**1. What data are you viewing?**

The data I am viewing is an experimental dataset that records soil organic matter content (SOC) under different experimental conditions (e.g., ambient CO₂ and elevated CO₂), as well as other relevant variables (e.g., experiment number, year of experiment, etc.). Data may include the following:

Experiment: experiment number.

ambient.CO2: soil organic matter content under ambient CO₂ conditions.

CO2: soil organic matter content under elevated CO₂ conditions.

Depth: depth of the sample

Time: time, etc.

**2. What do you expect your analysis to show and what are your assumptions? What do you expect your analysis to show, and what are your assumptions? How should soil organic matter content change under elevated CO2**

I expect the analyses to be able to:

Quantify the effect of elevated CO₂ on soil organic matter content by calculating the log response ratio (LRR) for each experiment.

Summarise the LRR by experimental phase (early, mid, late) to see if the effects of elevated CO₂ on SOC are consistent across phases.

Evaluate the overall effect of elevated CO₂ on SOC and explore its ecological significance.

Hypotheses

Hypothesis 1: Elevated CO₂ will increase soil organic matter content because plants are likely to produce more biomass under elevated CO₂ conditions, which will increase soil organic matter input.

Hypothesis 2: The effect of elevated CO₂ on SOC may be different at different stages of the experiment (early, mid, late). For example, the early stage may have a small effect, while the middle and late stages may have a significant effect.

Based on existing studies and hypotheses, elevated CO₂ may affect soil organic matter content through the following mechanisms:

Increasing plant biomass: Elevated CO₂ may promote plant photosynthesis and increase plant biomass, thus increasing soil organic matter input.

Changes in microbial activity: Elevated CO₂ may affect the activity of soil microorganisms, which in turn may affect the rate of organic matter decomposition.

Changes in carbon allocation: Plants may allocate more carbon to underground parts (e.g., the root system), increasing the accumulation of soil organic matter.

Therefore, I would expect soil organic matter content to increase under high CO₂ conditions, but the exact change may vary depending on the experimental phase, soil type, and ecosystem.

**3.Interpreting results after aggregating data: what do your final numbers mean? Do they support your initial hypothesis? Why do they and why don't they?**

Meaning of the final numbers

Log Response Ratio (LRR): LRR indicates the extent to which elevated CO₂ affects soil organic matter content. Positive values indicate that elevated CO₂ increased SOC and negative values indicate a decrease.

Whether the hypothesis is supported or not

LRR is positive and significant: Hypothesis 1 is supported, i.e., elevated CO₂ increases soil organic matter content.

LRR was significantly different at different stages: supports hypothesis 2 that the effect of elevated CO₂ on SOC varied by stage of the experiment.

Possible causes:

Increased plant biomass resulted in more organic matter inputs.

Changes in microbial activity slowed down organic matter decomposition.