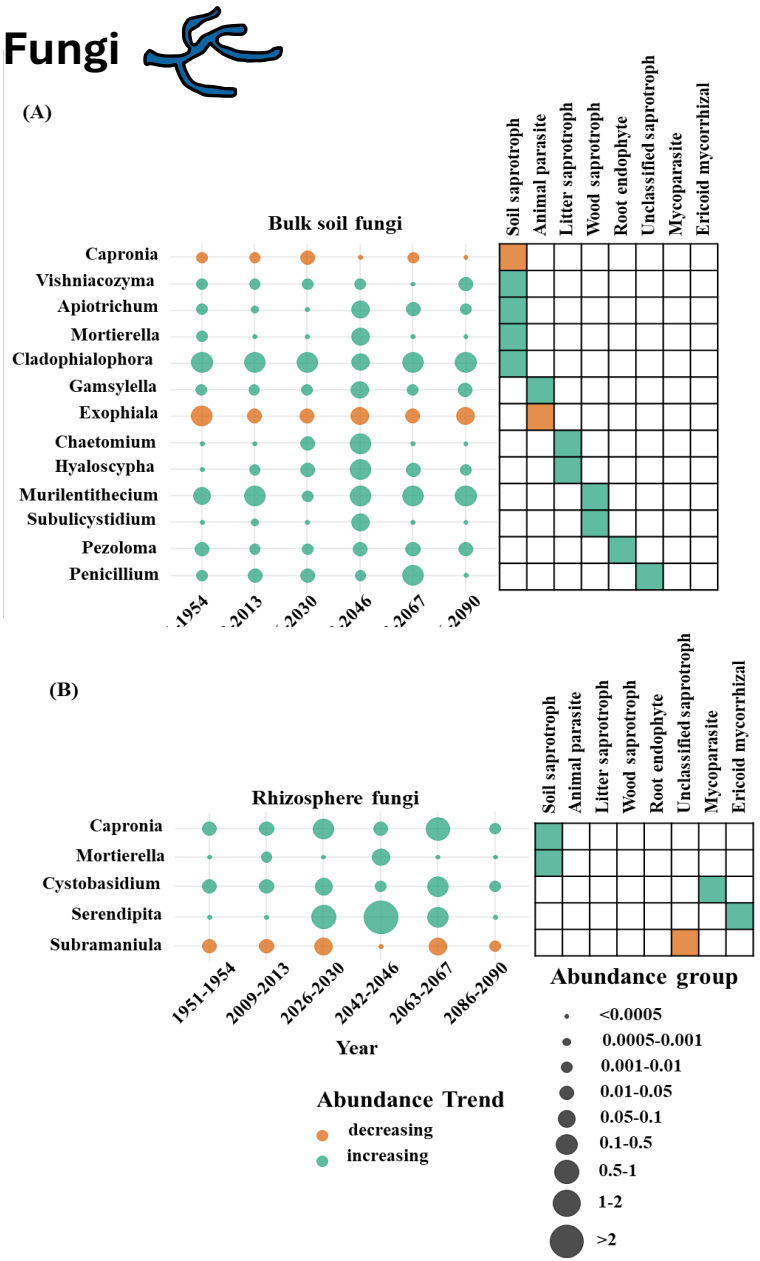
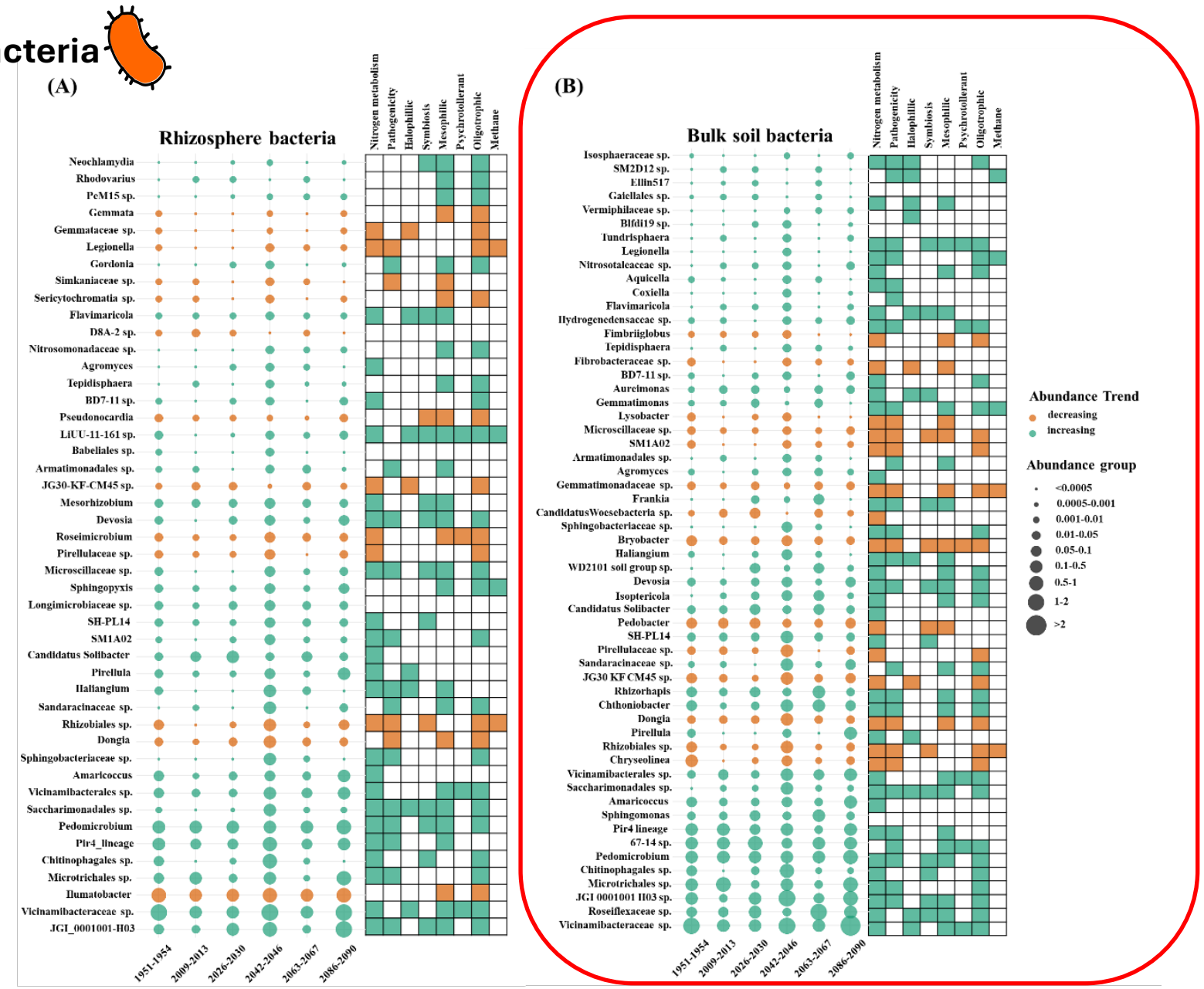


Stronger effect on bulk soil than on rhizosphere

Bacteria



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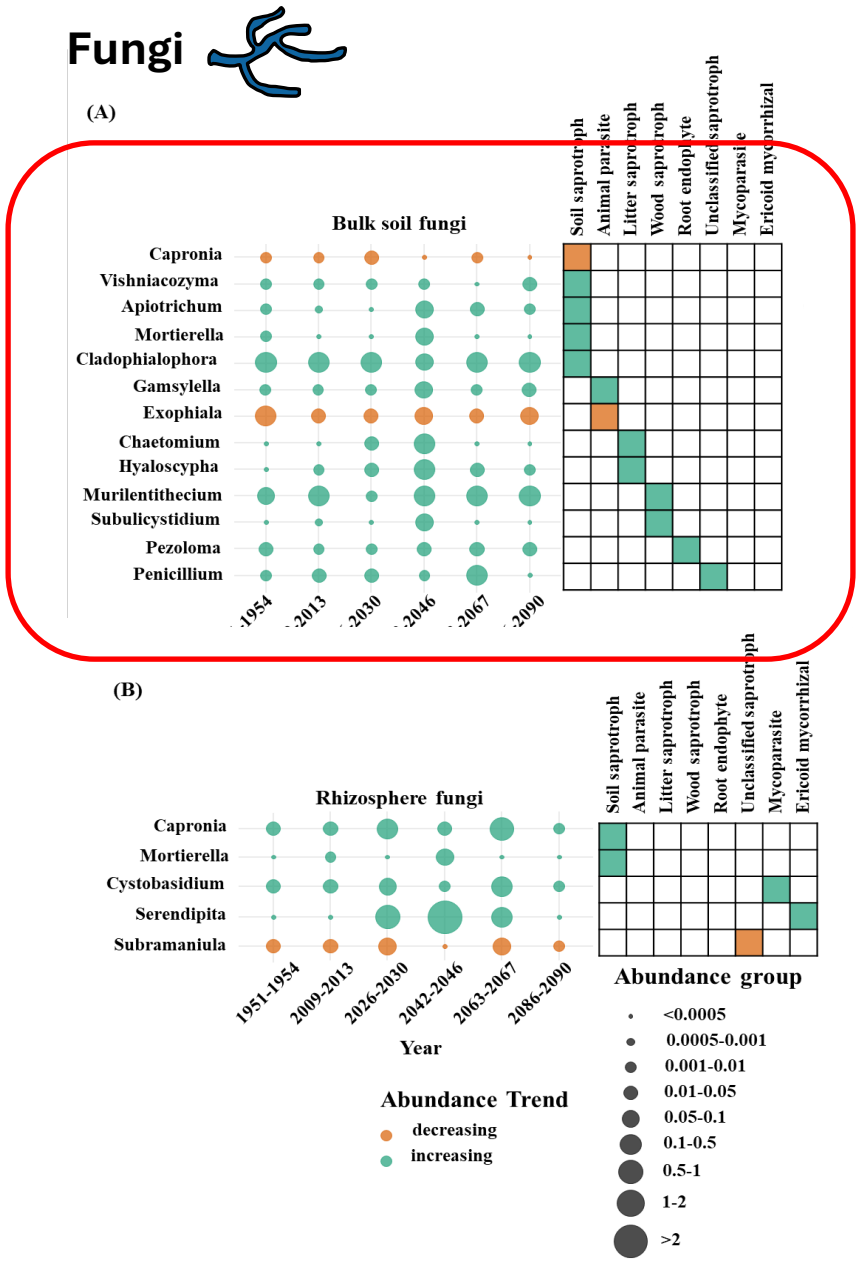

Take home messages

- Climate change leads to alteration of soil microbial communities
- Climate change affects functional profile of soil microbial communities directly, rather than through plant community
- Intensified nitrogen metabolism in soil will potentially affect plant communities in future
- ICOS and AnaEE have great yet unexplored collaboration potential

ICOS  **AnaEE**

Authors' Team

Special thanks to the UHasselt Ecotron engineers

Nier Su – PhD student

UHASSELT
KNOWLEDGE IN ACTION

CMK
CENTRE FOR ENVIRONMENTAL SCIENCES
UHASSELT

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Prof. dr. Nadia Soudzilovskaia

Prof. dr. François Rineau

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