Based on the light use efficiency (LUE) framework, GPP can be estimated as:

$$GPP = APAR \times LUE$$

where APAR is the absorbed photosynthetic active radiation by the chlorophyll molecules. Similar to GPP, the observed top-of-canopy SIF can be expressed as:

$$SIF = APAR \times \Phi_F \times f_{esc}$$

where Φ_F is the chlorophyll fluorescence quantum efficiency at the photosystem level, and f_{esc} is the escape probability. The total SIF (tSIF) can be obtained by canopy SIF divided by f_{esc}:

$$tSIF = \frac{SIF}{f_{esc}}$$

According to Zeng et al. (2019), the f_{esc} at the far-red band can be approximately expressed as:

$$f_{esc} \approx \frac{NIR_v}{fPAR}$$

where NIRv is the product of the near-infrared reflectance and the normalized vegetation index (NDVI), fPAR is the fraction of absorbed photosynthetically active radiation.

Based on the MODIS reflectance data (MCD43C4), we can acquire the NDVI and NIRv. In addition, the fPAR product by MCD15A2H was used to calculate the f_{esc}. The all data were resampled a spatial resolution of 0.25º×0.25º. Therefore, we can explore the seasonal pattern of the ratio of GPP to the total SIF (GPP/tSIF) in group A and B of each PFT (Figure S3).

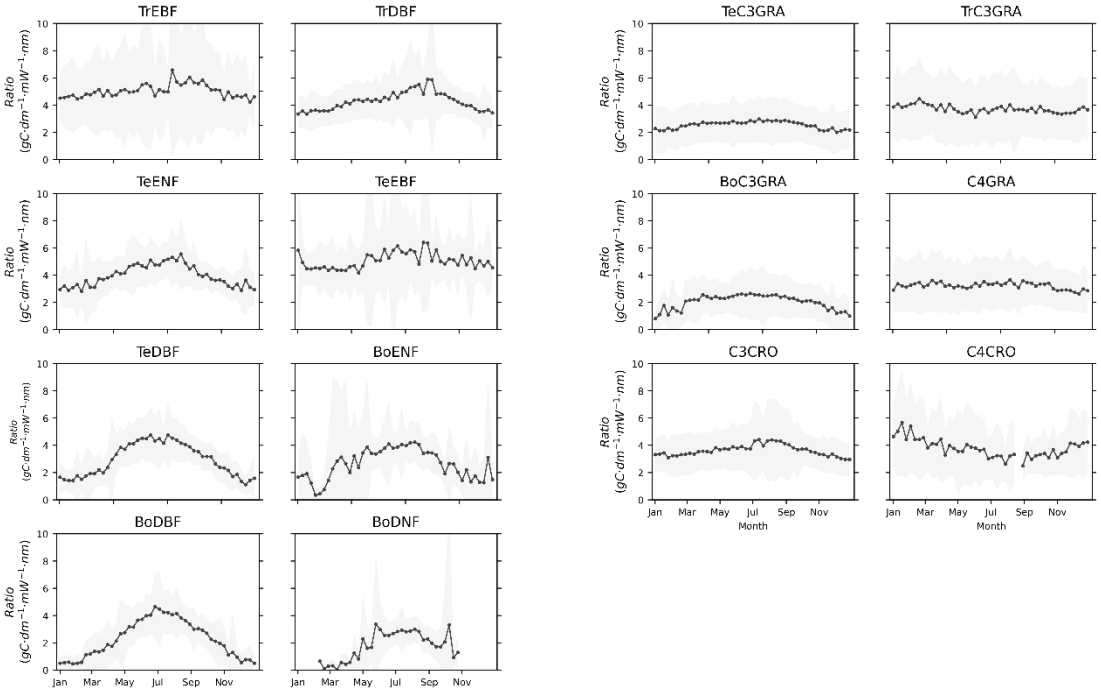

Figure S1. Seasonal dynamics of the ratio of GPP to the total SIF for PFTs (2018–2020). The black lines are the mean values, and the shaded areas represent the standard deviation intervals.

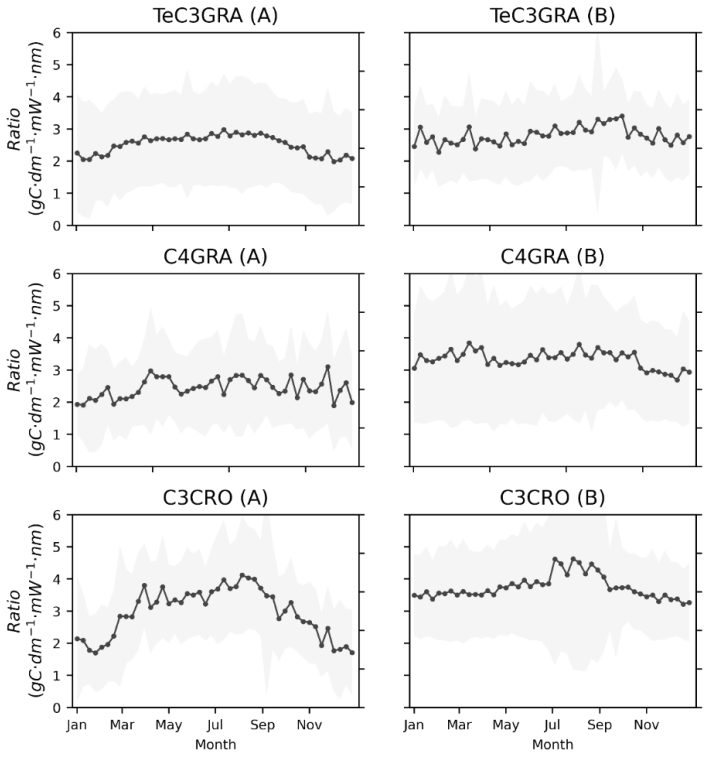

Figure S2. Seasonal dynamics of the ratio of GPP to the total SIF in group A and B for TeC3GRA, C4GRA and C3CRO (2018–2020). The black lines are the mean values and the shaded areas represent the standard deviation intervals.

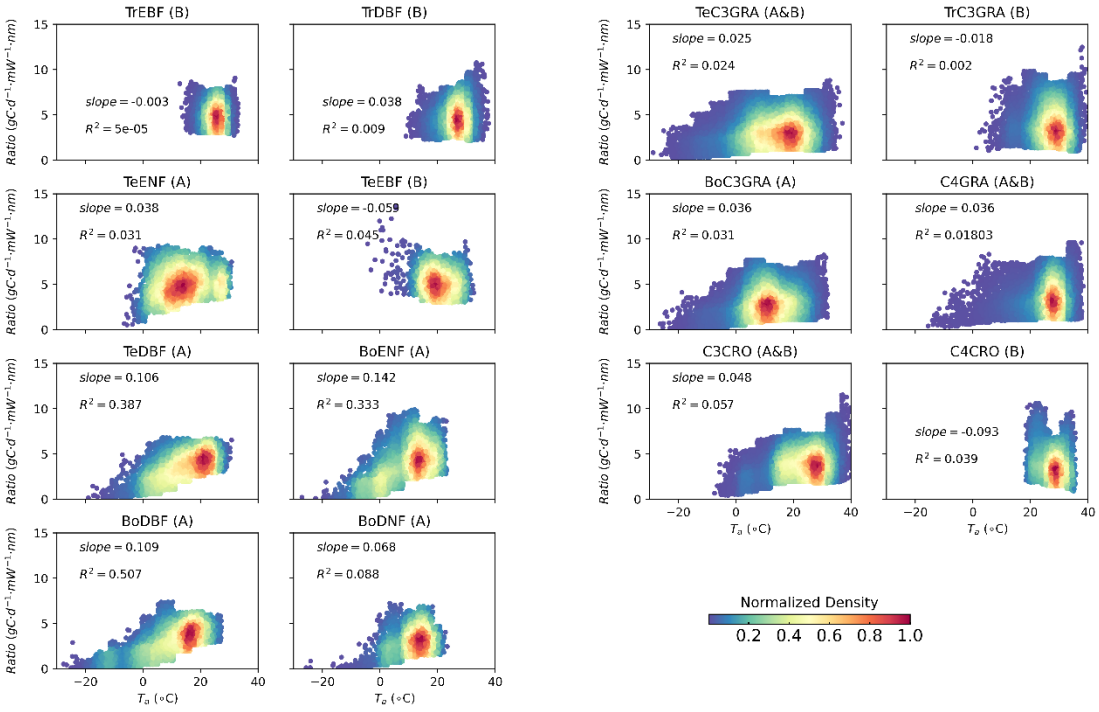

Figure S3. Relationship between the ratio of GPP to the total SIF and temperature for different plant functional types (2018–2020). A and B represent different groups. The slopes and determination coefficients of linear regressions are listed in each panel. The color bar represents the fraction of point density, normalized by the maximum point density.