DISPARATE RESPONSES OF SOIL-ATMOSPHERE CO_2 EXCHANGE TO BIOPHYSICAL AND GEOCHEMICAL FACTORS OVER A BIOCRUST ECOLOGICAL SUCCESSION IN THE TABERNAS DESERT

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Background

Motivation

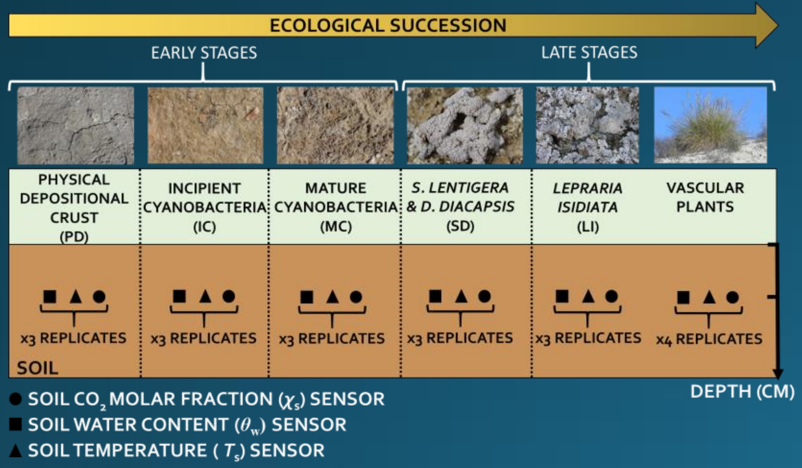
- It is still unknown how soil CO2 fluxes evolve during the ecological succession of biocrusts and which factors control them.
- In drylands, potential abiotic processes of CO2 uptake are still debated while estimates of the biotic contribution of photosynthetizing biocrusts to the net carbon uptake remain uncertain.

Main objective

- To identify the factors controlling soil-atmosphere CO2 fluxes

Methodology

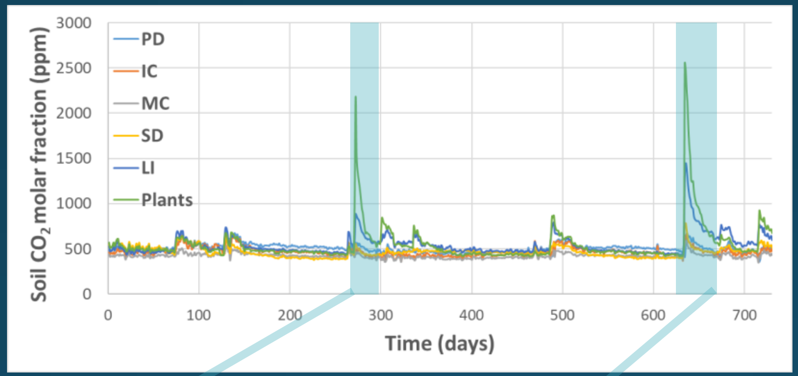
- Automated continuous measurements (every 20 min.) over 2 years
- Replicated spatially over the ecological succession of biocrusts
- Spatio-temporal statistical analysis

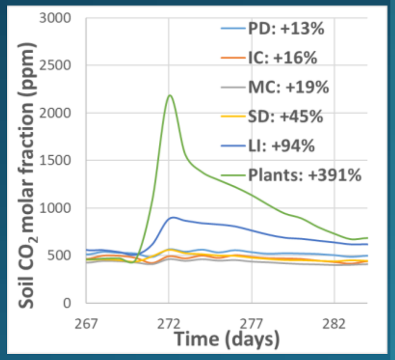


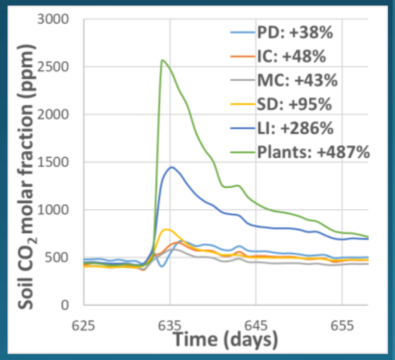
Main findings I

Co2 production processes

- Pulse response to precipitation
- Mainly controlled by θ_w interacting with T_s and antecedent moisture conditions (Birch effect)
- Sensitivity to θ_w ↗ from early to late succesional stages





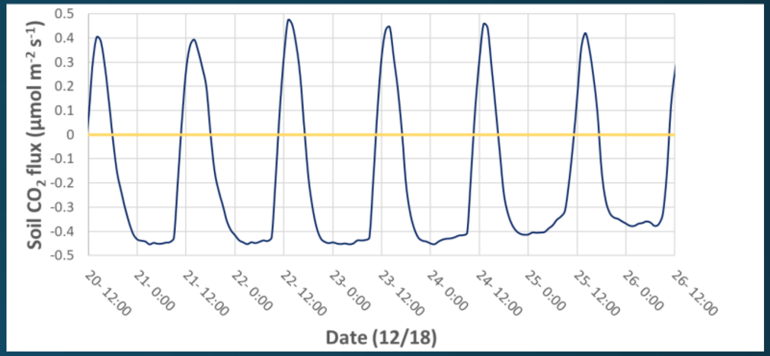


- Other identified drivers:
  - Soil organic carbon
  - Porosity

Main findings II

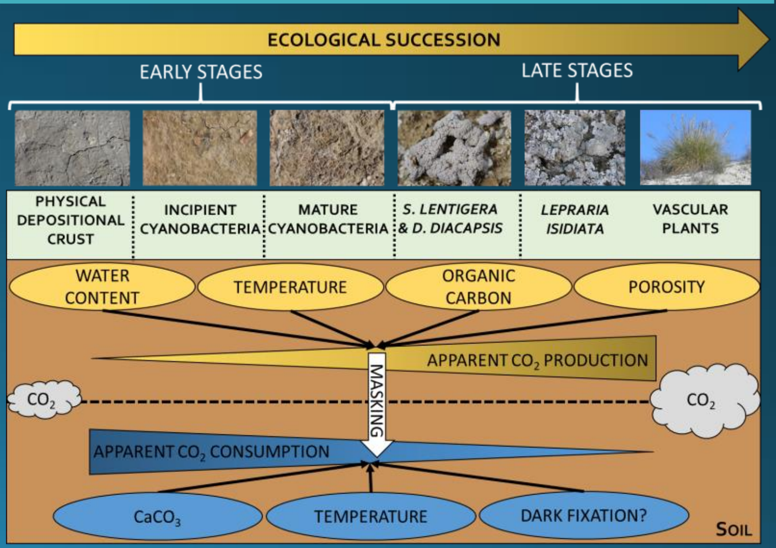
Co2 consumption processes

- Observed at night, mainly in early stages of succession
- Able to offset CO_2 emissions in some locations (115% of efflux)



- Results suggest a geochemical process of $CaCO_3$ dissolution

Summary



Acknowledgements

Funded by the research projects CGL2016-78075-P of the Spanish National Program and P18-RT-3629 of the Andalusian Regional Government including European Union ERDF