

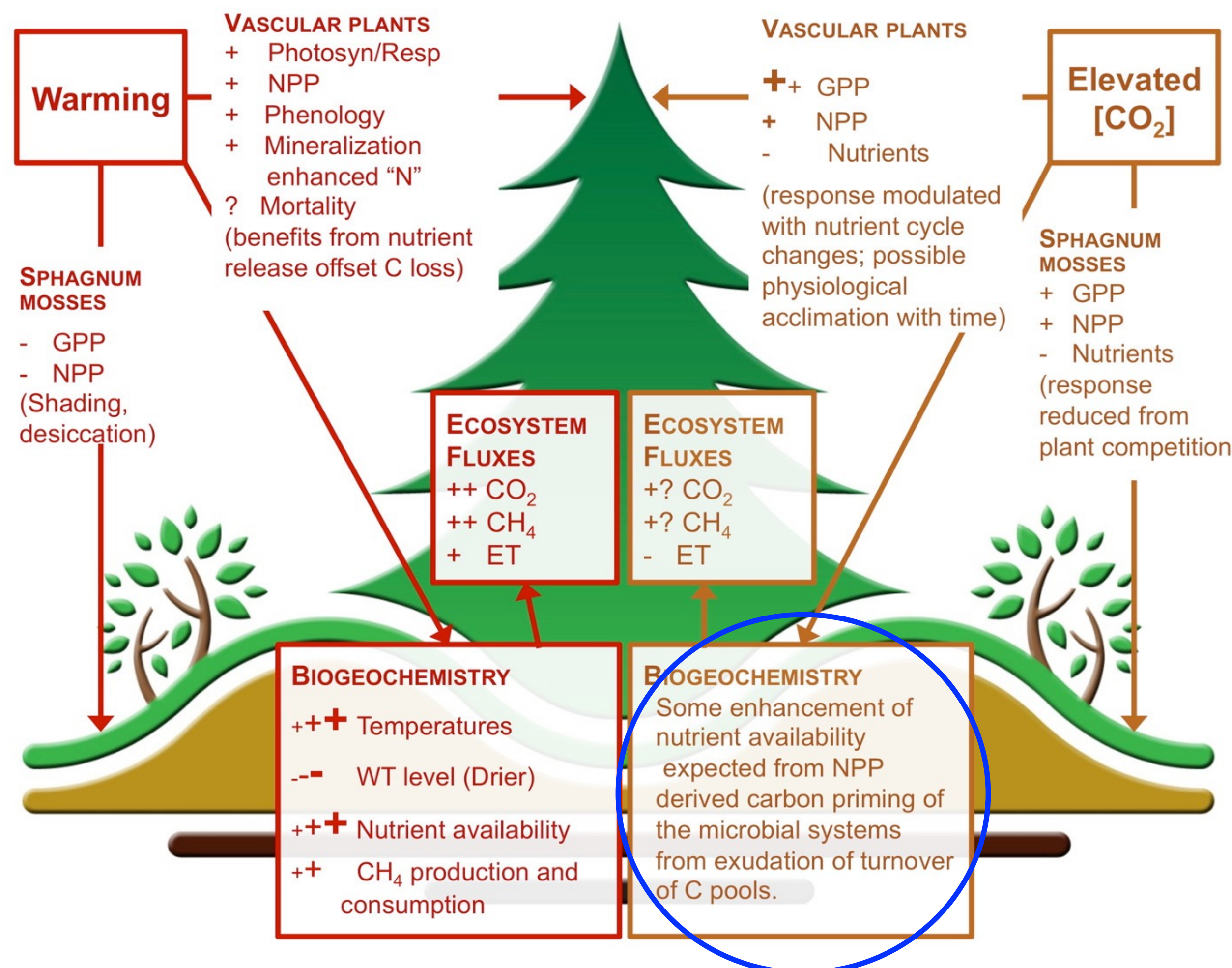
Soil Bacterial and Fungal Responses to Warming and Elevated CO₂ in a Temperate Peatland

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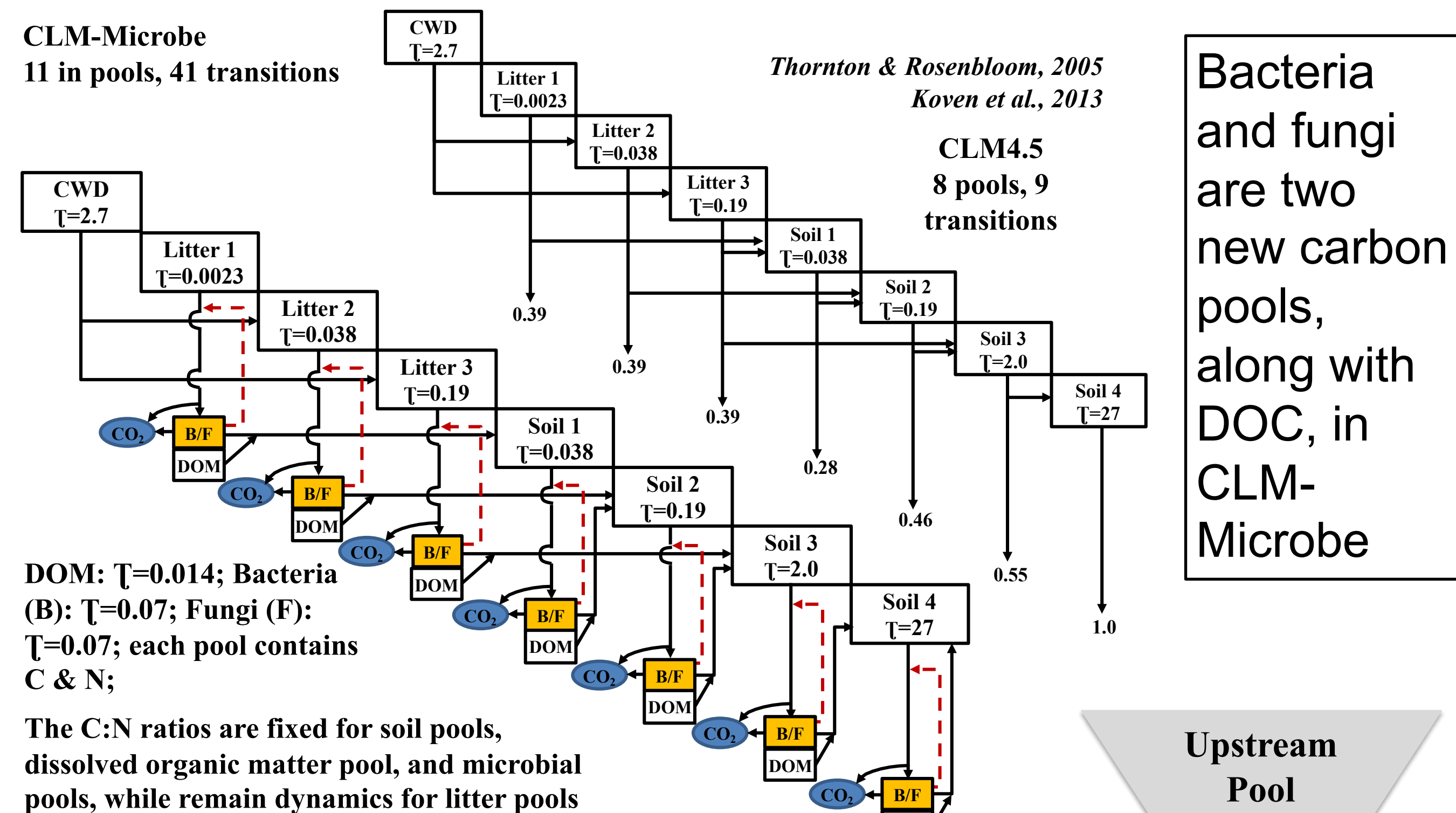
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SPRUCE Measurements



Targeting the 3rd SPRUCE project question)

- Are peatland ecosystems and organisms vulnerable to future environmental changes? What changes are likely?



Bacteria and fungi control the carbon flow from upstream pools to the downstream pools; their distinct physiological and functional traits cause variations in soil carbon cycling. Their biological acclimation and adaptation can be critical in soil carbon cycling.

Figure 1. Model structure for simulating bacterial and fungal biomass carbon

Bacteria & fungi under warming and eCO₂

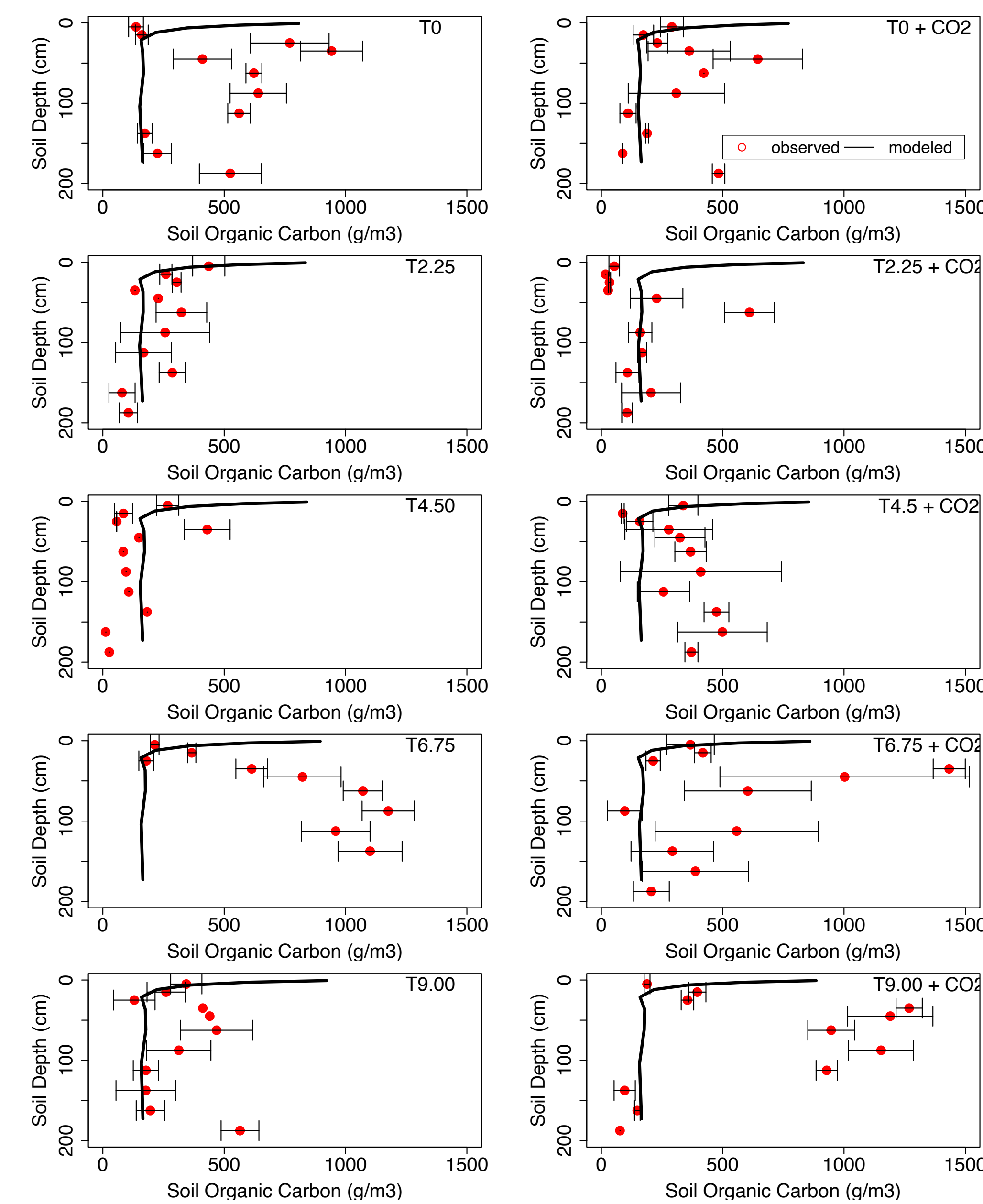


Figure 2. Simulated bacterial and fungal biomass carbon against observational data

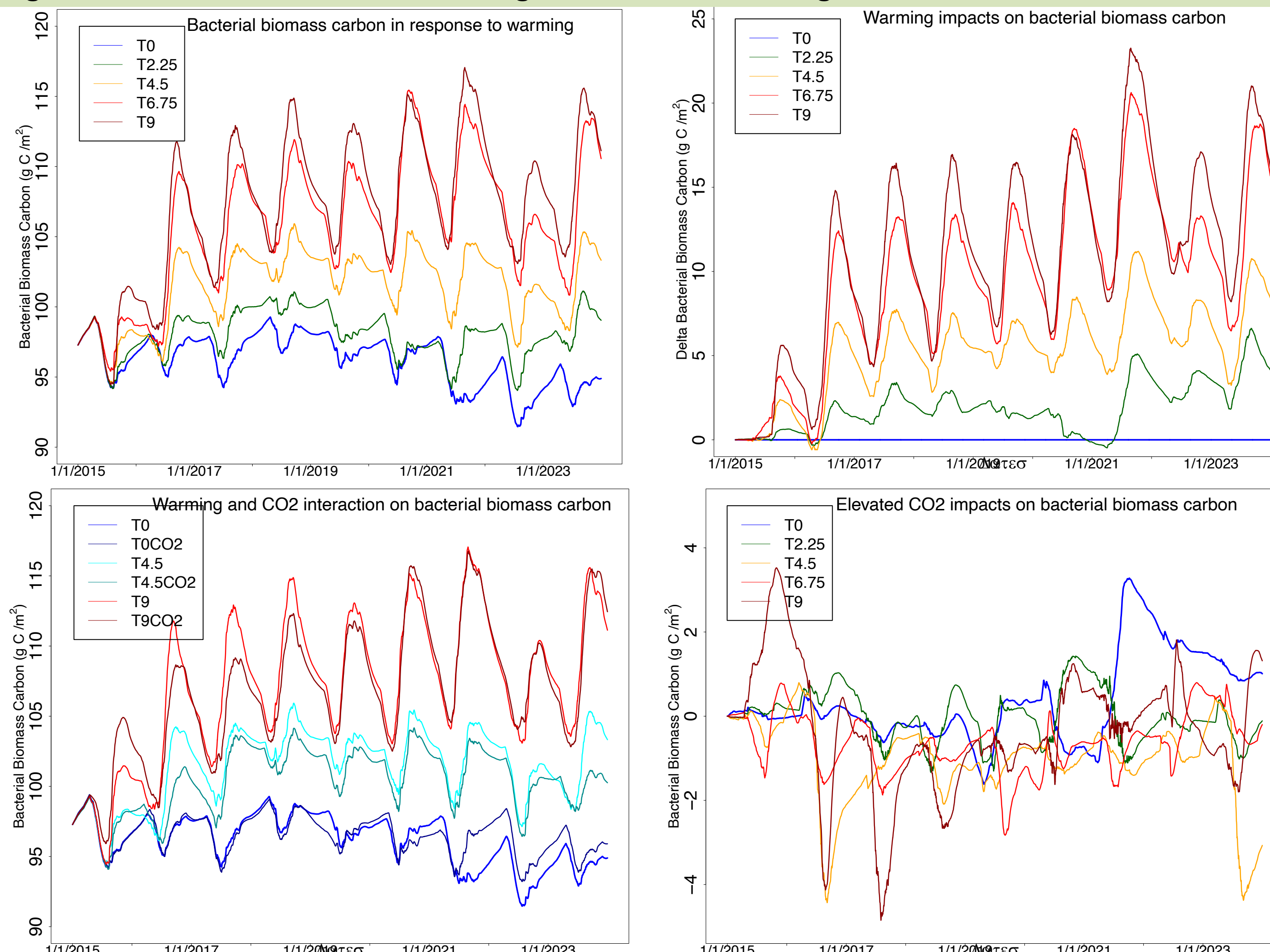


Figure 3. Bacterial responses to warming and eCO₂
Bacterial biomass carbon shows a very sensitive response to the warming gradient, while it is much less sensitive to elevated CO₂. Warming generally promotes bacterial biomass carbon. A strong seasonal variation of the bacterial responses to warming and elevated CO₂.

Interactive impacts of warming and eCO₂

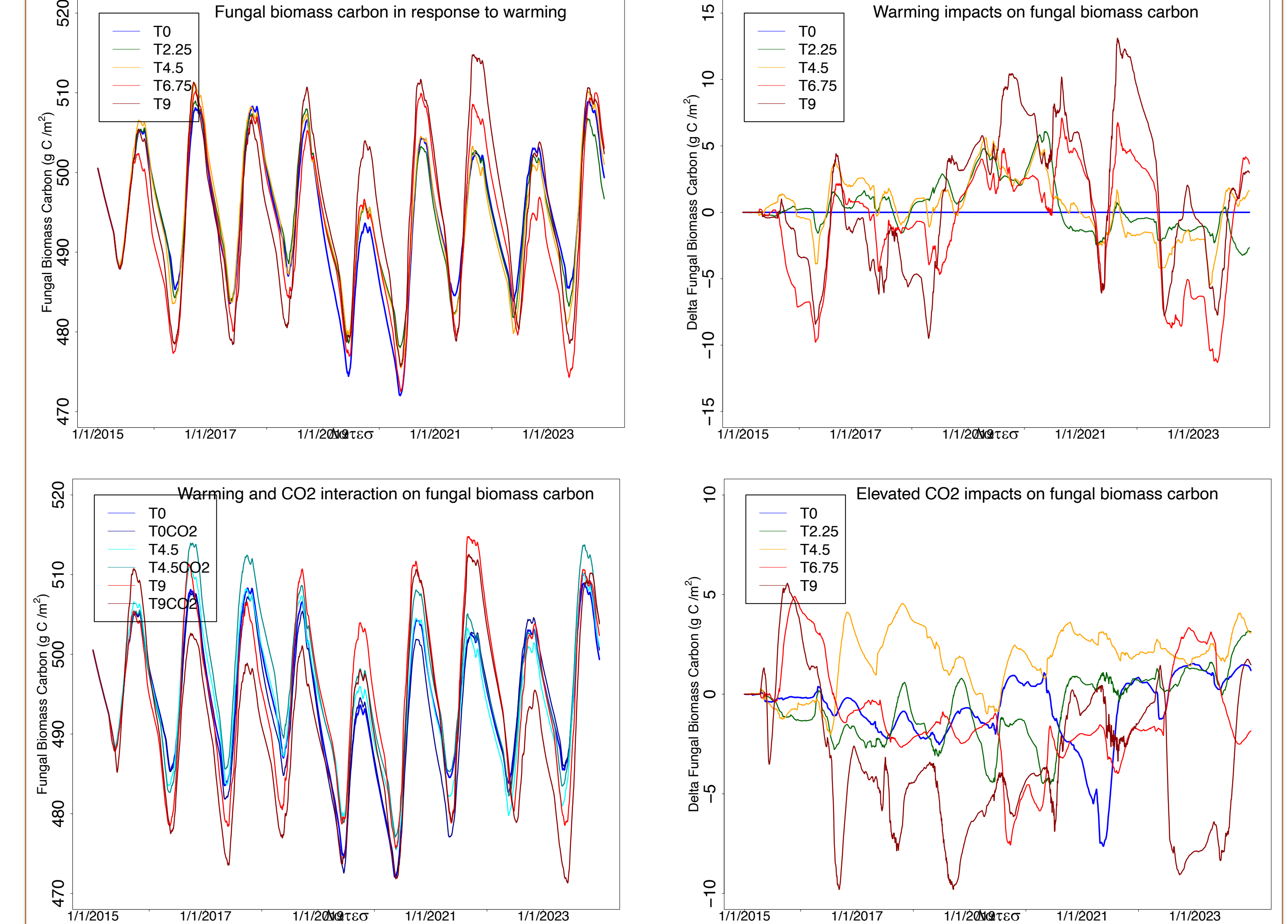


Figure 4. Fungal responses to warming and eCO₂

Fungal biomass carbon shows a less sensitive response to the warming gradient, and a much less sensitive response to elevated CO₂. Warming has positive and negative impacts on fungal biomass carbon. A substantial seasonal variation of the bacterial responses to warming and elevated CO₂.

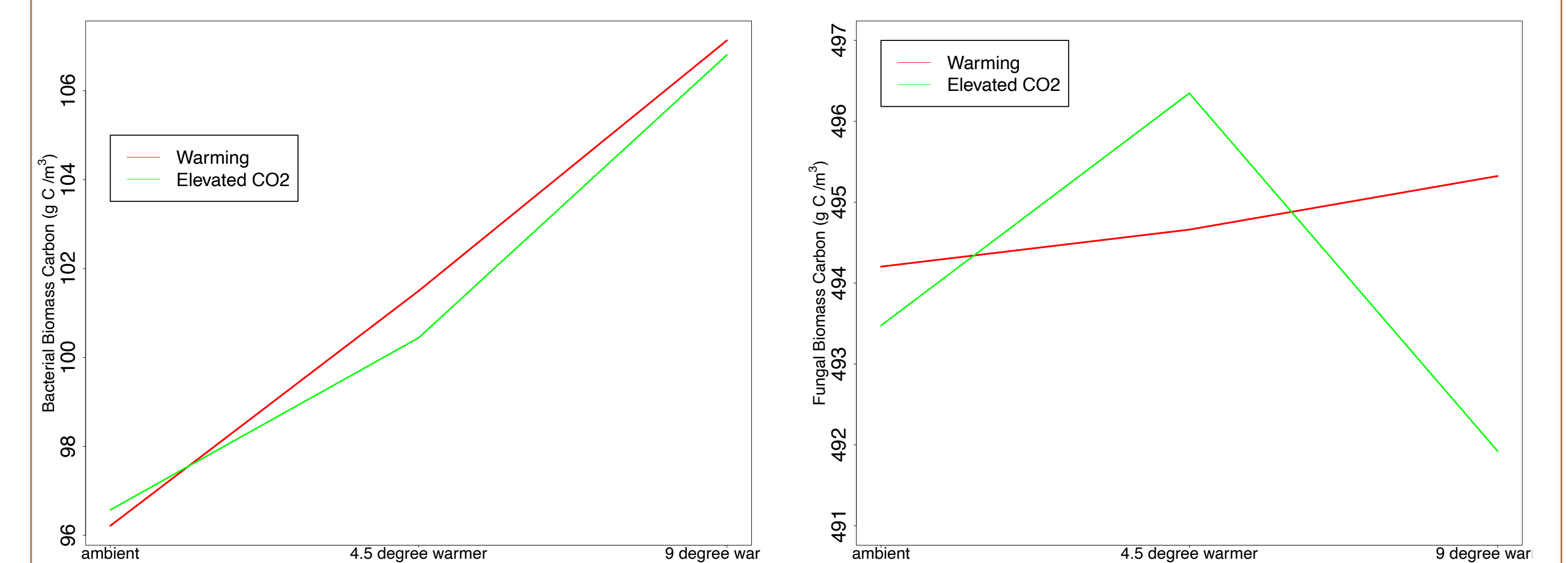


Figure 5. Warming and eCO₂ interaction impacts and bacterial and fungal biomass carbon

The interactive impacts of warming and eCO₂ are complicated. For the bacterial biomass carbon, the warming impact is positive; while eCO₂ is positive without warming, but negative with warming. For the fungal biomass carbon, the warming impact is positive; eCO₂ is negative without warming, but positive at 4.5 °C warming, and negative at 9 °C warming.

- ✓ Bacterial biomass carbon and fungal biomass carbon show different responses to warming and eCO₂.
- ✓ Bacteria are more sensitive to warming, while fungi are less sensitive; both show a minor response to eCO₂.
- ✓ There are interaction impacts between warming and eCO₂ on bacteria and fungi, dependent on other factors (mainly climate and carbon inputs).

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