Table 2S. Initial values and ranges of the parameters in the twenty-parameter model. K_c – the Michaelis-Menten constants of Rubisco activity for CO_2 at 25°C; K_o – the Michaelis–Menten constants of Rubisco activity for O_2 at 25°C; g_{m25} – mesophyll diffusion conductance at 25°C; V_{cmax25} – maximum carboxylation rate at 25°C; J_{max25} – maximum electron transport rate at 25°C; R_{D25} – mitochondrial respiration in the light; Γ^*_{25} – CO_2 compensation point without dark respiration; $E(E_{Kc}, E_{Ko}, E_{gm}, E_{\Gamma*}, E_v, E_J, E_{RD})$ – activation energy for the Arrhenius temperature function; $H(H_v, H_J, H_{gm})$ – deactivation energy describing the rate of decrease for temperatures above the optimum temperature; $\Delta S(\Delta S_v, \Delta S_J, \Delta S_{gm})$ – entropy factor used in the Arrhenius temperature function.

Parameter	Unit	Initial guess	Range	Reference
K_{c25}	μmol(CO_2)m^{-2} s^{-1}	344	248–584	(Sharkey *et al*. 2007, von Caemmerer *et al*. 1994)
K_{o25}	mol mol^{-1}	304	158–504	(Sharkey *et al*. 2007, von Caemmerer *et al*. 1994)
g_{m25}	μmol m^{-2} s^{-1} Pa^{-1}	2.5	0.03–30.0	(Ethier and Livingston 2004, Sharkey *et al*. 2007)
V_{cmax25}	μmol(CO_2)m^{-2} s^{-1}	86.4	34.3–200.0	(Kattge and Knorr 2007, Patrick *et al*. 2009)
J_{max25}	μmol m^{-2} s^{-1}	119.7	62.3–179.0	(Kattge and Knorr 2007)
R_{D25}	μmol(CO_2)m^{-2} s^{-1}	1.75	0.01–5.0	(Kosugi *et al*. 2003, Kosugi and Matsuo 2006)
Γ^*_{25}	μmol(CO_2) m^{-2} s^{-1}	3.74	3.30–4.85	(von Caemmerer *et al.* 1994, Sharkey *et al*. 2007)
E_{Kc}	kJ mol^{-1}	70.4	54.6–104.0	(Ethier and Livingston 2004, Sharkey *et al*. 2007, Patrick *et al*. 2009)
E_{Ko}	kJ mol^{-1}	29.8	9.3–36.3	(Ethier and Livingston 2004, Sharkey *et al*. 2007, Patrick *et al*. 2009)
E_{gm}	kJ mol^{-1}	49.6	n/a	(Sharkey *et al*. 2007, Patrick *et al*. 2009)
$E_{\Gamma*}$	kJ mol^{-1}	26.8	23.5–37.2	(Bernacchi *et al*. 2001, Ethier and Livingston 2004, Sharkey *et al*. 2007)
E_v	kJ mol^{-1}	65..4	51.3–128.4	(Leuning 1997, 2002, Medlyn *et al*. 2002, Kattge and Knorr 2007, Sharkey *et al*. 2007, Patrick *et al*. 2009)
E_J	kJ mol^{-1}	46.08	35.9–105.6	(Leuning 1997, 2002, Medlyn *et al*. 2002, Kattge and Knorr 2007, Sharkey *et al*. 2007, Patrick *et al.* 2009)
E_{RD}	kJ mol^{-1}	63.9	41.1–92.6	(Bernacchi *et al*. 2001, Ethier and Livingston 2004, Sharkey *et al*. 2007)
H_v	kJ mol^{-1}	200.0	129.9–214.7	(Medlyn *et al*. 2002, Kattge and Knorr 2007)
H_J	kJ mol^{-1}	200.0	129.9–214.7	(Leuning 1997, 2002, Kattge and Knorr 2007, Medlyn *et al*. 2002, Patrick *et al*. 2009)
H_{gm}	kJ mol^{-1}	437.4	n/a	(Sharkey *et al*. 2007)
ΔS_v	J mol^{-1} K^{-1}	0.65	0.41–1.25	(Leuning 1997, 2002, Medlyn *et al*. 2002, Kattge and Knorr 2007)
ΔS_J	J mol^{-1} K^{-1}	0.65	0.41–1.25	(Leuning 1997, 2002, Medlyn *et al*. 2002, Kattge and Knorr 2007)
ΔS_{gm}	J mol^{-1} K^{-1}	1.4	n/a	(Sharkey *et al*. 2007)