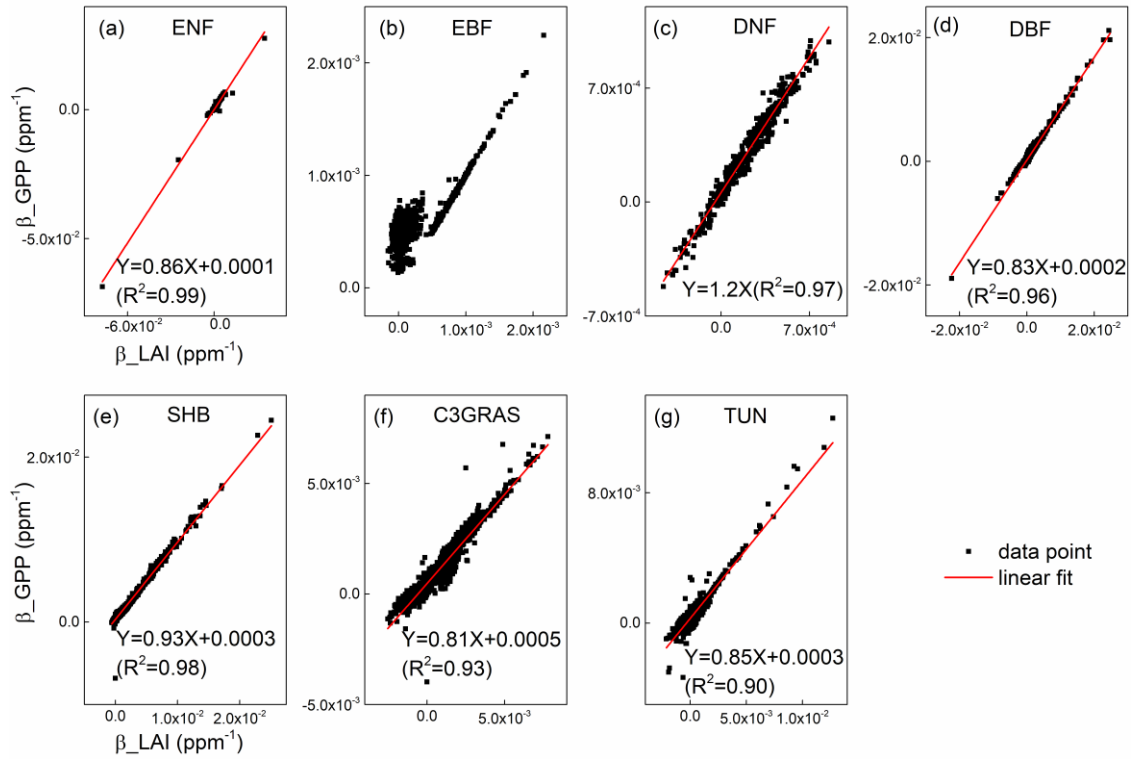**Supplymentary materials**

Table S1 Prescribed minimum LAI and maximum LAI values for C$_3$ plants in CABLE. Abbreviations are the same as Figure 1.
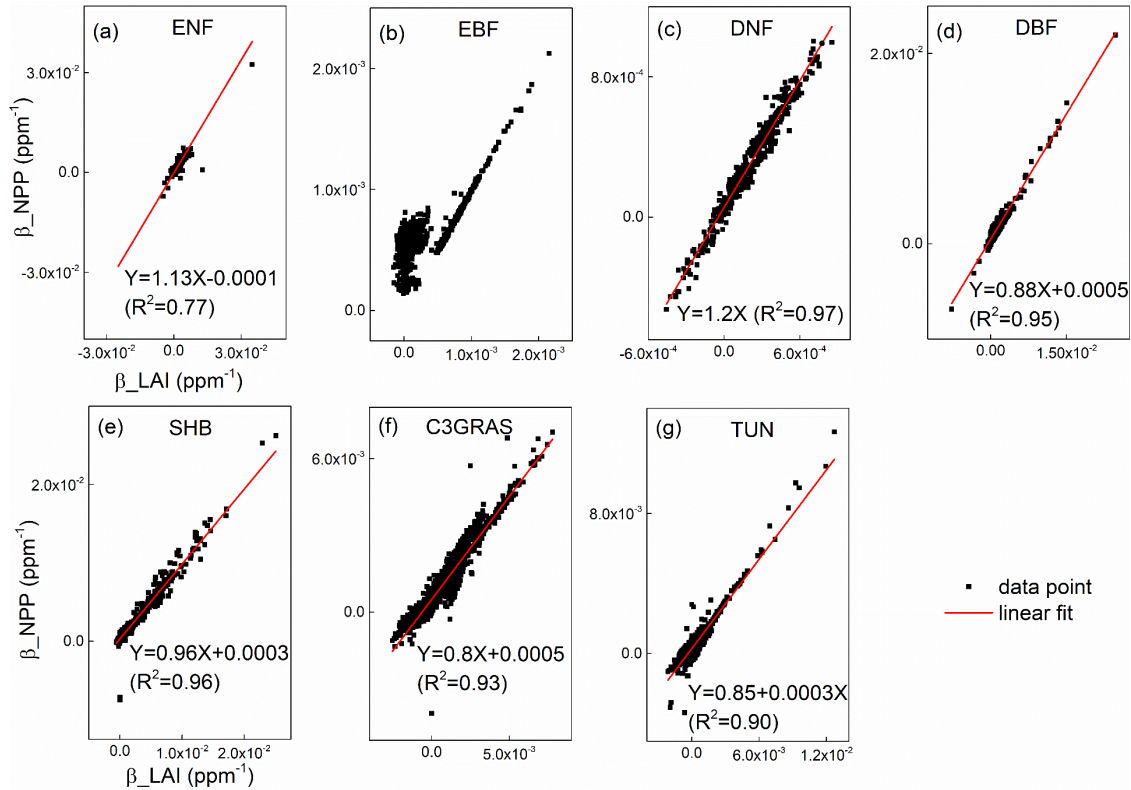
PFT	LAImin	LAImax
ENF	0.5	7
EBF	1	7
DNF	0.35	7
DBF	0.35	7
SHB	0.1	3
C3GRAS	0.1	3
TUN	0.1	3

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Figure S1 Correlations between β_{GPP} and β_{LAI} for patches within each C_3 vegetation type. Plants of the same type but at different locations show diverse responses of GPP primarily because the sensitivities of LAI vary. The relationships are all significant at the 0.01 level.
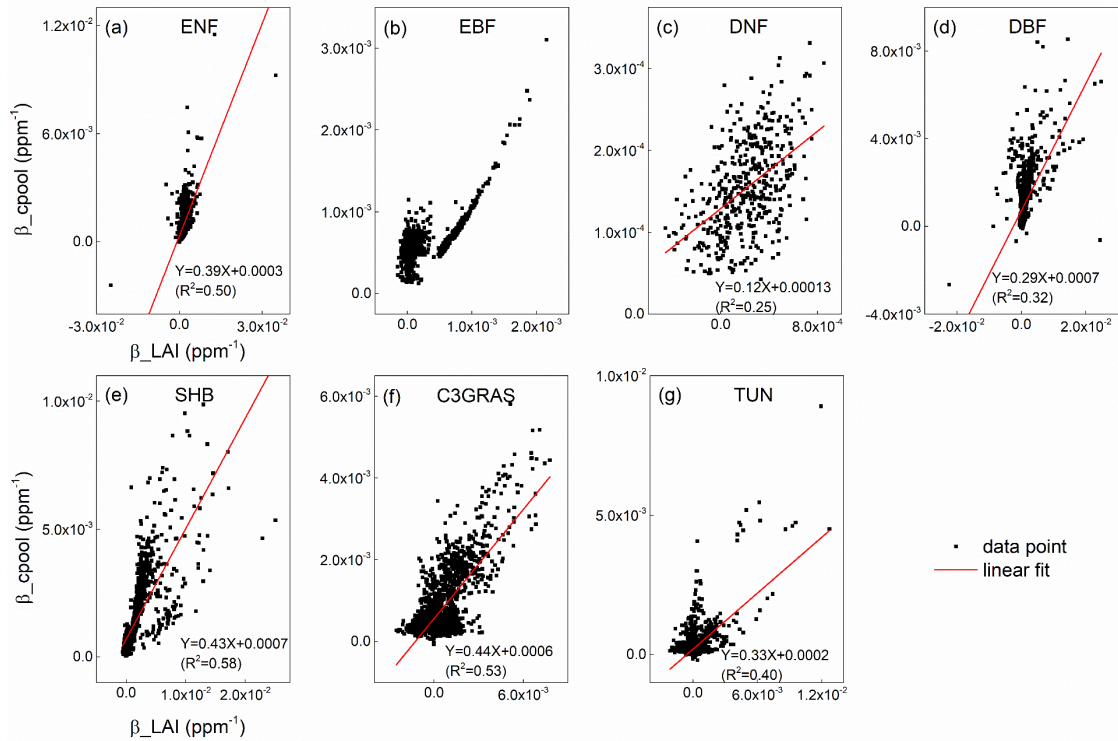
Figure S2 Correlations between β_{NPP} and β_{LAI} for patches within each C₃ vegetation type. Plants of the same type but at different locations show diverse responses of NPP primarily because the sensitivities of LAI vary. The relationships are all significant at the 0.01 level.
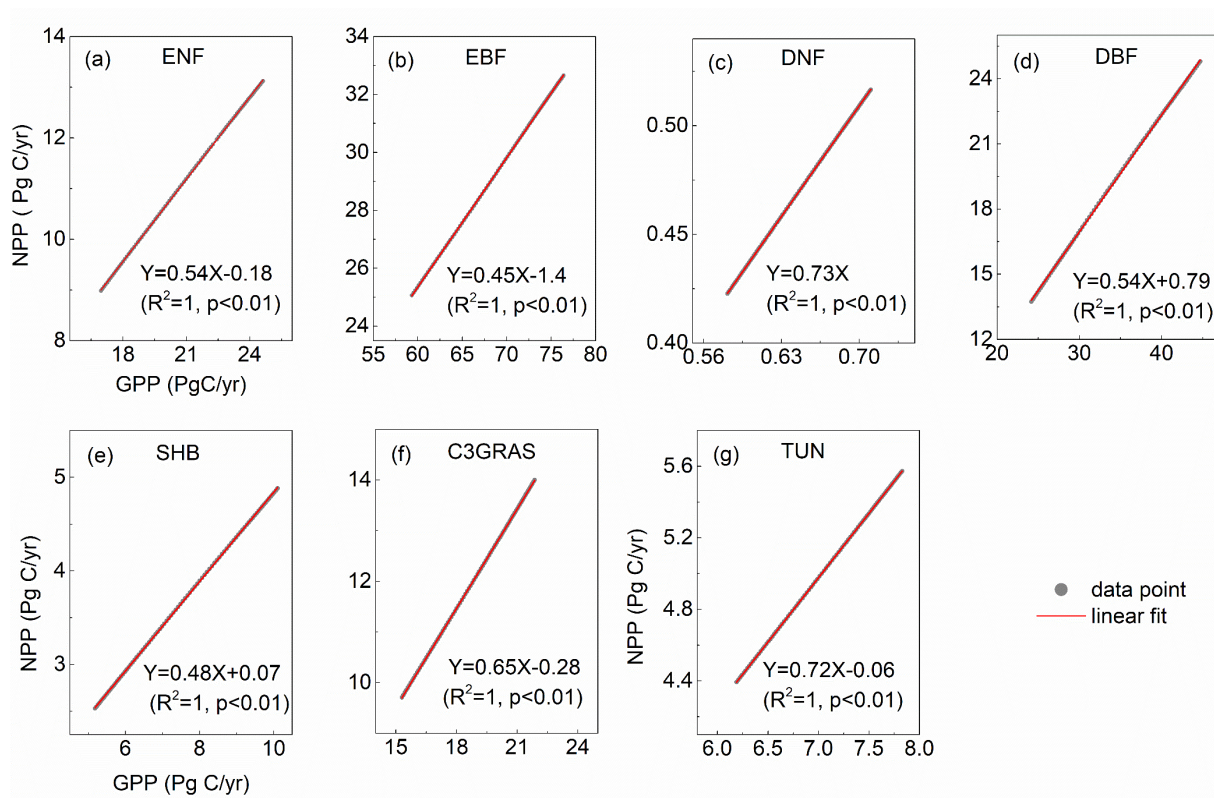
Figure S3 Correlations between β_{cpool} and β_{LAI} for patches within each C₃ vegetation type. The correlations between β_{cpool} and β_{LAI} are lower than those between β_{NPP} and β_{LAI}. The relationships are all significant at the 0.01 level.
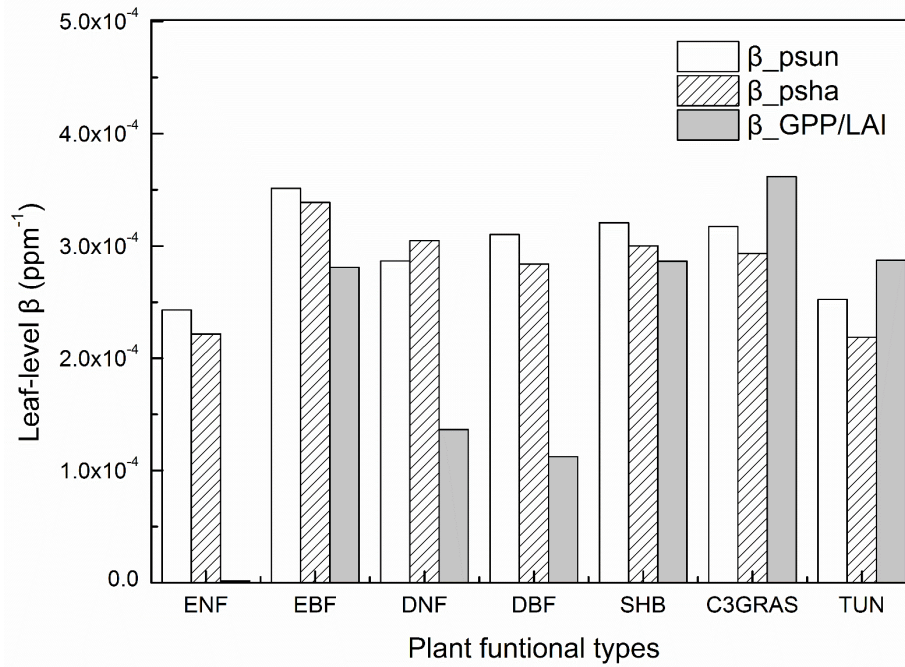
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Figure S4 Correlations between NPP and GPP with eCO$_2$ from 2011 to 2100 for C$_3$ plants in CABLE. Abbreviations are the same as Figure 1.
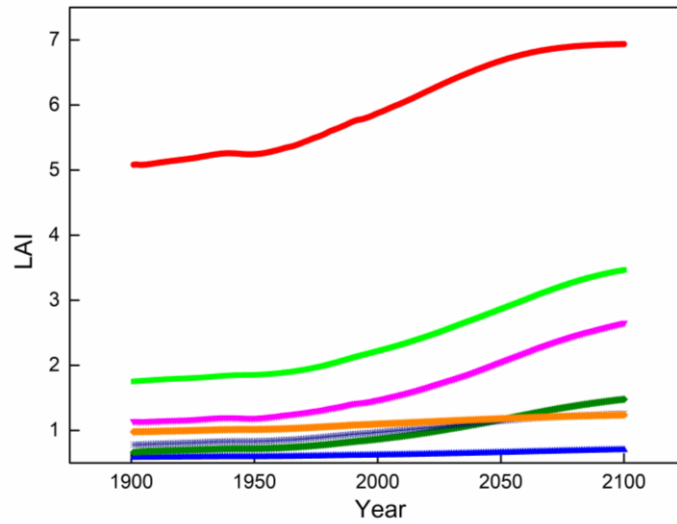
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Figure S5 Comparision between leaf level β calculated through biochemical parameters C_i and Γ_* for sunlit leaf (β_psun) and shaded leaf (β_psha) and sensitivity of GPP/LAI (β_GPP/LAI) for different C3 plants at the year 2056 in CABLE. Abbreviations are the same as Figure 1.

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Figure S6 Temporal trends of yearly average LAI in response to eCO$_2$ for C$_3$ plants from 1901 to 2100. LAI value of evergreen broadleaf forest increases with time but gradually saturates at the prescribed maximum value. LAI values of other plants also increase but are far below the prescribed maximum values at 2100. Abbreviations and symbols are the same as Figure 1.