Geosci. Model Dev. Discuss.,
https://doi.org/10.5194/gmd-2017-255-RC1, 2017


Geoscientific Model Development Discussions
Open Access
EGU



# *Interactive comment on* "ORCHIDEE-SOM: Modeling soil organic carbon (SOC) and dissolved organic carbon (DOC) dynamics along vertical soil profiles in Europe" *by* Marta Camino-Serrano et al.

**Anonymous Referee #1**

Received and published: 20 December 2017

Camino-Serrano et al. developed a soil module in ORCHIDEE to represent the vertically resolved SOC and DOC based on the pool-based structure of the CENTURY model. It is encouraging to see such kind of model development as noted by the authors that explicit modeling of DOC within and export from the land soil is challenging, but is important for the accurate estimation of the global SOC stocks. One of my concerns is the assumption of "all the products of decomposition from litter and SOC go to free DOC". I hope the authors can provide some support for this assumption, either from prior knowledge or from model optimization for simulated DOC and SOC. My other comments are listed below.



Printer-friendly version

Discussion paper

1. Change “decomposition times” to “turnover times” to be consistent with common terminology used in land models.

2. The definition of k in the equations should be decomposition rate constants, not rates.

3. Eqs. (2), (5), and (7) use the same I(t) term for input of each pools. They need to be differentiated and explicitly written out for readers to reproduce the model. For example, in Eq.(7), I(t) = ksol x SOC + klit x litter.

4. Suggest adding the gama term defined in Eq. (6) into Eq. (5).

5. The units for DOC are not consistent when defining the biological processes (e.g. Eq. (5)) and sorption (Eq. 12). State it if conversion is needed.

6. P7, line 17 – Is the “sum” within each soil layer?

7. P9, line 31 - What “boundary conditions”?

8. P11, lines 18,19 – Remove “in” in the parenthesis.

9. P13, line 25 – Change “iteratively” to “repeatedly”.

10. P14 – Please explain the early decrease of GPP from the measurement compared to the simulation in Figure 2D.

11. P15, line 13,14 – From Eq. 15, the clay content rather than pH can better explain the lower DOC. Was the statement about CUE here used to explain the lower DOC too? If so, from Eq. (7), decrease of CUE actually increases DOC.

12. P16, line 19 – Define SWC.

13. Any attempt made to optimize the simulated DOC and test if the proposed model makes sense?

---

Interactive comment on Geosci. Model Dev. Discuss., https://doi.org/10.5194/gmd-2017-255,

2017.