Geoscientific
Model Development
Discussions

Interactive comment on "Models of soil organic matter decomposition: the SOILR package, version 1.0" *by* C. A.Sierra et al.

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This manuscript describes a library of functions and tools for modeling soil organic matter decomposition under the R environment. The models are represented as a linear system of ordinary differential equations, which allows to consider them as a hierarchy.

The paper starts with a very short overview of existing models, then goes on to describe a general framework of OM decomposition after which the R-implementation is dealt with. I think this is a commendable effort to create a general framework of soil OM models, in an open-source environment. Coming from a different (but related) discipline, I found the modeling overview quite interesting.

My main issues concern the implementation itself. A

There is a lot of similarity between the implementation of SoilR and the R-package simecol as described in: Petzoldt, T. and K. Rinke (2007). simecol: An Object-Oriented Framework for Ecological Modeling in R. Journal of Statistical Software, 22(9), 1–31. URL http://www.jstatsoft.org/v22/i09/.

As far as I can see, SoilR could have easily been included in simecol, but of course it is up to the authors to create their own object-oriented framework. However, I see some missed opportunities, because simecol has very nice features from which SoilR could have benefitted, such as the simecol methods to retrieve the parameters, initial conditions, times, model code, etc... It is not clear how these can be viewed in SoilR, unless one knows how to deal with S4 classes in R.

I would like to see a comparison between SoilR and simecol in the paper and I would suggest to incorporate some of the simecol features in the next release of SoilR.

B

One thing that is better in simecol (in my opinion) is output generation. For dynamic output, the simecol output is of class deSolve (as well as of class matrix), so it provides access to the powerful plotting methods from the R-package deSolve associated to this class, e.g. for visualising multiple scenarios, comparing with data etc...

I do not like the type of output generated e.g. by function getC(), which returns only the values of the state variables, without the corresponding output times. This is potentially error-prone as the output times might change in between running the model and plotting. Thus, the code on page 1013 line 13

plot(times, rowSums(CtBare) ...

might produce strange output or fail to plot.

As "times" is also part of the "Model", I would suggest to rewrite the code as:

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plot(Bare@times, rowSums(CtBare), ...

C

The package vignette (as from pages 1010 l 6, 1011 l 2) does not work on windows: R complains that vignette 'GeneralModel' has no PDF. This should of course be corrected.

D

It is handy to provide a main help file, so that simply typing ?SoilR opens the main help page from which the function's help pages can be accessed. All that need to be done is to add a file called SoilR.Rd to the package. Novice users find it difficult to otherwise find the help pages.

Minor comments:

p 999. I would not call model (3) a variant of (2), as the input to X2 is completely independent of X1.

p. 1000. Equation 4 is bizarre as it has the same formulation for X1 and Xm. Maybe the subscripts of the parameters are wrong?

p. 1002. Equation 11: shouldn't sum gamma be equal to 1? Is there a check in the package for this ?

Equation 12: the names of variables are confusing as r (on the LHS) is the product of R C (right hand side) and R contains r j in diagonal – I would suggest to use different symbols to make clear the difference of rj, r and R.

p. 1007 l2 . . . and ODE solver -> an ODE solver????

p. 1007 initialize -> initializes

p. 1007, line 26 as required by the majority of ODE solvers??? I do not understand this sentence.

p. 1012 l 8: Sweeden ?

p. 1012 l 18, The R-script lacks a comma at the end, so it didn't work

p. 1017: what is k3j in eq 22? And k4j in 24

p. 1019,l19 strange sentence

At certain places, rather difficult jargon is used, e.g.

p995, l15 "For this reason, the continuous quality theory has only been implemented to describe the dynamics of "the first moment" of the distribution of quality"

p1007, l9 "..and switches between "stiff and non-stiff" methods during the simulation when the stiffness of the system changes . . ."

I don't see why appendix A is necessary

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