Biogeosciences Discussions

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Reply on Editor comments

Laura Anahí Macario-González et al.

Author comment on "Geodiversity influences limnological conditions and freshwater ostracode species distributions across broad spatial scales in the northern Neotropics" by Laura Anahí Macario-González et al., Biogeosciences, https://doi.org/10.5194/bg-2021-298-AC1, 2022

Dear Editor,

we appreciate all comments and suggestions made to improve the manuscript. Please find below answers for each of your comments. In case we were unable to follow them, we provide an explanation.

General comments by Associate Editor
I have now read your last submitted manuscript and have to say that I remain seriously confused about your usage of the term "geodiversity". I have no doubt that the aquatic ecosystems you investigated are located in a geologically diverse region. Surely, this geodiversity may have an imprint on the biodiversity at the larger spatial scale of the whole investigated region. The mechanism behind this is likely that geological conditions drive limnological conditions that then shape the composition of communities, here exemplified by ostracod assemblages. So, what I see is the use of the word "geodiversity" for two very different things:

1) The actual range or variety of geological conditions in a given region. This agrees with the definition provided in the very first sentence of the introduction. I think it is also fine to use the word in this sense for headlines, to illustrate general linkages (e.g. the connection of geodiversity and biodiversity) or to interpret larger-scale implications of your findings (e.g. for biodiversity in the region).

2) The (average) geological conditions at a given sampling site. This agrees with the way you compute and use variables that somehow describe geology. There is no single variable in the entire manuscript that actually expresses geodiversity in the sense defined. Also the latent variable in the SEM which is called "geodiversity" can´t actually express the variety of ecological conditions at any site, as it plainly inherits the "state"-nature of the variables it is allowed to be controlled by (lines 248-249). Prominent examples for this usage include the second question which the MS aims to address (line 103), and - more importantly - is exactly aligned with the main conclusions of the manuscript (see, for instance, lines 495-501 or the complete chapter 4.1.).

This "double-use" of the word geodiversity is in the end simply confusing for the reader. It causes statements like "geodiversity...is...constant in [region X]", which I have difficulties to understand. It suggests sloppy usage of the word geodiversity and hard-to-follow statistical analysis. And it finally gives the reader the impression of a "broken promise".

It is my responsibility as an associate editor to assure quality of published manuscripts. In this role, I recommend to reconsider the usage of the word "geodiversity". In your MS, it may be appropriate in some places, yet not so much in others. A "clean" use will benefit the paper. Ultimately, I will leave this decision to the team of authors, however, and will not reject the paper if you decide to just stick to how you used it.

Answer by authors:
In regard of the term geodiversity, we consider that the main point of disagreement between you and our multidisciplinary team, is how this term is interpreted. We consider geodiversity as an integrative concept, and, in lines 39-45, its components are described. We used the view of Zarnetske et al. (2019) who describe different approaches to evaluate geodiversity in a region of interest. Please consider that using a single variable (e.g. elevation) or a broad range of geodiversity-related variables it is possible to study the relationships between biodiversity and geodiversity.

We approach geodiversity based on at least nine geological and mineralogical variables. This is in counterpart of what you write “no single variable in the entire manuscript actually express geodiversity in the term defined”. We clarify our initial concept to focus on an integrative approach, see line 103-106. Furthermore, in the introduction, we now explain how geodiversity can be studied based on measurements of its components.

The SEM analysis does not intend to express the variety of ecological conditions of a single site, but rather explains causal relationships between tested variables without considering a geographical extent (e.g., influence of limnological conditions on biodiversity). In this case, following our initial and integrative concept, the term geodiversity in SEM is constructed using geological and mineralogical variables (lines 247-249) and different variable combinations were used in the models tested. Therefore, we consider that the term geodiversity in SEM agrees with the definition provided in the introduction.

Considering that our team favors the usage of the term geodiversity, and that two anonymous reviewers were satisfied with the explanation we provided for geodiversity, we decided to keep the term throughout the manuscript. We hope that our revision now provides a clean use of the term geodiversity to avoid misinterpretations.