

Supporting information of “GOLUM-CNP v1.0: a data-driven modeling of carbon, nitrogen and phosphorus cycles in major terrestrial biomes” by Yilong Wang, Philippe Ciais, Daniel Goll, Yuanyuan Huang, Yiqi Luo, Ying-Ping Wang, A. Anthony Bloom, Grégoire Broquet, Jens Hartmann, Shushi Peng, Josep Penuelas, Shilong Piao, Jordi Sardans, Benjamin D. Stocker, Rong Wang, Sönke Zaehle, Sophie Zechmeister-Boltenstern

Table S1 C:N, C:P and N:P molar (atomic) ratios across major biomes from Zechmeister-Boltenstern et al. (2015). Targeted biomes are: tropical rain forests (TRF), temperate deciduous forests (TEDF), temperate coniferous forests (TECF), boreal coniferous forests (BOCF), tundra (TUN), tropical/C4 grasslands (TRG), and temperate/C3 grasslands (TEG). Note that N:P ratios in Zechmeister-Boltenstern et al. (2015) are not exactly equal to the ratio of C:P to C:N, but the differences are small.

		TRF	TEDF	TECF	BOCF	TRG	TEG	TUN
C:N	Foliage	25	25	59	49	39	25	49
	Root	47	59	67	57	39	88	54
	Wood	148	471	844	525	--	--	--
	Soil	16	19	20	32	25	10	13
C:P	Foliage	1027	867	1232	1049	753	1278	2167
	Root	3125	1962	1186	1574	1300	2829	1300
	Wood	13574	11179	24297	19734	--	--	--
	Soil	159	366	302	960	509	130	138
N:P	Foliage	43	36	23	23	20	53	45
	Root	52	22	18	30	32	27	20
	Wood	93	24	29	38	--	--	--
	Soil	13	20	15	31	31	--	11

Table S2 Mean residence time of C, N and P in ecosystems (unit: years). Targeted biomes are: tropical rain forests (TRF), temperate deciduous forests (TEDF), temperate coniferous forests (TECF), boreal coniferous forests (BOCF), tundra (TUN), tropical/C4 grasslands (TRG), and temperate/C3 grasslands (TEG).

	TRF	TEDF	TECF	BOCF	TRG	TEG	TUN	Globe
C	29	49	48	106	40	67	101	38
N	382	1016	637	4834	987	3075	7896	1586
P	2520	3263	4413	6167	4483	6291	7077	6092

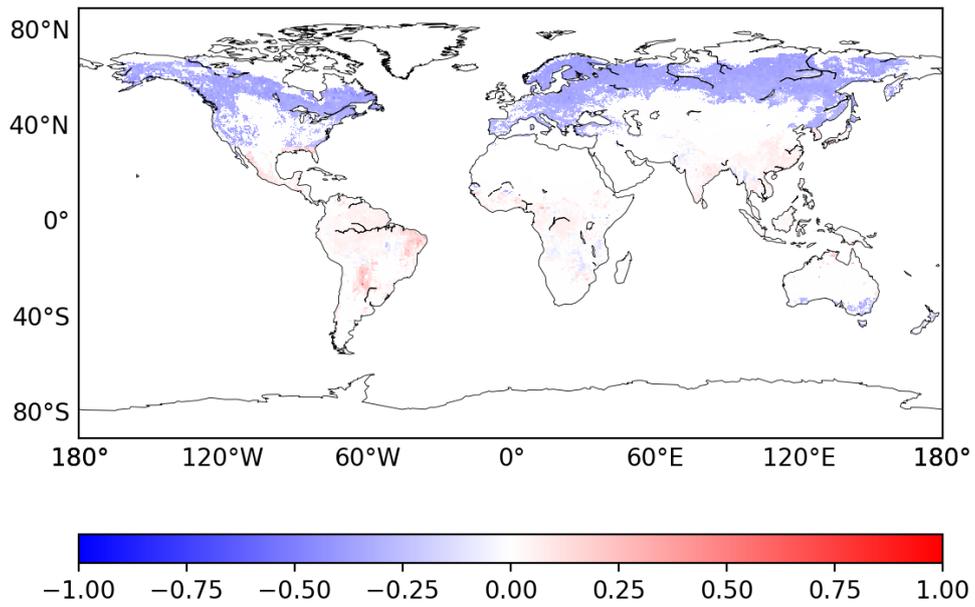


Fig. S1 Relative differences in the woody biomass between the steady-state biomass in this study and the original CARDAMOM dataset. The grid cells dominated by grassland are excluded.

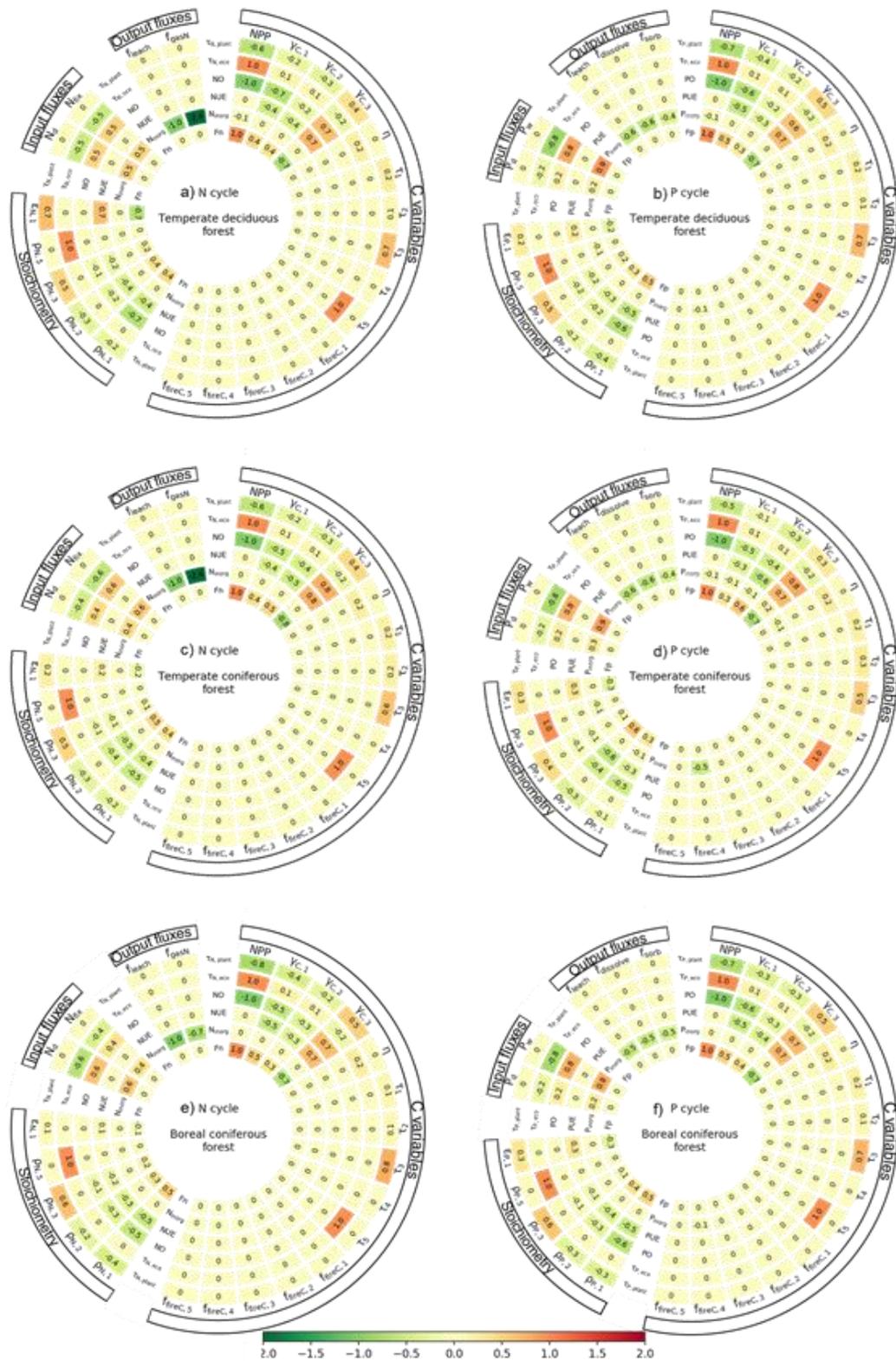


Figure S2 Mean sensitivity of the estimates of rates of nutrient uptake, inorganic nutrients, nutrient-use efficiencies, openness, turnover time of nutrients in the ecosystem and turnover time of nutrients in plants to the input variables for temperate deciduous forests (a and b), temperate coniferous forests (c and d) and boreal coniferous forests (e and f).

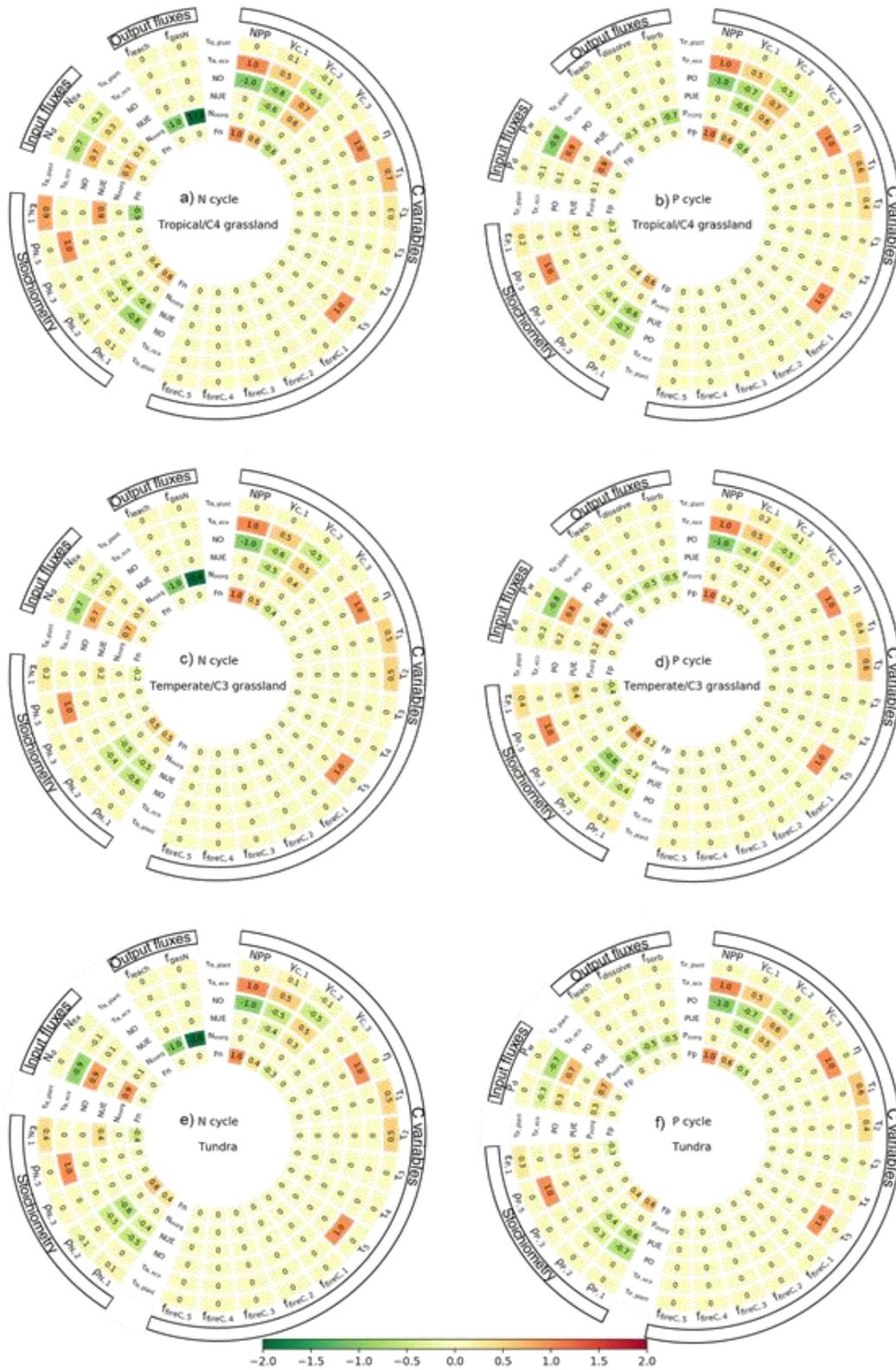


Figure S3 Same as Fig. S2 for non-forest biomes: tropical/C4 grasslands (a and b), temperate/C3 grasslands (c and d) and tundra (e and f).

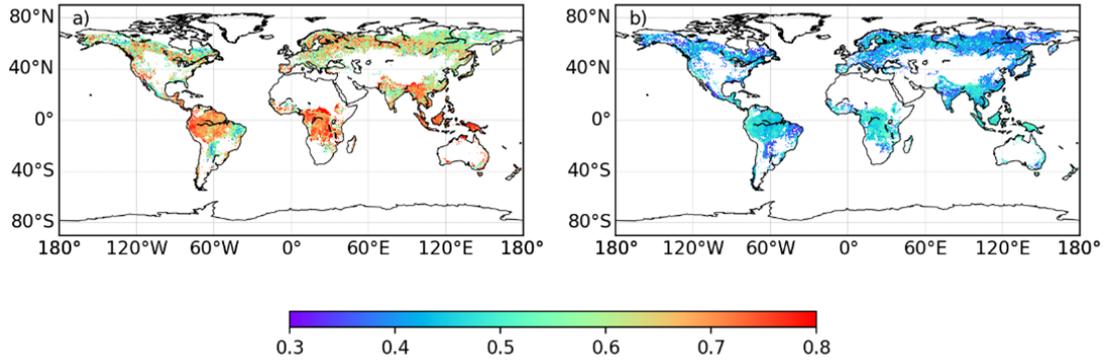


Figure S4 NPP allocation fractions to woody biomass in original CARDAMOM (a) and adjusted (see Sect. 5.1) carbon cycle model (b).

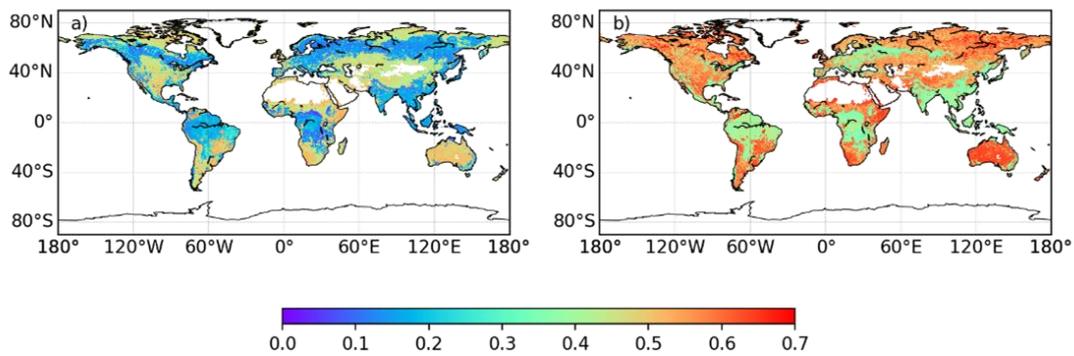


Figure S5 NPP allocation fractions to fine roots in original CARDAMOM (a) and adjusted (see Sect. 5.1) carbon cycle model (b).

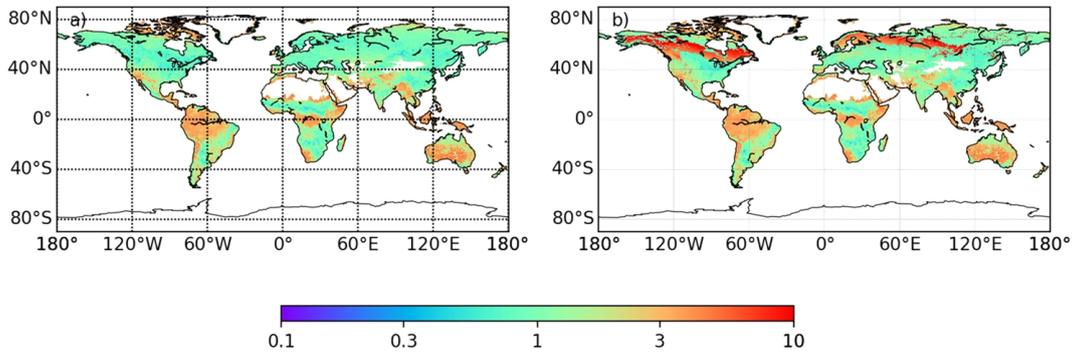


Figure S6 Leaf longevity in original CARDAMOM (a) and adjusted (see Sect. 5.1) carbon cycle model (b).

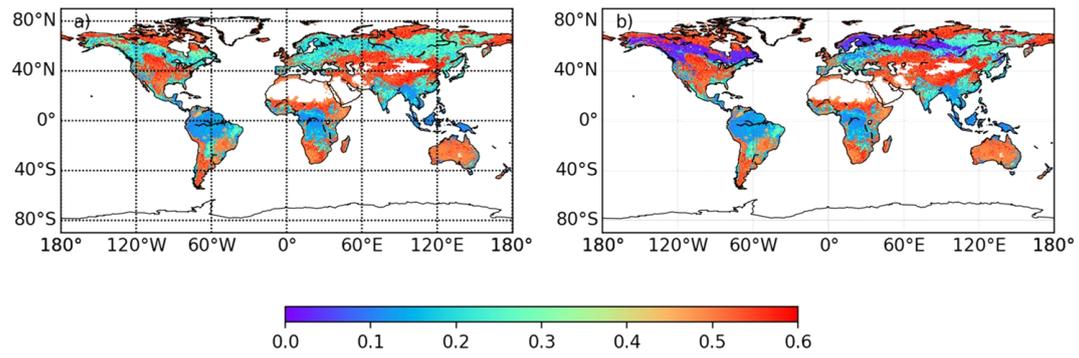


Figure S7 NPP allocation fractions to foliage in original CARDAMOM (a) and adjusted (see Sect. 5.1) carbon cycle model (b).