

Interactive comment on “Reviews and syntheses: Carbon use efficiency from organisms to ecosystems – Definitions, theories, and empirical evidence” by Stefano Manzoni et al.

Anonymous Referee #2

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The manuscript submitted by Manzoni et al. is a review associated to a database analyse around the concept of carbon use efficiency and carbon storage efficiency. The quality of the manuscript is very high and I particularly appreciated the effort of the authors to gather data from very different sources to have a broad view of the CUE/CSE concept. The writing is excellent and despite the complexity of the question the authors succeed to make a clear and easy to read document. I am convinced that this paper will be provide an important contribution to the literature and since it deals with data coming from plants, soil, ocean, etc. at different spatiotemporal scales it is of broad interest.

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I may have few minor comments to try to make the manuscript even more attractive.

Section 3. Can you provide a bit more details on the methods used to collect the data (e.g. keywords used in ISIWEB).

Section 4.1 You cite two studies as example but some methodological details are missing to fully understand your arguments (what kind of carbon added (litter, glucose, . . .) or how long was the incubation for instance).

I missed some words on the anthropogenic effect on ecosystems CSE. In all the manuscript you compared different types of ecosystems but it may be interesting to compare systems highly managed like cropland or European forest and grassland with a substantial fraction of the NPP appropriated by humans (see Krausmann et al. (2013) for instance).

As a modeller I have a very selfish request (but I guess it may help others). I appreciated the section 4.5 but I guess that the majority of the modellers using CUE concept are aware of the limitations presented here. Maybe one or two paragraphs with some concrete recommendations will be helpful. In particular, I am wondering if CUE or CSE at organisms or ecosystem levels should be considered as emerging properties of a given system and if yes it might become an interesting approach to evaluate model by comparing the CUE/CSE observed at the system level.

Krausmann, F., Erb, K.-H., Gingrich, S., Haberl, H., Bondeau, A., Gaube, V., Lauk, C., Plutzar, C. and Searchinger, T. D.: Global human appropriation of net primary production doubled in the 20th century, *Proc. Natl. Acad. Sci.*, 110(25), 10324–10329, doi:10.1073/pnas.1211349110, 2013.

Interactive comment on Biogeosciences Discuss., https://doi.org/10.5194/bg-2018-275, 2018.

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