

Interactive comment on “Soil carbon stocks in ecoregions of Africa” by M. Henry et al.

M. Henry et al.

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Comments of the Referee #2 (below identified as R2:) Author answer (below identified as A:)

R2: These mainly focus upon identification of the major sources of uncertainty and implications for both current database use and future database improvements.

R2: Specific comments: The main issue is that the current analysis only presents the possible range of total C stocks using different databases which differ mainly in the number of soil profiles and spatial resolution and detail of the map units. In my opinion, an in depth analysis of the within-map unit (soil type) variability in carbon concentration, gravel content and bulk density should be performed on all databases.

A: It was possible only for the database 1996, the soil properties per soil profiles were not available for the other databases.

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R2: This should highlight the differences between the databases (eg how does the increased number of map units of the ISRIC-WISE or HSWD databases affect the variances?)

A: The databases do not allow analysing the variance of soil properties. The only database that could be used is the database Batjes 1996. However, it is not possible to analyse the influence of soil profile numbers on the variance.

R2: but also indicate which specific soil types and geographic regions are the main source of uncertainty and should therefore be considered as high-priority areas for further improvements.

A: It is not possible to know: see previous comments

R2: The motivation of this work was our poor understanding of the size and distribution of soil carbon in Africa. At the same time, table 1 indicates that Africa is well characterized as more than 40% of the profiles in the global databases are situated in this continent although it covers only 20% of the land area. Does this imply that our carbon stock estimates for Africa are less uncertain than estimates for other continents?

A: The authors do not agree: it means that 40% of the soil profiles of the global database were taken in Africa, because the global database does not integrate most of the soil database E.g. in Europe.

R2: Finally, the introduction and discussion are mainly focusing on C sequestration issues but the linkages with the main text and objectives are unclear to me.

Detailed comments:

R2: Page 799 line 20: soil Line 25: half as large when compared to?

A: The sentence was modified: The cultivation of tropical soils reduces their carbon content by 40% 5 yr after clearing (Detwiler, 1986)

R2: Page 803 Line 6: More details are needed that describe in detail how this linkage

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and aggregation was done

A: The ambiguous sentence was modified. The FAO-UNESCO (1974) legend was used to link the soil properties data with the soil map units on the grid maps.

R2: Page 804 line 17: variable n is not used in the equation

A: The ambiguous sentence was modified.

R2:Page 808 line 2: Amundson

A: The sentence was modified.

R2: Line 16: these values do not correspond with the values given in Table 4 Line 17: Pg vs Tg: the use of different units is confusing; use the same unit throughout the manuscript

A: The text was modified.

R2: Line 28: I dont fully understand how this should increase the SOC stock. Do you mean improve?

A: The ambiguous sentence was modified.

R2: Page 811 line 23: I assume this should be 0-100 cm?

A: The ambiguous sentence was modified.

R2: Table 1: add fraction of profiles in Africa

A: The table was modified.

R2: Table 2: Specify which datasets were used and add uncertainties

A: The table was modified.

R2: Table 3: Specify which datasets were used

A: The title was modified.

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R2: Table 4: the layout of the SOC (Tg) column could be improved \

A: The table was modified.

R2: Fig 1: add units and data sources

A: The figure was modified.

R2: Fig. 1. Soil carbon stock distribution in Africa for the 0–30 cm soil layer using the HWSD soil database.

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