Supplementary materials



Figure 1. GPP across Europe. From top to bottom — (1) Simulated by LPJ-GUESS, (2) GPP from FLUXCOM (2001-2015), and (3) GPP bias, under three different land-use datasets: LUH2, HYDE, and HILDA++.



Figure 2. GPP across Europe. From top to bottom — (1) Simulated by LPJ-GUESS, (2) GPP from VODCA2GPP (1988-2020), and (3) GPP bias, under three different land-use datasets: LUH2, HYDE, and HILDA++.



Figure 3. GPP across Europe. From top to bottom — (1) Simulated by LPJ-GUESS, (2) GPP from TRENDYv12 ensemable mean (1901-2022), and (3) GPP bias, under three different land-use datasets: LUH2, HYDE, and HILDA++.



Figure 4. NPP across Europe. From top to bottom — (1) Simulated by LPJ-GUESS, (2) GPP from MsTMIP ensemable mean (1901-2010), and (3) GPP bias, under three different land-use datasets: LUH2, HYDE, and HILDA++.



Figure 5: NPP across Europe: From left to right — (1) Simulated by LPJ-GUESS using HILDA+, (2) NPP from MODIS(2001-2022), (3) NPP bias



Figure 6: Spatiotemporal Comparison of Aboveground (NPP) and Belowground Carbon (SOC) Across Two Historical Periods (1901-1950, 1951-1980, 1981-2022)



Figure 7: Temporal Dynamics and Trend Changes of Different Soil Carbon Pools



Figure 8: Temporal trends in land fraction and carbon stocks across four land-use types. The rows represent forest (top), natural (second), cropland (third), and pasture (bottom). Each row includes land cover fraction (left) and associated carbon pools (right)