

Interactive comment on “Calculating the global contribution of coralline algae to carbon burial” by L. H. van der Heijden and N. A. Kamenos

J.-P. Gattuso

gattuso@obs-vlfr.fr

Received and published: 4 August 2015

van der Heijden and Kamenos have done an impressive compilation of data from the literature and report on the distribution, surface area covered, primary production and calcification of coralline algae. This is not a formal review, I would just like to highlight a few issues and provide suggestions that the authors might find useful.

1. A major problem is the considerable uncertainty regarding the definition of key parameters.

- “Carbon burial” is not defined, and I think misused. It is the amount of organic carbon that is exported to the bottom and escapes remineralization in the water column and sediment. It is therefore the amount of carbon
C4047

preserved in the sediment. This process is not really looked into in the manuscript. Five rates of CaCO_3 accumulation are given in Table 5 but the amount of organic carbon buried is not reported.

- “Primary production”: is also not defined and the term used loosely. It is absolutely critical to mention whether rates of gross or net primary production are discussed. This issue may explain the quite surprising conclusion that “*Coralline algae therefore have production rates similar to mangroves, saltmarshes and seagrasses*”.
 - “Calcification”: it is also not mentioned whether net of gross calcification is reported. I suspect that Table 4 mixes both.
 - “Carbon storage”: even though it is acknowledged that calcification is a source of CO_2 , statements such as “*coralline algae have a significant capacity to store carbon*” or “*Using this potential carbon storage by coralline algae, the global production of free-living algae/CCA was ... suggesting a total potential carbon sink of ...*” are misleading. I would suggest that a proper CO_2 balance is made, taking into consideration all processes involved (gross primary production, respiration, gross calcification, dissolution) in order to define the sink/source behavior in terms of C and CO_2 . The approach of Gattuso et al. (1995) might be useful.
2. Section 5 “*Future prospects: ocean acidification and rising temperature*” is very succinct and does not assess the most recent papers. It could better reflect the current knowledge.
 3. Section 6 “*Conclusions*”
 - “*Reduction of CO_2 to a sustainable level is required to avoid further environmental damage and various solutions have already been proposed.*” is vague and it is not clear which solutions are being referred to.

- Calculations should be refined as part of this paper by qualifying the terms used and ascertaining that the aggregated numbers are correct.

4. Other comments

- 7852/9: "*The total surface area of the coastal zone, thus the potential habitat for benthic coralline algae, is estimated between...*". That is incorrect because it includes a lot of soft-bottoms, very little of which is a proper habitat for coralline algae.
- 7852/10: are 6 citations really useful here?
- 7856/9: word missing
- 7856/11: space missing
- If the paper is accepted, I recommend that the supplementary tables are provided in a numeric format.

Reference cited

Gattuso J.-P., Pichon M. & Frankignoulle M., 1995. Biological control of air-sea CO₂ fluxes: effect of photosynthetic and calcifying marine organisms and ecosystems. *Marine Ecology Progress Series* 129:307-312.

Interactive comment on Biogeosciences Discuss., 12, 7845, 2015.