

General comments

It has been recognized that the global significance of the inland freshwater carbon cycle. However, it has been completely overlooked owing to the inadequate data and improper models. The new model branch, ORCHILEAK evolved from ORCHIDEE, not only improves our understanding of carbon transformations but also provides a fundamental for the assessment of the impacts of climate change. The main purpose is clear and it is worth developing to quantify the lateral exports of carbon off the terrestrial ecosystems. The results showed that ORCHILEAK could successfully simulate the fluvial transport of DOC and CO₂ evasion in Amazon basin. However, I have several specific comments from the perspectives on the model development and verification.

Specific comments

1. What was the time step to execute this model? Several spatial and temporal resolutions were mentioned, e.g. at a 30 min time step and a 1° (or 0.5°) resolution for the hydrology model and at a 6 min to daily time steps and a 1° (or 0.5°) resolution for the C fluxes. I was wondering how the model was executed in practice. How did different time steps work together in one model? Besides, did the choices of time steps operate in coordination with the spatial resolutions?
2. I would suggest a table showing the input details essential for the model execution and the outputs, perhaps including their spatial and temporal resolutions.
3. There is not any information regarding the calibration and validation, e.g. the performance measures in the calibration and validation.
4. P21, L8. What is the performance in terms of the spatial pattern of flood area?
5. Fig. 9. As mentioned above, were there any performance measures showing how good the simulations were? What were the results for monthly time series?
6. Table 1b. I was wondering how the SOC was simulated. What was the initial condition in the model? Did the simulated SOC change with time? How much did it change?
7. Fig. 14. It is found the simulated DOC basically varied within a small range

around 4 mgL^{-1} except the simulations at M, implying the simulated seasonal variability of DOC fluxes (in Fig. 12) were mainly attributed to the discharge not DOC concentration. I speculate the monthly time series for Q would mimic the DOC fluxes. Are these persuasive results for a DOC model? Besides, I wouldn't say the simulations reproduce well DOC concentration (L1, P33).

8. CH₄ evasion was negligible. How about the influence of DIC?
9. Is it possible to give a diagram illustrating the numbers of each C flux for the study watershed, just like Fig. 3 but with numbers on each arrow?
10. Fig. 4. What do the yellow color stand for? Where are the discharge gauges? Do you think landuse map is helpful?
11. Table 4. What do the stars indicate? Why is the surface runoff represented by % for the RO3?