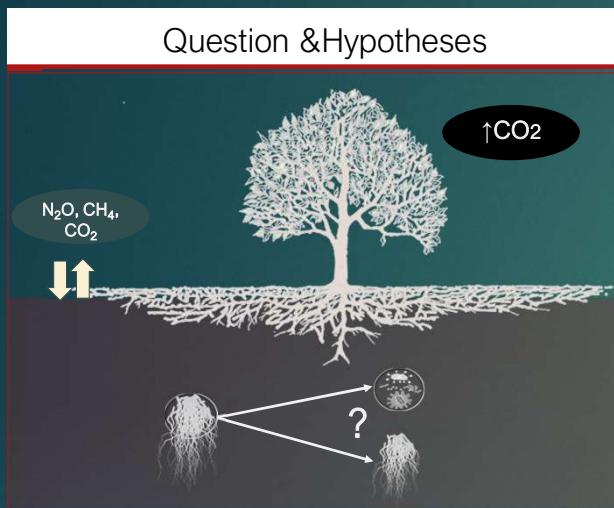


At the interface of soil and air; What happens under future climates?

Douwes Dekker, N.G¹., Ullah, S, Mackenzie, R., Gauci, V. (2021)



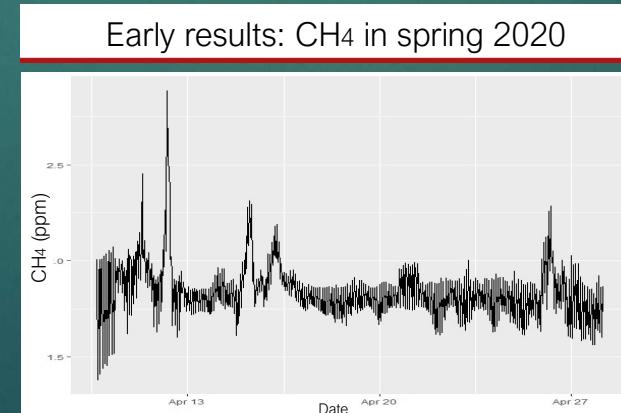
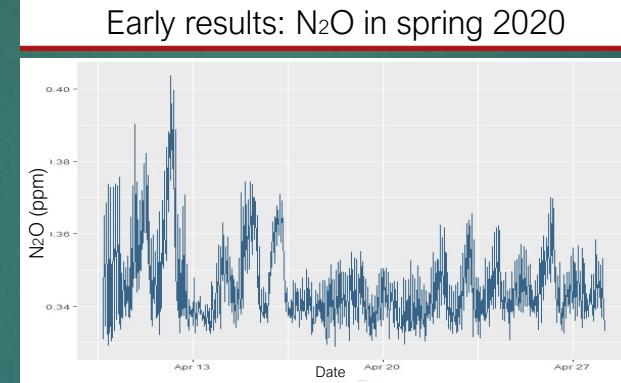
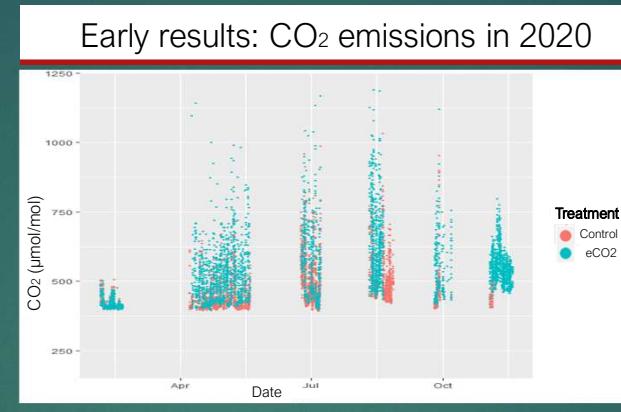
What happens to soil GHG emissions under elevated CO_2 ? (figure 1)

- More C allocation belowground; increase in microbial activity (but not growth?) and exp. Increase in respiration under elevated CO_2 (e CO_2).
- Competition between trees and soil microbes for N; N_2O expected to increase, but depending on N availability trees may outcompete microbes for N.
- As a result of increased C input (through root exudates) into the soil under e CO_2 , and potential increase in soil moisture due to reduced evapotranspiration, CH_4 emissions expected to increase.

Experimental set-up

Continuous measurements in the field, measuring CO_2 , N_2O and CH_4 fluxes from soil collars.

In the future PLFA-analysis to investigate changes in microbial community.



Interpreting results and future work

- Data are uncleared.
- Earlier findings showed a positive effect of e CO_2 on soil CO_2 emissions after 1 year (pers. Comm. Kourmouli, 2021). From the figure, there appears to be a peak concentration of CO_2 under e CO_2 compared to the control.
- This might suggest relatively higher fluxes on average from the e CO_2 plots.
- A more detailed analysis, including all plots, will be performed to confirm flux dynamics over time.
- These will ascertain if elevated fluxes under e CO_2 in the initial years of fumigation are sustained.
- N O_2 and CH_4 Fluxes are from treatment (e CO_2) array; trace gasses can be detected. Interesting to consider temperature and soil moisture (i.e., oxygen levels) effects, as well as the effect of e CO_2 on soil emissions.

Implications of research

- Understanding how CO_2 down- and upregulates other GHG fluxes allows understanding the possibilities and limits of carbon storage in forests across the globe.
- Considering the role of the microbial community will help understand what regulates these fluxes.

About the author

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