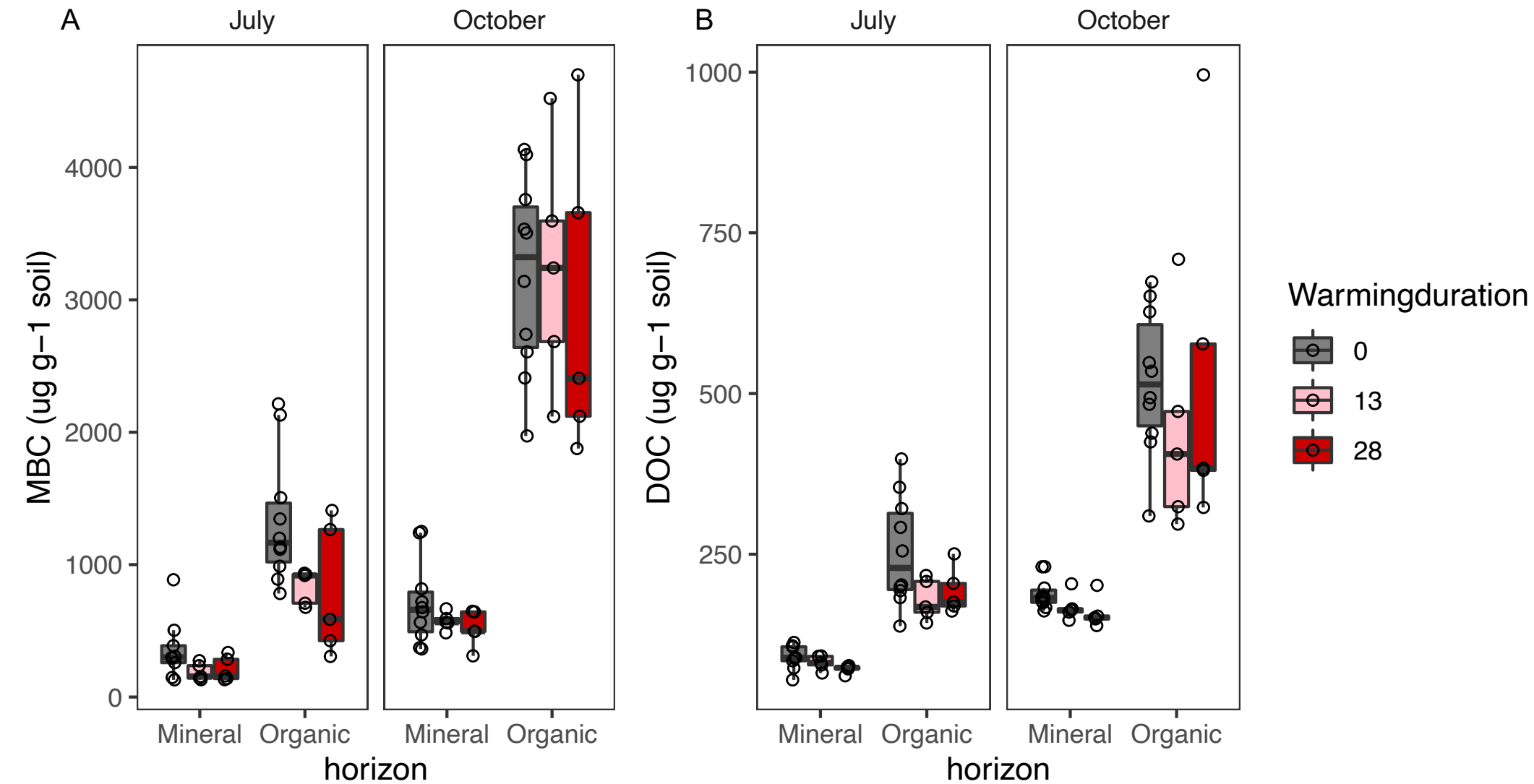
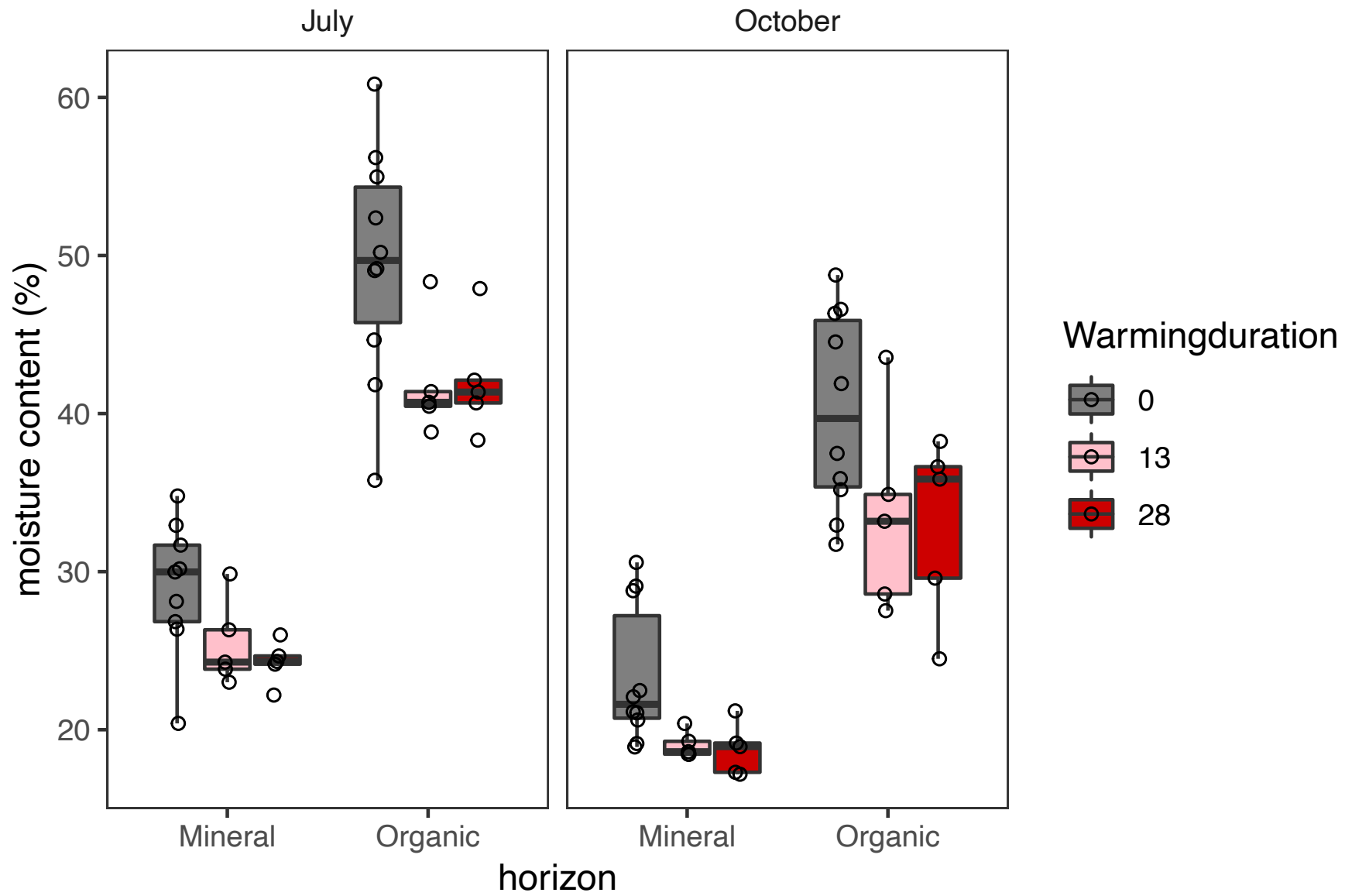


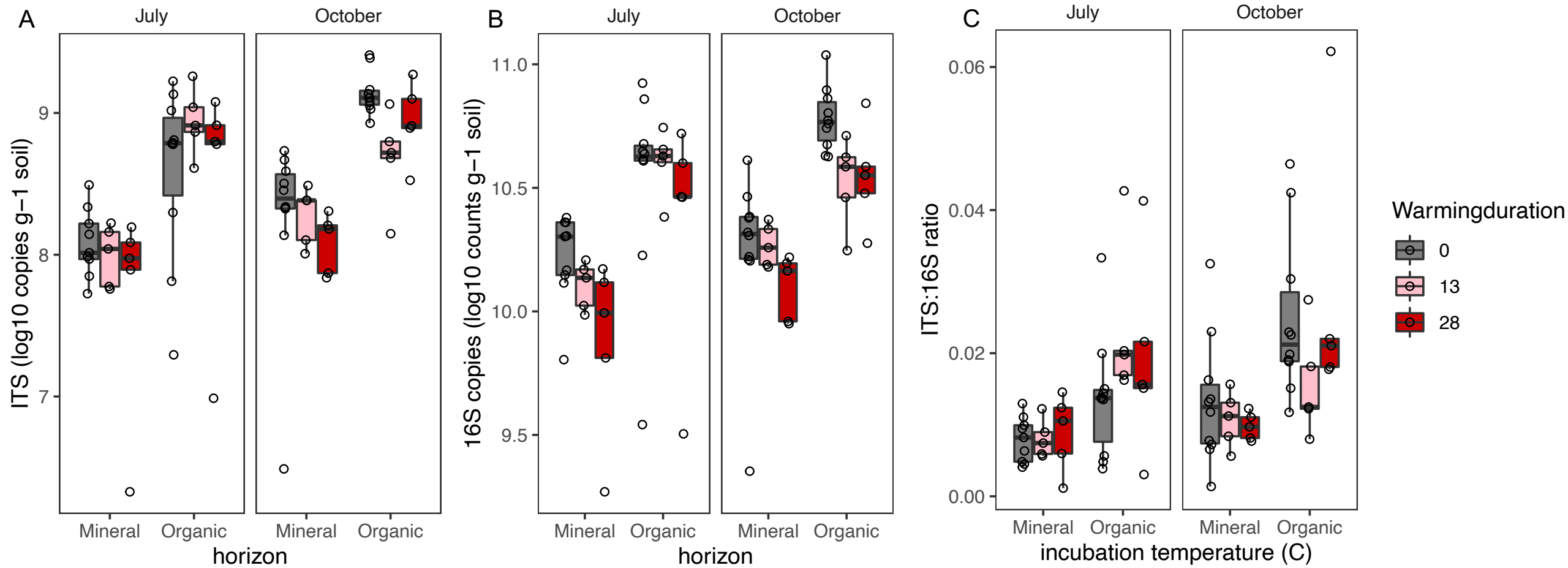
Supplementary Figures



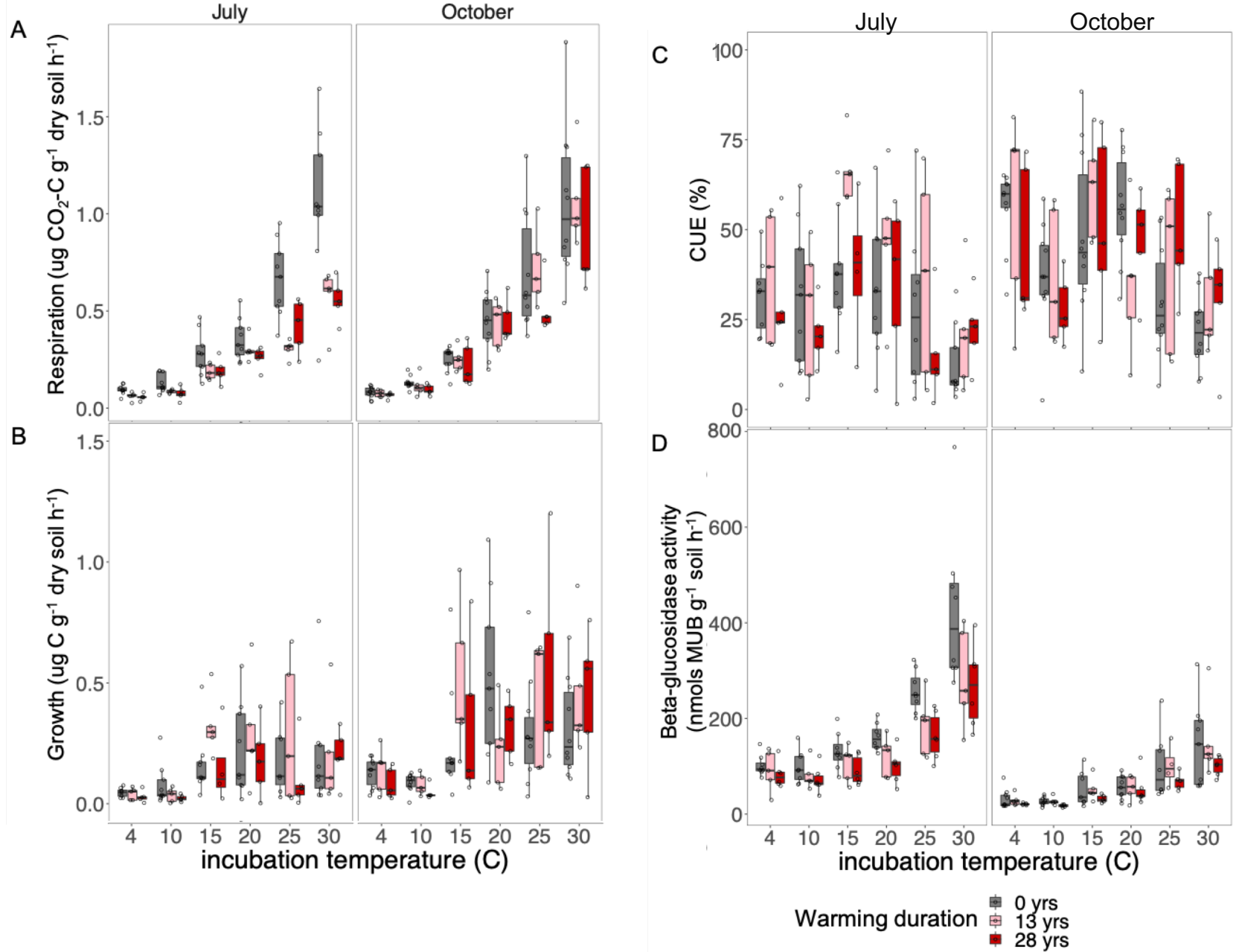
Supplementary Figure 1. Microbial biomass carbon (A) and dissolved organic carbon (B) response to seasons, soil depth and long-term warming.



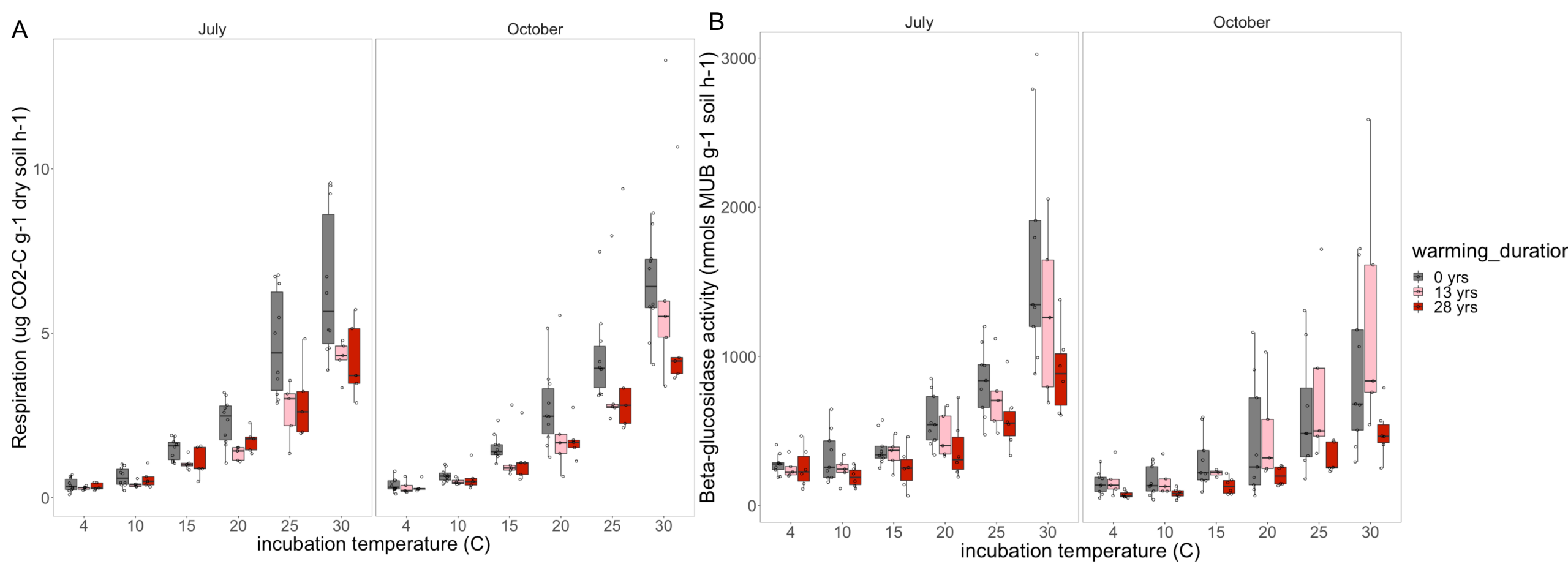
Supplementary Figure 2. Soil moisture response to seasons, soil depth and long-term warming.



Supplementary Figure 3. Fungal (A), bacterial (B) and fungal to bacterial ratio (C) response to seasons, soil depth and long-term warming.

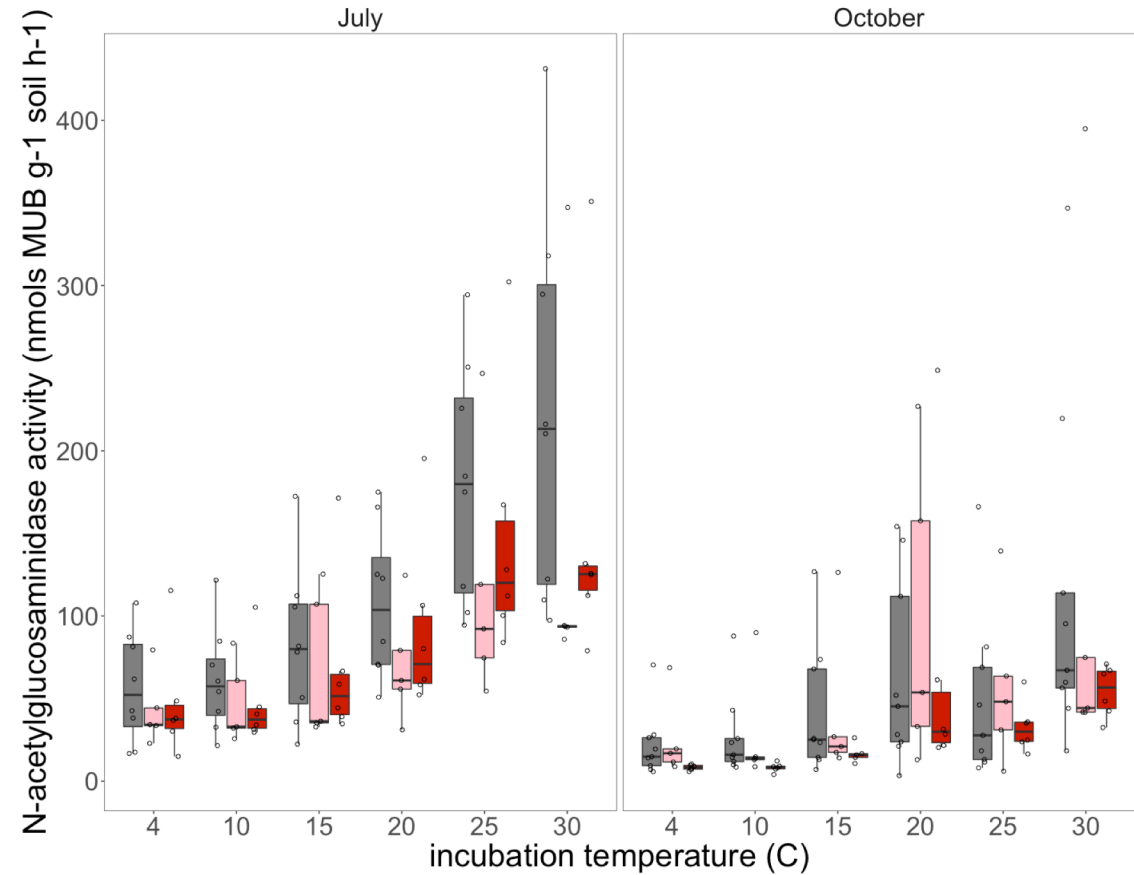


Supplementary Figure S4. Boxplots of temperature sensitivity of microbial carbon cycling processes. Respiration rate (A), growth rate (B), CUE (C) and BG extracellular enzyme activity (D) at different temperatures from 4 to 30°C measured under laboratory incubations in July and October for the mineral soils.

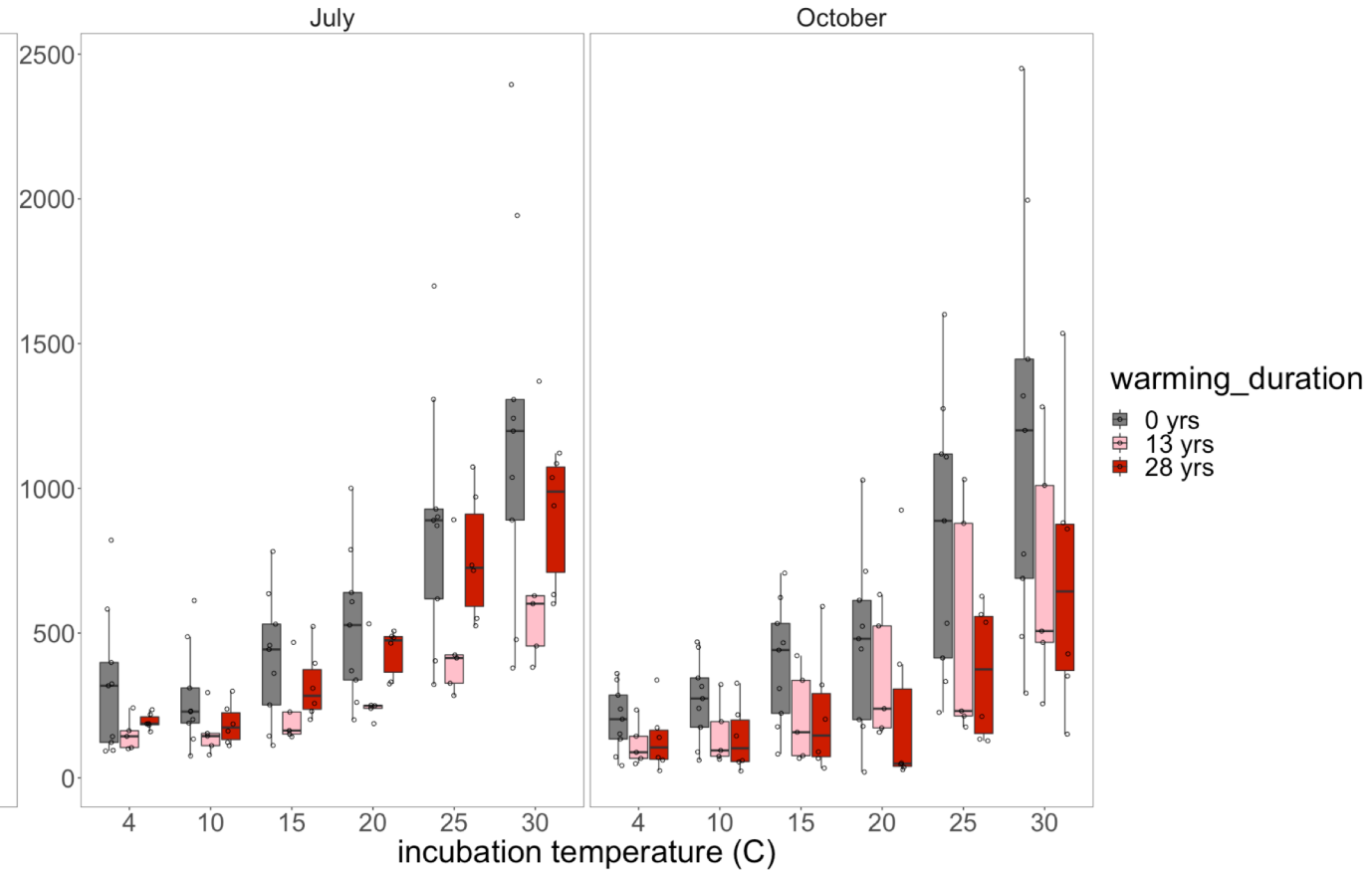


Supplementary Figure 5. Temperature sensitivity of respiration (A) and betaglucosidase activity (B) in organic soils measured at different temperatures from 4-30°C during laboratory incubations in July and October.

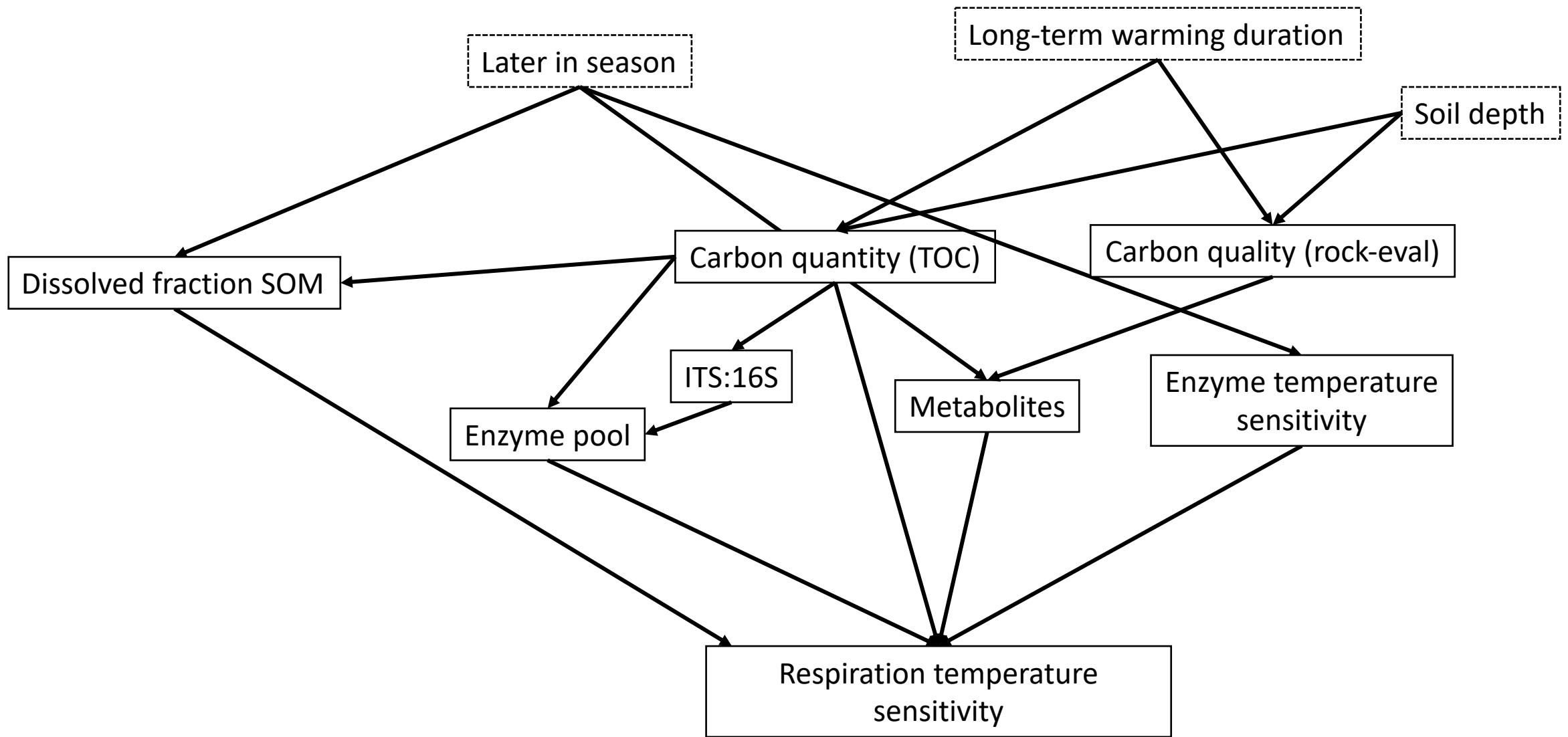
A



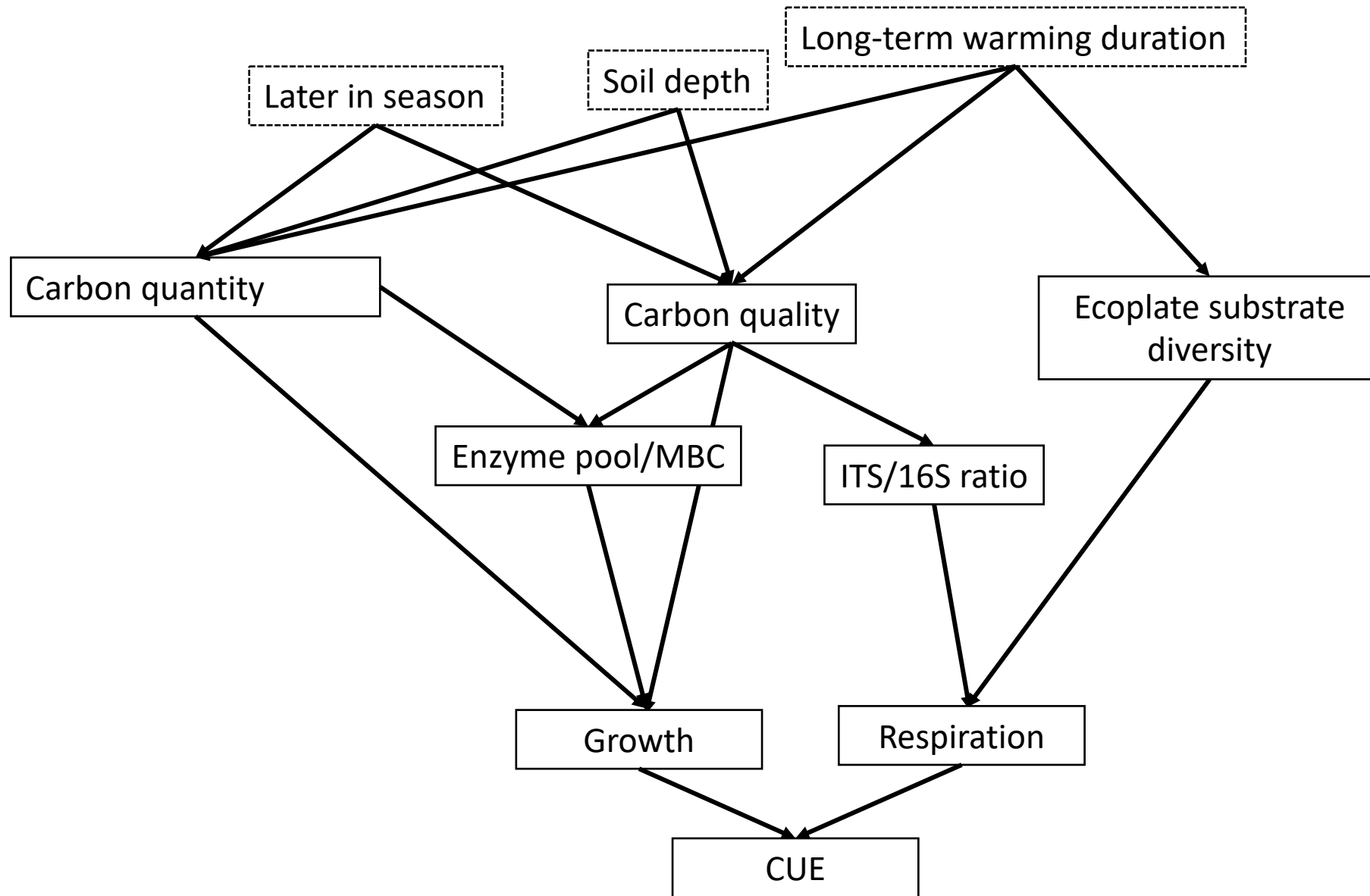
B



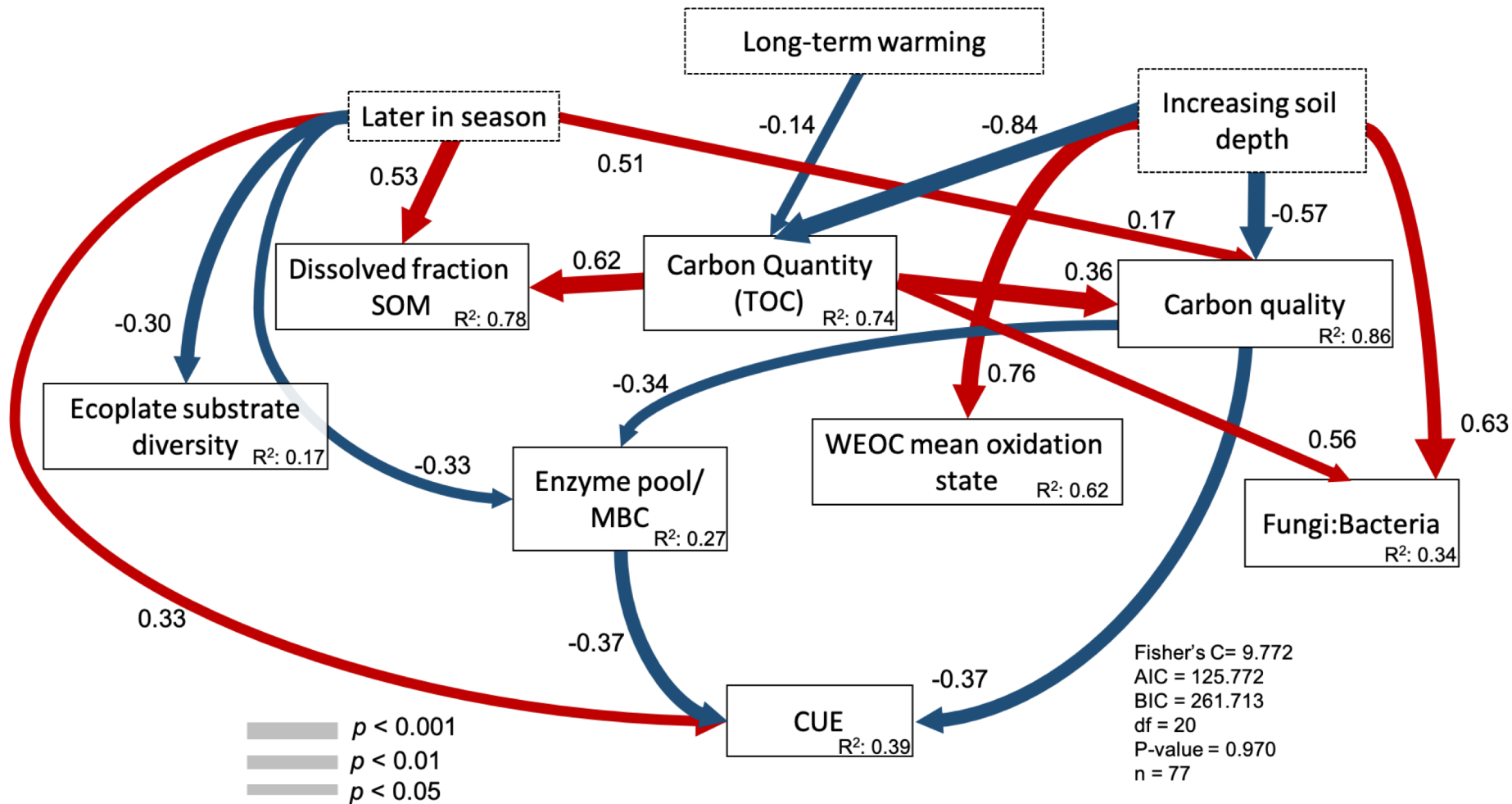
Supplementary Figure 6. Temperature sensitivity of N-acetylglucosaminidase in mineral (A) and organic (B) soils. measured at different temperatures from 4-30°C during laboratory incubations in July and October.



Supplementary Figure S8. Hypothesized structural equation model for the respiration temperature sensitivity.



Supplementary Figure S9. Hypothesized structural equation model for the CUE.



Supplementary Figure S10. Structural equation model explaining CUE without growth and respiration. Significant paths are shown in red if positive or in blue if negative. Path width corresponds to degree of significance as shown in the lower left. The amount of variance explained by the model (R^2) is shown for each response variable, and measures of overall model fit are shown in the lower right. Dissolved fraction of SOM: dissolved organic carbon measured by a TOC-L analyzer; carbon quantity: total carbon quantified during rock-eval ramped thermal pyrolysis; carbon quality: PCOA axis 1 of rock-eval ramped thermal pyrolysis; enzyme pool/MBC: composite variable of maximum activity recorded for beta-glucosidase, N-acetylglucosaminidase and oxidative enzymes by microbial biomass carbon; SOM mean oxidation state: SOM oxidation state calculated from polar metabolites; Fungi:Bacteria: 16S rRNA gene copy number g⁻¹ soil: ITS gene copy number g⁻¹ soil; respiration/MBC: respiration measured at 20C/ microbial biomass carbon; growth/MBC: growth measured at 20C/ microbial biomass carbon and CUE: carbon use efficiency measured at 20C. Global goodness-of-fit: Fisher's C.