Comment on egusphere-2022-562

Anonymous Referee #2

Referee comment on "Biotic factors dominantly determine soil inorganic carbon stock across Tibetan alpine grasslands" by Junxiao Pan et al., EGUsphere, https://doi.org/10.5194/egusphere-2022-562-RC2, 2022

Review Pan et al, Biogeosciences, Aug 2022

Pan and co-authors studied how much inorganic carbon (SIC) is stored in soils throughout the Tibetan plateau along with biotic and abiotic paramters. In their main conclusion, they report a that biotic parameters excert greater control over SIC stocks than abiotic paramters, and that the significance of abiotic parameters is higher in the subsoil than in the topsoil.

The topic of this study – soil inorganic carbon stocks and their controls - is a timely and important, and the authors have collected an impressive dataset of biotic and abiotic measures. Their methods are state of the art and well described (although more details on plant parameter measurements are needed), and overall the manuscript is clearly written.

Unfortunately, I do not think that the second research question (contributions of different controlling factors to SIC stocks), on which the majority of the manuscript focuese, cannot be answered with the chosen experimental design, as correlation cannot proof causality. With this design, the authors can only show association of SIC stocks with external factors. In the most cases, it is not clear if e.g. FA, BA etc. influence SIC, if SIC influcens

FA, BA, etc, or if both variables are independently influenced by an underlying third parameter.

In my opinion, this issue could be solved by rewriting large sections of the manuscript, removing wording like 'X has an effect on SIC', discussing potential controls in both directions as well as potential underlying third variables, and very, very carefully assessing if the partitioning into biotic and abiotic factors is still possible.

One avenue for improving this manuscript would be to re-focusing it towards which parameters can be used to predict SIC content (rather than which parameters control SIC), which could be useful for mapping/upscaling of SIC stocks.