



Nonlinearities and transit times in soil organic matter models: new developments in the SoilR package

Carlos Sierra and Markus Müller

Max Planck Institute for Biogeochemistry, Jena, Germany

SoilR is an R package for implementing diverse models representing soil organic matter dynamics. In previous releases of this package, we presented the implementation of linear first-order models with any number of pools as well as radiocarbon dynamics. We present here new improvements of the package regarding the possibility to implement models with nonlinear interactions among state variables and the possibility to calculate ages and transit times for nonlinear models with time dependencies. We show here examples on how to implement model structures with Michaelis-Menten terms for explicit microbial growth and resource use efficiency, and Langmuir isotherms for representing adsorption of organic matter to mineral surfaces. These nonlinear terms can be implemented for any number of organic matter pools, microbial functional groups, or mineralogy, depending on user's requirements. Through a simple example, we also show how transit times of organic matter in soils are controlled by the time-dependencies of the input terms.