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# Modelling dynamic interactions between soil structure and the storage and turnover of soil organic matter

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**Supplementary material**

Table S1. List of variables and their symbols used in the model description.

| Symbol | Description | Unit |
|---|---|---|
| $f_{agg}$ | aggregation factor | $m^3\ m^{-3}$ |
| $f_{som}$ | soil organic matter concentration | $kg\ kg^{-1}$ |
| $F_{prot}$ | physical protection factor | - |
| $F_{text(mic)}$ | proportion of microporous textural pore space | - |
| $I_r$ | below-ground inputs of organic matter | $kg\ m^{-2}\ year^{-1}$ |
| $I_m$ | above-ground inputs of organic matter | $kg\ m^{-2}\ year^{-1}$ |
| $k_{mix}$ | rate coefficient for proportion of organic matter that is mixed annually | $year^{-1}$ |
| $k_Y$ | first-order rate constants for the decomposition of young organic matter | $year^{-1}$ |
| $k_O$ | first-order rate constants for the decomposition of older organic matter | $year^{-1}$ |
| $M_{s(m)}$ | mass of mineral matter | $kg\ m^{-2}$ |
| $M_{s(o)}$ | total mass of organic matter | $kg\ m^{-2}$ |
| $M_{Y(mes)}$ | pool of young organic matter in mesoporous soil regions | $kg\ m^{-2}$ |
| $M_{Y(mic)}$ | pool of young organic matter in microporous soil regions | $kg\ m^{-2}$ |
| $M_{O(mes)}$ | pool of older organic matter in mesoporous soil regions | $kg\ m^{-2}$ |
| $M_{O(mic)}$ | pool of older organic matter in microporous soil regions | $kg\ m^{-2}$ |
| $T_Y$ | source-sink term for the mixing of young organic matter between micropores and mesopores | $kg\ m^{-2}\ year^{-1}$ |
| $T_O$ | source-sink term for the mixing of older organic matter between micropores and mesopores | $kg\ m^{-2}\ year^{-1}$ |
| $V_t$ | total soil volume | $m^3$ |
| $V_{t(min)}$ | minimum soil volume | $m^3$ |
| $V_s$ | volume of solids | $m^3$ |
| $V_{s(o)}$ | volume of organic matter | $m^3$ |
| $V_{s(m)}$ | volume of mineral matter | $m^3$ |
| $V_p$ | total pore volume | $m^3$ |
| $V_{text}$ | textural pore volume | $m^3$ |
| $V_{mac}$ | macropore volume | $m^3$ |
| $V_{agg}$ | aggregation pore volume | $m^3$ |
| $V_{agg(mic)}$ | volume of aggregation micropores | $m^3$ |
| $V_{text(mic)}$ | volume of textural micropores | $m^3$ |
| $\alpha$, $n$ | shape parameters reflecting the pore size distribution | $cm^{-1}$, - |
| $A_{xs}$ | cross-sectional area (= 1) | $m^2$ |
| $\gamma_b$ | soil bulk density | $kg\ m^{-3}$ |
| $\gamma_o$ | organic matter density | $kg\ m^{-3}$ |
| $\gamma_m$ | mineral matter density | $kg\ m^{-3}$ |
| $\varepsilon$ | organic matter retention coefficient | - |

| | | |
|---|---|---|
| $\phi$ | porosity | $m^3\ m^{-3}$ |
| $\phi_{mac}$ | macroporosity | $m^3\ m^{-3}$ |
| $\phi_{mes}$ | mesoporosity | $m^3\ m^{-3}$ |
| $\phi_{mic}$ | microporosity | $m^3\ m^{-3}$ |
| $\phi_{min}$ | minimum matrix porosity | $m^3\ m^{-3}$ |
| $\phi_{mat}$ | matrix porosity | $m^3\ m^{-3}$ |
| $\psi$ | soil water pressure head | cm |
| $\psi_{mic/mes}$ | pressure head defining the size of the largest micropore in soil | cm |
| $\theta$ | soil water content | $m^3\ m^{-3}$ |
| $\Delta z$ | thickness of soil layer | m |
| $\Delta z_{min}$ | minimum thickness of soil layer | m |