

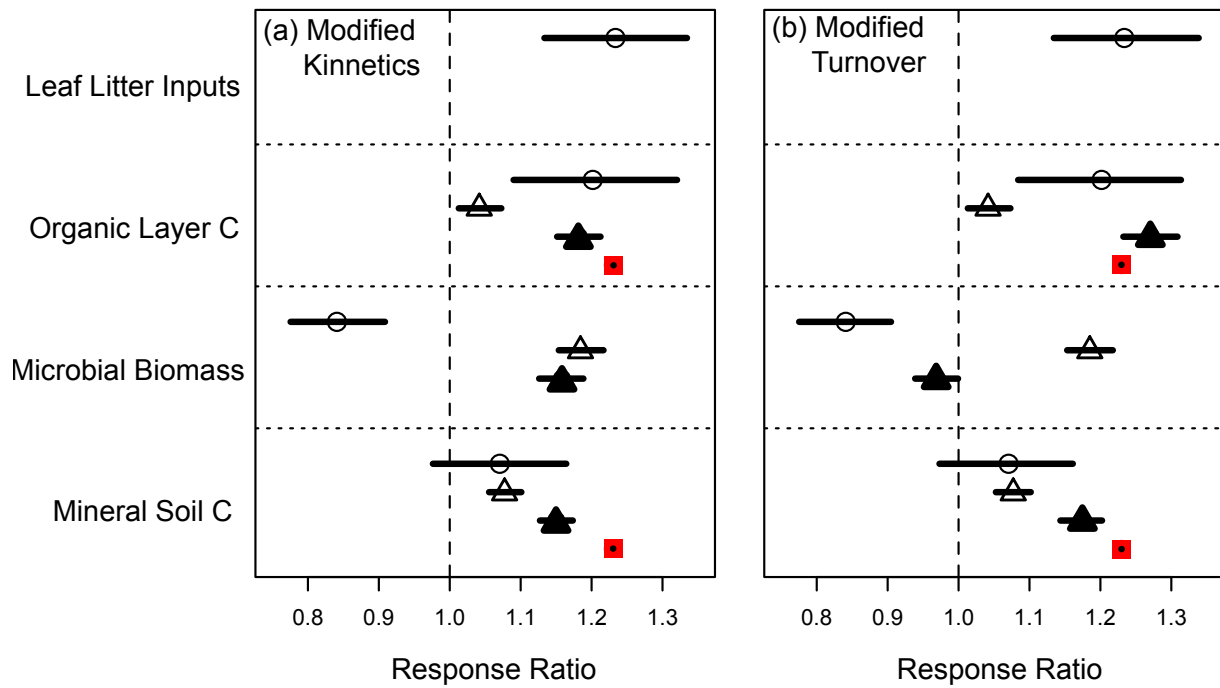


*Supplement of*

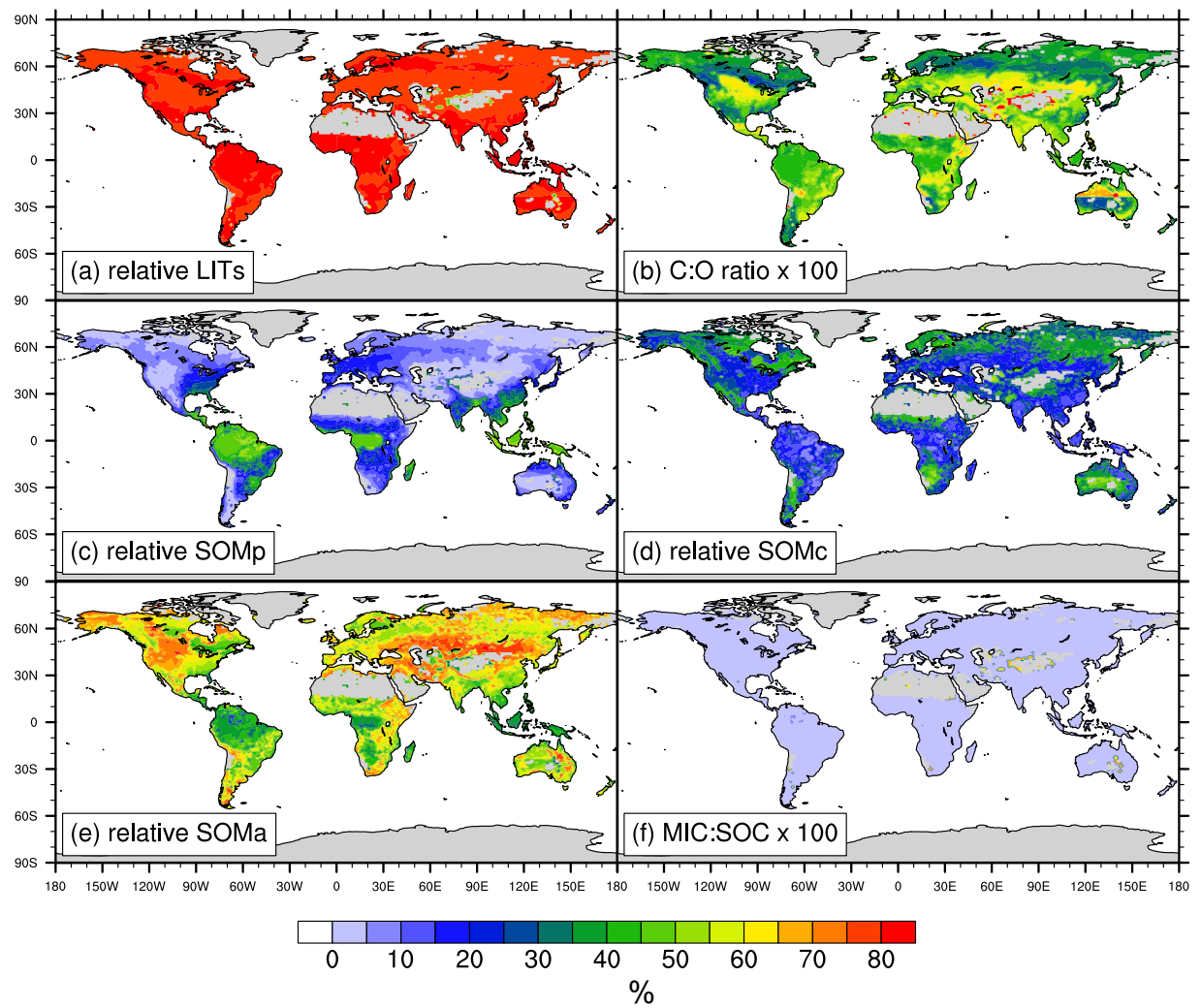
## **Representing life in the Earth system with soil microbial functional traits in the MIMICS model**

**W. R. Wieder et al.**

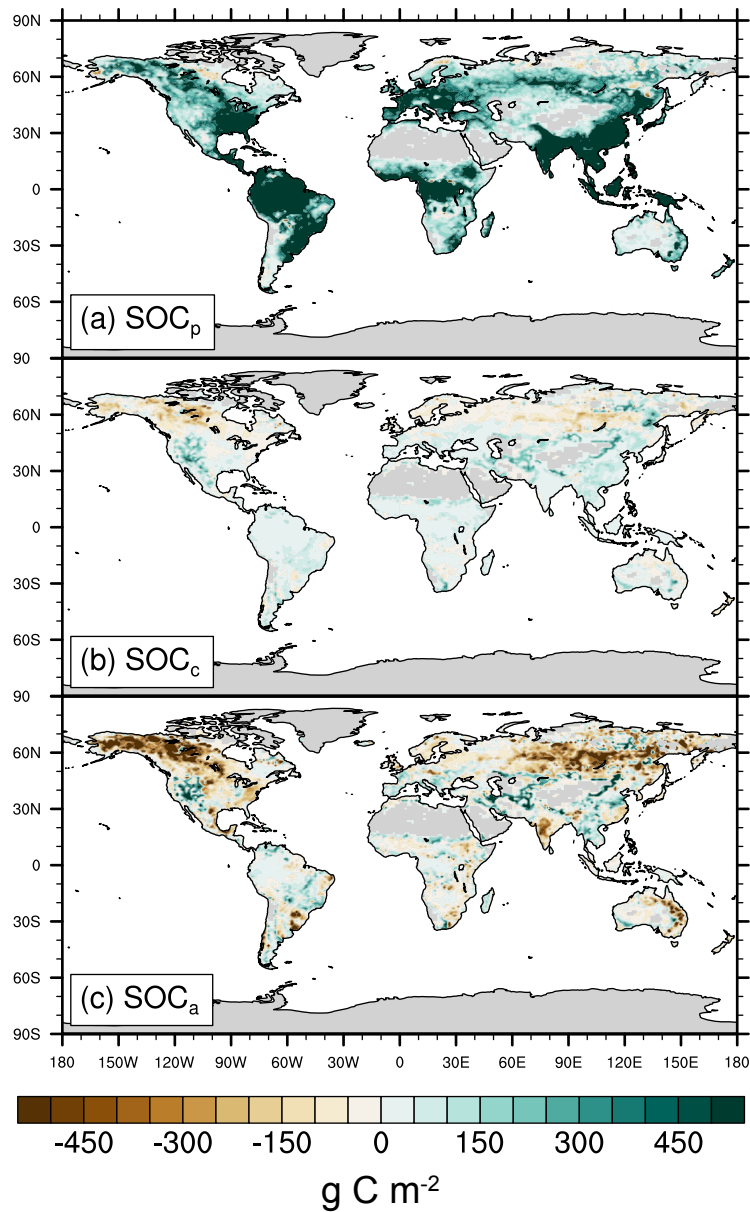
*Correspondence to:* W. R. Wieder ([wwieder@ucar.edu](mailto:wwieder@ucar.edu))



Supplementary Figure 1. Observed and modeled C response ratio (treatment / control) to experimental N enrichment with modifications to (a)  $V_{\max}$  and (b)  $\tau$  (described in Appendix A). As in Fig. 3, open circles show observational mean and 95% confidence interval reported by (Liu & Greaver, 2010). Modeled results show the steady-state changes in soil C projected by MIMICS (open triangles), modified MIMICS (filled triangles) and DAYCENT (filled squares).



Supplementary Figure 2. Spatial distribution of relative (a) litter, (b,f) microbial biomass, and (c-e) SOM pool sizes from steady-state MIMICS simulations. Results calculated by dividing individual pool sizes by the total pool size in each grid cell and multiplying by 100 (e.g., in Fig S2a structural litter / total litter \* 100). The C:O ratio (b) represents the copiotrophic pool size divided by the oligotrophic pool size.



Supplementary Figure 3. Change in individual SOC pools simulated by MIMICS by the end of the 21<sup>st</sup> century following increases in NPP from elevated [CO<sub>2</sub>]. Most of the soil C gains in MIMICS (Figs. 5 & 6) are driven by C accumulation in the (a) physically protected pool (53 Pg globally). Changes in the (b) chemically protected pool are much smaller (accumulating 2.3 Pg C globally), and show more spatial heterogeneity. Finally, increasing NPP builds more microbial biomass, which accelerates the decomposition of (c) microbial available SOC, especially at high latitudes, producing a net C loss from SOM<sub>a</sub> pools to the atmosphere (totaling 5 Pg C globally).