Five years in; how does soil respiration respond to elevated atmospheric CO_2 concentrations in a mature forest?

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Key hypothesis

Soil respiration will increase as a result of enhanced carbon inputs into the soil, microbial activity, and soil moisture content.

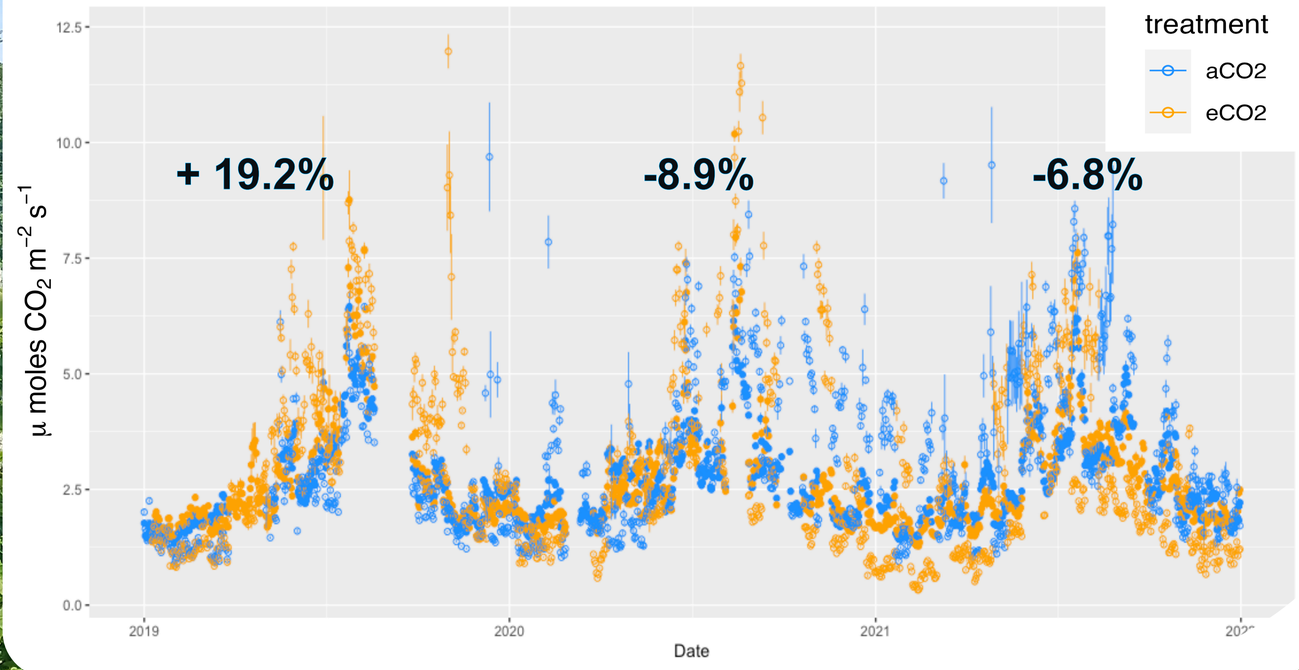
Methods

Soil respiration data collection at BIFoR FACE under **eCO_2** compared to aCO_2

Using the LI-8100A linked to a multiplexer - measured *in situ*.

Feed into empirical model using both soil **moisture** and **temperature** data from BIFoR FACE.

Soil respiration: daily averages for observed (open circles) and modelled (closed circles) data



Gap-fill the soil respiration data (figure) using the equation:

$$R_{soil} = \alpha * e^{(\beta * T_{soil})} * \frac{M_{soil}}{M_{soil} + \varepsilon}$$

Results:

Higher respiration under eCO_2 in 2019, then switch in 2020 and 2021. Both modelled and observed show this trend.

Discussion

- Initial effect of eCO_2 on soil respiration but this seems to diminish
- No treatment effect on soil moisture or temperature
- Increase in litter fall under eCO_2
- Marginally higher root production under eCO_2 could lead to higher soil respiration; do these trends continue?

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