Biogeosciences Discussions

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Reply on RC1

Dong-Gill Kim et al.

Author comment on "Reviews and syntheses: Enhancing research and monitoring of land-to-atmosphere greenhouse gases exchange in developing countries" by Dong-Gill Kim et al., Biogeosciences Discuss., https://doi.org/10.5194/bg-2021-85-AC1, 2021

Response to the comments by Referee 1 on 'bg-2021-85'

We, authors appreciate the reviewer's analysis, thoughtful comments, and constructive suggestions. Below we provide our responses following the original comments by the reviewer.

The presented paper "Reviews and syntheses: Enhancing research and monitoring of land to-atmosphere greenhouse gases exchange in developing countries" aims at bringing some light into our current knowledge of GHG exchange in developing countries. While this topic is very relevant to the scientific community the current document only barely provides any new information. Given that this is a review and synthesis, one would expect the authors would do some in-depth analysis of the existing knowledge with the overall goal to generate new information. Unfortunately the current documents does not fulfil these expectations.

Response: We tend to agree with the reviewer (and with the other reviewer) on this point. In fact, the aim of this study was to summarize and share our ideas and suggestions for enhancing research and monitoring of carbon and greenhouse gas (GHG) exchange in developing countries, a topic that we think is urgent to push forward. Exactly due to the motivation of the paper (lack of observations) it is very premature at this stage (or even impossible with a sufficient quality and acceptable uncertainty) to make a 'Review and Synthesis' paper on AT&A for GHG research. In fact, we originally planned to submit the manuscript as "Ideas and Perspectives" (https://www.biogeosciences.net/about/manuscript_types.html) but due to the length limit ("a few pages only") we had to submit as "Review and Synthesis". After a more detailed check however we found that there are Ideas and Perspective papers in *Biogeosciences* with a length comparable or longer than our manuscript (e.g., Wilson et al. 2020- Biogeosciences, 17, 5809–5828, https://doi.org/10.5194/bg-17-5809-2020). So our plan, if we will have the chance, would be to resubmit it under "Ideas and Perspectives" category.

At the moment the document rather represents a list - also not a full list I must admit - on what types of research related to GHG emissions in developing countries has been ongoing. Such lists are already available and the authors even present a figure from Burba et al. on the number of EC stations globally, yet it remains unclear what the share of such stations between developed and developing countries is and which sites are active and/or part of networks etc. At the same time, and specifically for the African continent such a review of stations has recently been made and the authors even cite the relevant papers. Yet there is no need to repeat such information.

Response: We agree, although the review of the eddy covariance station is only a small part of the overall message. The situation with the flux towers inventory is complex and it is not so easy to get the information on the real existence and running, because this is in the nature of the network, which is organized bottom up. In a new version of the paper, we will cite the relevant papers reviewing stations in the African continent and try to contact directly all the PIs of the stations for more detailed info about the current situation and medium-term plan.

There are some interesting aspects in the manuscript, ie why is it the case that station of South America are not part of the bigger networks and how could this be overcome?

Response: Thanks for the suggestion, this is definitely an aspect where we could investigate more (also related to the point above).

Also the AT&A approach is interesting, though it has also been stated before. At the moment the authors dont provide a clear way forward on how one could come to a point to use such technology. Similarly, while the authors mention that there is a large uncertainty in global GHG knowledge due to the lack of observations in developing countries, there is no analysis on how large this bias actually is nor what would be necessary to reduce the uncertaity by XY%.

Response: On the possible plan and development some aspects are discussed in the paper, but furthermore we can work to make this clearer and identify better the critical aspects. The analysis on the possible reduction of uncertainty instead, although for sure interesting, would require a completely different work and a large activity involving a strong modeling component and data simulations, something we consider out of scope with respect to our idea of the paper. There are various ongoing efforts to identify uncertainties caused by lack of carbon and GHG research in developing countries. We will provide the synthesis of the current progress in a new manuscript.

Another important point is that the title is misleading. It states GHG exchange, however the authors start with an overview on Carbon stocks. Moreover the flux value defintion is not fully clear, nor is it clear how the information was derived.

Response: We agreed, and we thought switching the manuscript to the "Ideas and Perspectives" category could make it more in line with the content. In addition, we recognized that the title should include "carbon" to better reflect the contents of the manuscript. Therefore, if we can resubmit the manuscript as "Idea and Perspective" we will clearly change the title to make it more in line with the content as below for instance:

Ideas and Perspectives: Enhancing research and monitoring of carbon and land

to-atmosphere greenhouse gases exchange in developing countries

In summary, the document resembles rather a white paper in its current stage and could be informative for ie internation organization or to a certain degree for policymakers but it does not fulfil the necessary in depth analysis and standard of a scientific paper. I don't doubt the ambitions or efforts anticipated by the authors but in order to derive something feasible, more research on the existing literature and synthesis analysis is needed. This may not be what the authors have hoped for yet I am confident that with some reflection the authors will see the shortcoings here too and will work on an in depth analysis tackling an interesting topic.

Response: We basically agree; this is more an opinion paper, but we still think that is could be of interest in *Biogeosciences* as "Ideas and Perspectives" since it can stimulate the discussion around an issue that has negative effects not only in the less developed countries but also at global scale.