

| Symbol                               | Value                            | Units                                      | Description  | Source(s)   |
|--------------------------------------|----------------------------------|--|--|---|
| $\tau_{\text{veg}}$                  | 10                               | years (converted into seconds)             | biomass residence time   | SimBA (all versions)  |
| $R_d$                                | 287.0                            | $\text{J K}^{-1} \text{kg}^{-1}$           | gas constant for dry air on Earth                                      | –   |
| $\epsilon_{\text{max}}$              | $5.0 \times 10^{-10}$            | $\text{kg C J}^{-1}$                       | max. light use efficiency  | model calibration   |
| $\text{CO}_2^{\text{comp}}$          | 40                               | ppmv                                       | $\text{CO}_2$ light compensation point                                 | Franks et al. (2013)  |
| $T_{\text{crit}}$                    | 20                               | $^{\circ}\text{C}$                         | temperature at which productivity limitation begins                    | see Sect. 2.2.3   |
| $k_{\text{veg}}$                     | 1                                | –  | light extinction coefficient   | see Sect. 2.2.3   |
| $\Omega_c$                           | 0.7                              | –  | clumping index   | Pisek et al. (2010); He et al. (2012)                           |
| co2conv                              | $4.15 \times 10^{-7}$            | $\text{kg C kg air}^{-1} \text{ppmv}^{-1}$ | unit conversion factors  | manipulation of Eq. (B7) from Raupach (1998)                    |
| $\frac{c_i}{c_a}$                    | 0.80                             | –  | ratio of intercellular to atmospheric $\text{CO}_2$                    | somewhat common daytime value for C3 plants                     |
| $r_{\text{ssmin}}$                   | 10                               | $\text{s m}^{-1}$                          | minimum soil surface resistance  | van de Griend and Owe (1994)                                    |
| $r_{\text{ssmax}}$                   | $10^{30}$                        | $\text{s m}^{-1}$                          | maximum soil surface resistance  | –   |
| $\rho_w$                             | 1000                             | $\text{kg m}^{-3}$                         | density of liquid water  | –   |
| $f_{\text{snow for}}$                | 0.12                             | –  | snow-covered fraction of the forest cover                              | see Sect. 2.2.5   |
| trmax                                | $2.78 \times 10^{-7}$            | $\text{m s}^{-1}$                          | max. transpiration rate  | Knorr (2000)  |
| $r_{\text{cminmin}}$                 | 0                                | $\text{s m}^{-1}$                          | absolute min. canopy resistance  | –   |
| $r_{\text{cmax}}$                    | $10^{30}$                        | $\text{s m}^{-1}$                          | max. canopy resistance   | –   |
| $c_8$                                | $\approx 43.3$ (see Sect. 2.2.7) | –  | for normalizing $10^{\circ}\text{C}$ soil respiration to that of SimBA |   |
| $c_9$                                | 106                              | K  | for soil respiration   | Jenkinson et al. (1990)   |
| $\text{LAI}_{\text{min}}$            | 0.05                             | –  | min. leaf area index in wet soils                                      | –   |
| $\text{LAI}_{\text{max}}$            | 7                                | –  | max. leaf area index in wet soils                                      | model calibration   |
| $c_6$                                | 0.195                            | $\text{kg C}^{-1} \text{m}^2$              | biomass to LAI conversion  | model calibration   |
| $W_{\text{fraccrit,lai}}$            | 0.05                             | –  | critical soil wetness fraction for commencement of leaf fall           | model calibration   |
| $c_1$                                | 0.2                              | $\text{kg C}^{-1} \text{m}^2$              | biomass–forest-cover relationship                                      | see Sect. 2.2.9   |
| $c_2$                                | 1.0                              | $\text{kg C m}^{-2}$                       | biomass threshold for forest cover commencement                        | see Sect. 2.2.9   |
| $c_7$                                | 9                                | $\text{kg C m}^{-2}$                       | soil organic carbon saturation value with respect to soil albedo       | see Sect. 2.3.1   |
| $\alpha_{\text{sand}}$               | 0.32                             | –  | sandy soil albedo  | see Sect. 2.3.1   |
| $\alpha_{\text{peat}}$               | 0.12                             | –  | albedo of organic-matter-rich soil                                     | see Sect. 2.3.1   |
| $c_4$                                | 1.5                              | $\text{kg C}^{-1} \text{m}^2$              | shape parameter for snow-covered albedo                                | model calibration   |
| $c_5$                                | 1.5                              | $\text{kg C m}^{-2}$                       | biomass threshold for snow masking                                     | model calibration   |
| $\alpha_{\text{min deep snow flat}}$ | 0.40                             | –  | albedo of warm, deep, pure snow  | Roesch et al. (2001)  |
| $\alpha_{\text{max deep snow flat}}$ | 0.80                             | –  | albedo of cold, deep, pure snow  | Roeckner et al. (2003)  |
| $\alpha_{\text{max snow for}}$       | 0.30                             | –  | maximum albedo of snow-covered forest                                  | Moody et al. (2007)   |
| $c_{12}$                             | 0.10                             | $\text{kg C}^{1/2}$                        | conversion of biomass into soil bucket depth                           | model calibration   |
| $W_{\text{maxmin}}$                  | 0.05                             | m  | minimum soil bucket depth  | see Sect. 2.3.2   |
| $z_{0\text{min}}$                    | 0.01                             | m  | surface roughness for bare soil  | Oke (1987)  |
| $z_{0\text{const}}$                  | $\approx 0.035$                  | m  | biomass–roughness relationship   | see Sect. 2.3.3   |
| $c_{15}$                             | 8                                | $\text{kg C m}^{-2}$                       | biomass–roughness relationship   | model calibration   |
| $c_{16}$                             | 0.5                              | $\text{kg C}^{-1} \text{m}^2$              | biomass–roughness relationship   | model calibration   |
| $c_{17}$                             | 2.5                              | m  | $\approx$ surface roughness for fully forested land                    | typical value for tropical rain forests (Sellers et al., 1996b) |