Biogeosciences
Discussions

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Interactive comment on "Global soil-climate-biome diagram: linking surface soil properties to climate and biota" *by* Xia Zhao et al.

Anonymous Referee #4

Received and published: 31 March 2019

The article by Zhao et al., present an interesting global dataset for some soil parameters, linking these properties with climate and biota. Nevertheless, there are sevral issues that should be clarified and disucssed in much more details. The mentioned databases report row data for soil profiles, while the authors use also some parameters which are derived from these data (e.g. SOC and SON stocks). How these data were derived and harmonized should be better explained, since in the paper they are used to derive the linkages betwen soil, climate and biota. For the soil profiles in the different databases, were used only the soil layers having all the necessary parameters usefull to calculate the stocks of C and N? I am referring in particular to Bulk density and rock fragments content. If not, how the authors were dealing with this fact? They were using pedotransfer functions to derive bulk density? And if rock fragments con-

tent was missing? Since these two parameters are affecting wery much the stock the authors should make an effort in explaining how the database were harmonized. The discussion is sometimes weak. For instance the authors fould a correlation between bulk density, MAT and MAP. Similarly the call variation in relation to MAT and MAP? The discussion on the observed differences between ecosystems is quite poor. Not so many recent references are considered for the discussion. The effect of the vegetation on the selected soil parameters should be better considered and discussed.

Specific comment: Page 3 Line 5-10: "Compiled". And what about harmonization of the data?

Page 3 Line 20-30: Since most of the soil profiles were collected a very different range of years, how the climate was related to the propoerties? What you mean with pedological information? The fact the soil profiles data are presented by horizons?

Page 5 line 20-25: Which is the meaning of providing a mean global value for SOC and SON?

Page 6 line 5: In brackets (MAT < 400 mm) is probably MAP rather than MAT?

Page 6 line 20-30: the fact that bulk density is affected by precipitation and temperature should be better discussed. SImilarly the increases in clay content in relation to MAT and MAP. How soil erosion affect the clay fraction? Is soil erosion selective for the clay? And Silt and Sand? An effect of the actual land use on bulk density should also be pointed out in the discussion.

Page 7 line 5-10: The fact that in the tropical area Clay and bulk density decrease with altitude how can be explained? Which is the meaning of this decrease?

Figure 2: SOC density box Looking at the SOC density it appear that there is quite a lot of C in the North Mediterranean area, which is usually quite poor in SOC due to the continuous use of the land for agricultrue since millennia. On the other side also the area covered by tropical primart forests in Africa (e.g. Congo basis) seems to be

relatively poor? How they authors can explain these facts?

Bulk density box How the authors explain the very high values of BD for the United states? Why the are so high compared to other regions. Apparently in the USA there are not so many differences in BD in relation to the different ecosystems (e.g. Forests vs. grassland vs cropland)

Table 1. The BD of cropland appear to be similar to those of savanna and grassland. How it can be explained? Suìimilarly, concerning the SOC stock how it can be explained that cropland have similar values of tropical forests?

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