Figure S1. The comparison (ME: mean error, BIAS: relative bias, NSE: Nash–Sutcliffe coefficient efficiency, RMSE: root mean square error, and *r*: correlation coefficient) between the Global SPEI database and calculating SPEI in 1985, 1995, and 2005.
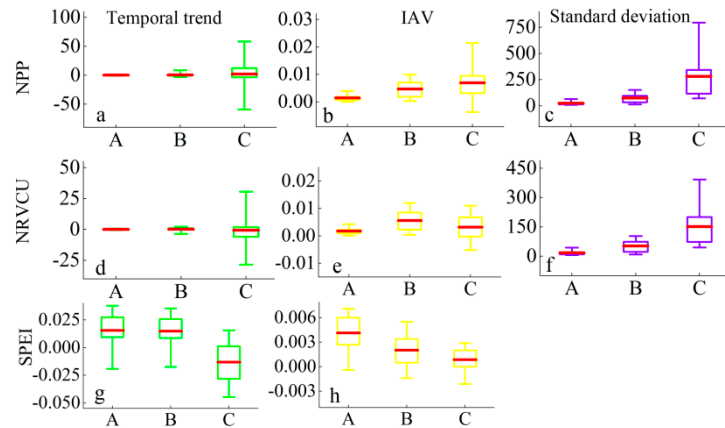

Figure S2. (**a**)–(**h**) represent the temporal trends; interannual variability (IAV); and standard deviations for the net primary production (NPP), net reduction in vegetation carbon uptake (NRVCU), and Standardised Precipitation–Evapotranspiration Index (SPEI) in the (A) alpine steppe, (B) alpine meadow, and (C) forest ecosystems. Horizontal lines in box plots denote the 95th, 75th, average value, 25th, and 5th percentiles from top to bottom.
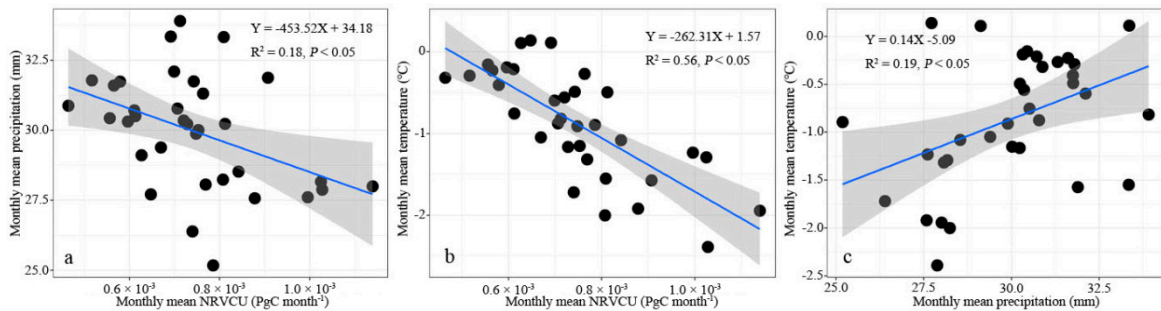

Figure S3. The correlation analysis between (**a**) monthly mean net reduction in vegetation carbon uptake (NRVCU) and monthly mean precipitation, (**b**) monthly mean NRVCU and monthly mean temperature, and (**c**) monthly mean precipitation and temperature.
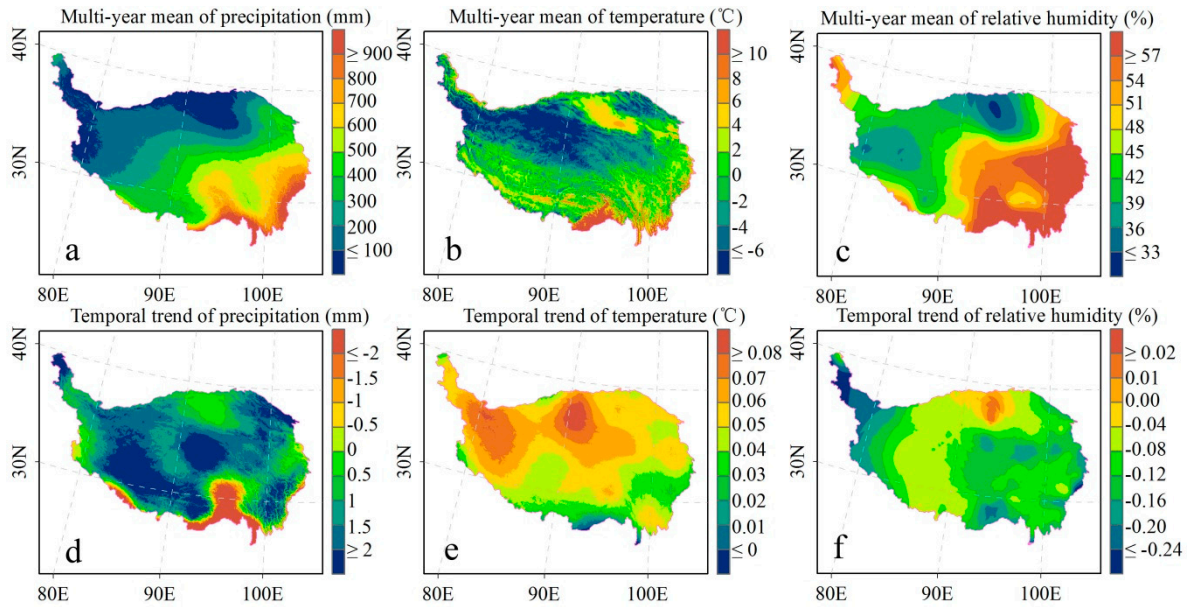
Figure S4. Spatial patterns of the multi-year mean for (**a**) precipitation, (**b**) temperature, and (**c**) relative humidity in the Tibetan Plateau during the 1982–2015 period and temporal trends of (**d**) precipitation, (**e**) temperature, and (**f**) relative humidity.
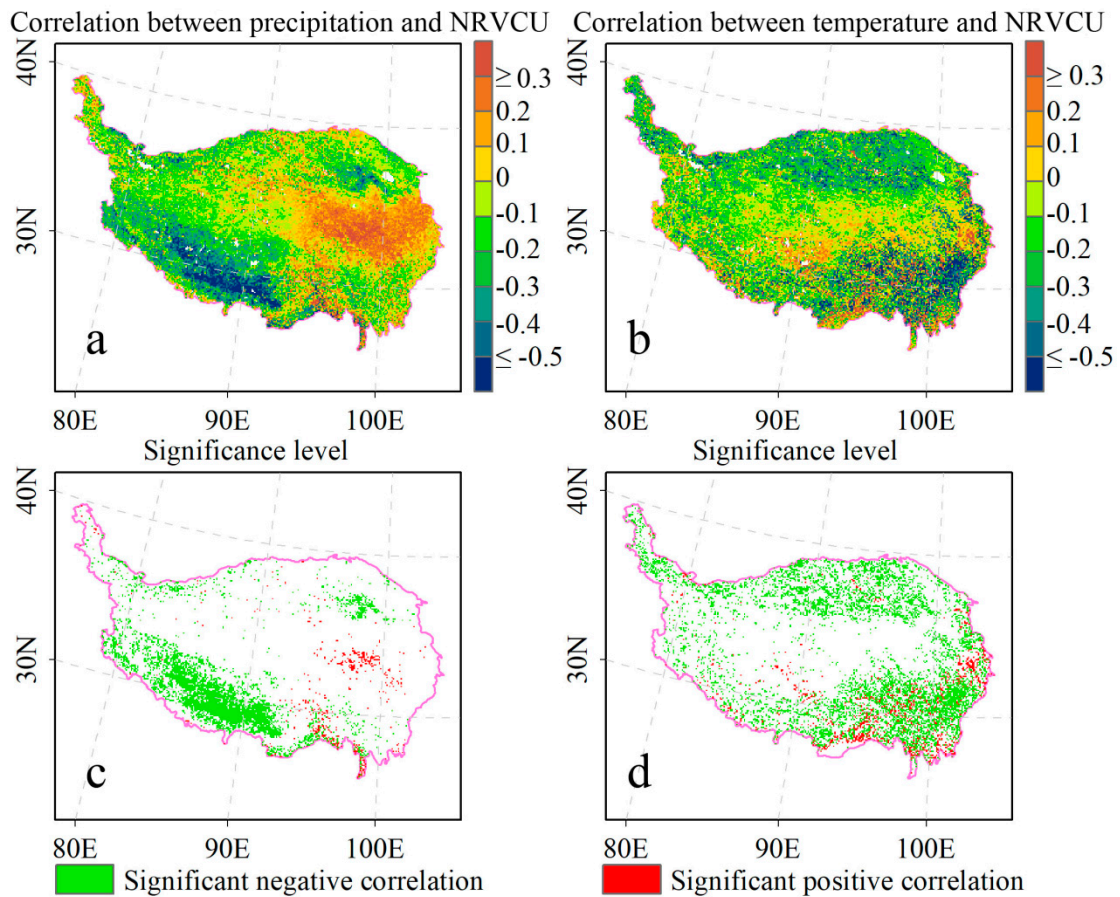

Figure S5. Spatial correlation between (**a**) net reduction in vegetation carbon uptake (NRVCU) and precipitation, (**b**) NRVCU and temperature. The significance level between (**c**) NRVCU and precipitation, (**d**) NRVCU and temperature.
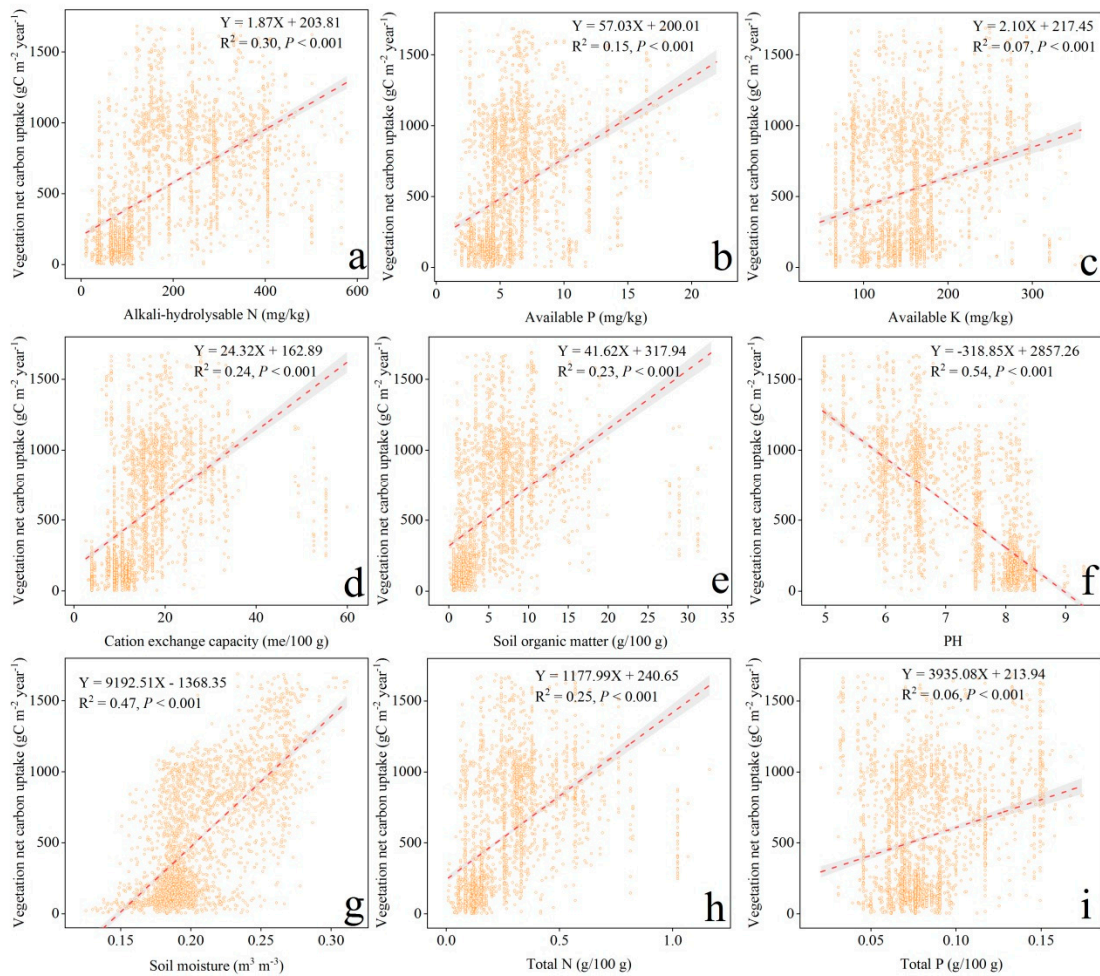
Figure S6. Correlation analysis between vegetation net carbon uptake and (**a**) alkali-hydrolysable N, (**b**) available P, (**c**) available K, (**d**) cation exchange capacity, (**e**) soil organic matter, (**f**) PH, (**g**) soil moisture, (**h**) total N, and (**i**) total P.
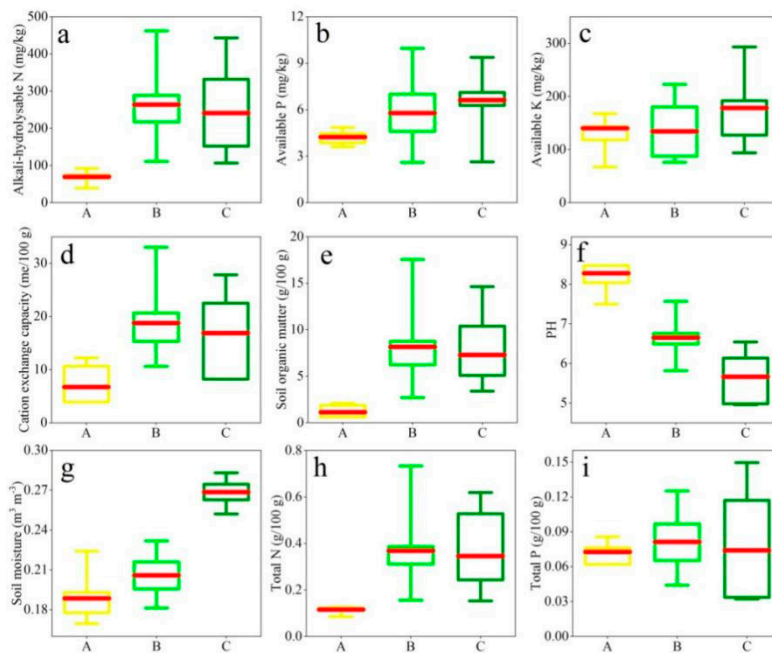

Figure S7. (**a**) Alkali-hydrolysable N, (**b**) available P, (**c**) available K, (**d**) cation exchange capacity, (**e**) soil organic matter, (**f**) PH, (**g**) soil moisture, (**h**) total N, and (**i**) total P in (A) alpine steppe, (B) alpine

meadow, and (C) forest ecosystems. Horizontal lines in the box plots denote the 95th, 75th, average value, 25th, and 5th percentiles from top to bottom.