

Symbol	Description	Units	Eq(s).
Group 1			
$f_R(z)$	A function describing the distribution by depth of root carbon.	unitless	S1
$C_R(z, t)$	The amount of root carbon.	$\text{mg C cm}^{-3} \text{ h}^{-1}$	3, S1
$f_S(z)$	A function describing the distribution by depth of carbon from soil organic matter (SOM)	unitless	S1
$C_{\text{SOM}}(z)$	The amount of carbon from SOM.	$\text{mg C cm}^{-3} \text{ h}^{-1}$	7, S1
$f_M(z)$	A function describing the distribution by depth of microbial carbon	unitless	S1
$C_{\text{MIC}}(z)$	The amount of microbial carbon.	$\text{mg C cm}^{-3} \text{ h}^{-1}$	3, S1
$\theta(z, t)$	Soil water content	$\text{m}^3 \text{ m}^{-3}$	3, 6, 7
$\theta_R^{\text{ant}}(z, t)$	Antecedent soil water content (used in S_R function) calculated as a weighted average of soil water content from the previous four days. The weights are $w = (0.75, 0.25, 0, 0)$.	$\text{m}^3 \text{ m}^{-3}$	3
$\theta_M^{\text{ant}}(z, t)$	Antecedent soil water content (used in S_M function) calculated as a weighted average of soil water content from the previous four days. The weights are $w = (0.2, 0.6, 0.2, 0)$.	$\text{m}^3 \text{ m}^{-3}$	6
$T_S(z, t)$	Soil temperature	Kelvin	3, 6
$T_S^{\text{ant}}(z, t)$	Antecedent soil temperature calculated as a weighted average of soil temperature from the previous four weeks. The weights are $w = (0.25, 0.25, 0.25, 0.25)$.	Kelvin	3, 6
Group 2			
$c(z, t)$	Total soil CO_2 .	$\text{mg CO}_2 \text{ m}^{-3}$	1
$c_R(z, t)$	Soil CO_2 derived from root sources.	$\text{mg CO}_2 \text{ m}^{-3}$	1
$S_R(z, t)$	Source term describing the production of soil CO_2 from root respiration.	$\text{mg CO}_2 \text{ m}^{-3}$	1
$c_M(z, t)$	Soil CO_2 derived from microbial sources.	$\text{mg CO}_2 \text{ m}^{-3}$	1
$S_M(z, t)$	Source term describing the production of soil CO_2 from microbial respiration.	$\text{mg CO}_2 \text{ m}^{-3}$	1
$D_{\text{gs}}(z, t)$	Diffusivity of soil CO_2	$\text{m}^2 \text{ s}^{-1}$	1, 2
$\varphi_{\text{g}}(z, t)$	Air-filled soil porosity.	$\text{m}^3 \text{ m}^{-3}$	1, 2
$C_{\text{SOL}}(z, t)$	The amount of soluble carbon from SOM.	$\text{mg C cm}^{-3} \text{ h}^{-1}$	5, 7
$V_{\text{max}}(z, t)$	Maximum potential decomposition rate (microbial carbon).	$\text{mg C cm}^{-3} \text{ h}^{-1}$	6
$E_o(z, t)$	Analogous to energy of activation.	Kelvin	4c