Geoscientific
Model Development
Discussions

GMDD

Interactive
comment

Interactive comment on "CARBON-DISC 1.0 – A coupled, process-based model of global in-stream carbon biogeochemistry" *by* Wim Joost van Hoek et al.

Anonymous Referee #1

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The manuscript presents a model for carbon cycling in streams. It claims to have a global relevance, however it was only tested on one selected river basin, the Rhine. The publication also indicates several Strahler orders of investigation, however on the Rhine only the main River seems to have been investigated. Another major criticism of this work is that the model does not really seem to incorporate seasonality or events such as draughts or floods. These can have very important implications on river carbon fluxes.

Overall the manuscript is well written but claiming globality only because it is potentially possible would be not enough to justify publication. Some detailed comments are

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[Discussion paper]

16 name the independent global databases 22 retrodiction. DO you mean reconstruction? 23 fair agreement is too vague. Quantify 52 / 53 explain why these models are unsuitable 66 why did you choose the Rhine basin? 69 This and all other occasions spell out abbreviations such as IMAGE-DGNM upon first use 73 0,5 degree. How does this compare to other models? 76 adjustable to which minimum time segment? Fig 1 increase text in colored boxes. This is hardly readable 95 Why are CaCO3 particles not considered? Justify with references 96 How are respiration and photosynthesis incorporated as important processes? 108-110 While it is true that weathering plays a prominent role for ALK input important sinks are photosynthesis and evasion of CO2. Also important sources of respiration simply cannot be ignored. Another missing aspect is the hyporheic zone. Partially these aspects occur later on but the text needs to be arranged in a way that it becomes clear. 116 why monthly and not fortnightly? 135 km3/year. What about seasonality? 136 mmmol /km3 is a somewhat strange unit. Why was it used here? Normally mmol / L is used. 136 total amount. Do you mean concentration? 140 to 145 These assumptions over-simplify how a river really works and need some more work. With this it is questionable that the model will run a realistic representation Whole section 2 All equations need to be listed in an overview table Fig 3 should be presented at an earlier stage in the text as an introduction to all parameters and processes. It is too easy to state that the schemes (?) do not show lateral fluxes for clarity purposes. They should be important. Results 363 if this global model is only tested on the Rhine basin this is too little. Other basins in each climatic zone should be tested and also an overall run with estimations for each continent and the whole world should be performed. Section 3.1. what do you mean by schemes?

Interactive comment on Geosci. Model Dev. Discuss., https://doi.org/10.5194/gmd-2019-205, 2019.