

Interactive comment on “Local soil quality assessment of north-central Namibia: integrating farmers’ and technical knowledge” by Brice Prudat et al.

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We are very excited to have been given the opportunity to revise our manuscript. We carefully considered your comments. Herein, we explain how we revised the paper based on those comments and recommendations.

We hope that these revisions improve the paper following your suggestions.

General comments

Reviewer’s comment: Including soil descriptions using WRB soil classification increases the relevance to the broader public.

C1

Author’s answer and suggestions: We agree with this concern and we would add few soil descriptions, including pictures and FAO names. A short chapter following 3.2 "Technical analysis of farmers’ field experiences" will be added to explain the major trends regarding the WRB (reference soil groups, qualifiers). Add in Chapter 3.5.1 "Importance of a soil quality evaluation toolbox": "Soil classification based on the FAO is used by Namibian institutions and is used to draw the Namibian soil map. Therefore, it could be appropriate to use for international and scientific communication. However, this classification system does not bring additional information that would benefit this paper and was therefore not discussed. FAO classification is orientated towards representing "primary pedogenetic process[es]" and does not aim at detecting soil differences at micro-scale, neither spatial nor temporal" (IUSS Working Group WRB, 2014). Therefore, the use of this classification is not relevant to highlight SQ differences at small-scale. Moreover, the classification of the described soils in the WRB is poorly informative given the low prevalence of diagnostic properties and horizons leading to poorly informative nomenclature."

Reviewer’s comment: The presented toolbox seems useful, but detecting very slight colour differences in the field will not be easy.

Author’s answer and suggestions: It must be emphasized that this toolbox is a suggestion that would require further developments. Considering the comment and the low accuracy of Munsell colour evaluation, we would modify the colour shade classes defined in the toolbox to include more soil colour shade values in the 0 class. This would result in more soils classified into the "0"-class; 1) avoiding an overinterpretation of changes to be undertaken; and 2) corresponding better to the farmers SQ evaluation. The values are then adapted to avoid over-interpretation of field data collected. In §3.4.4 "Outcome of toolbox application": "The developed toolbox is and remains a suggestion for evaluating SQ and for prioritising SQ-improvement practices." Moreover, we would change the SQ evaluation classes of Colour shade (Fig 4b) to include more values in the 0-class.

C2

Reviewer's comment: As in many tropical agricultural soils, fertility in terms of N and P availability will be a severe limiting factor in this area (besides water limitation). It is however not taken into account in the soil quality evaluation. I realize that it may not be a property that can readily be measured by farmers, but it should at least be discussed as an important limiting factor.

Author's answer and suggestions: Known to be limiting nutrients in most agricultural land, particularly in sub-Saharan Africa, N and P availability are most likely significant for plant growth. However, given the high connection between these nutrients and the soil short-term fertilisation, we decided to not include these analysis in our evaluation as our work aim to understand and follow longer-term soil fertility discussion. We would however add a comment in §2.3.2 Laboratory analyses, to explain why we did not measure these nutrients.

Specific Comments

Reviewer's comment: Table 1: depth of topsoil can better be changed to soil depth or rooting depth, as depth of topsoil is defined by the user, not so much a soil property.

Author's answer and suggestions: These properties have been copied from Wienhold et al. (2004), as suggested in the figure caption. We would therefore not change it.

Reviewer's comment: Table 1: Infiltration rate, or capacity?

Author's answer and suggestions: Water infiltration rate, to precise in Table 1.

Reviewer's comment: P3L7: Soil diversity: misleading term, soil variability is more apt.

Author's answer and suggestions: Changed following suggestion.

Reviewer's comment: P3L14: How do you define the process of agricultural evolution?

Author's answer and suggestions: Changed into "evolution of agricultural practices" (P3L13).

C3

Reviewer's comment: P6L8: unclear why some farmers are visited more than once, while others are not.

Author's answer and suggestions: The farmers who showed a broad soil and agricultural knowledge during the first interview and open to discussion were visited several times.

Reviewer's comment: P7L21: Further on only pHCaCl is shown/mentioned, so why also include pHH₂O here? Better remove it if you don't show further results.

Author's answer and suggestions: pHH₂O removed from Methods.

Reviewer's comment: P10L2: chemical fertility is still low compared to many other soils. Differences are relative between local soils, which should be emphasized.

Author's answer and suggestions: Changes in §3.2, P10 L1: "All these characteristics suggest the higher potential of omutunda to provide nutrients, coming from any sources, compared to the other KWSUs."

Reviewer's comment: Also the term chemical fertility may be a bit misleading; soil fertility may be better in this context.

Author's answer and suggestions: We always used "chemical fertility potential" to clearly indicate that it is not the actual chemical fertility (related to nutrient content) but an indicator for the potential that the soil could reach if sufficiently fertilised. We think that replacing "chemical fertility" by "soil fertility" will add confusion to the reader.

Reviewer's comment: Fig 2 doesn't seem to be very relevant for the story, not very comparable to the other data shown (more detailed). So I would suggest to remove it. Also values on x-axes of first and third pane are hard to understand (not in line with table above).

Author's answer and suggestions: We would remove this figure, given the different depth resolution illustrated compared to the rest of the data used.

C4

Reviewer's comment: P14L17-26: sentences are hard to understand. Wording can be improved/clarified.

Author's answer and suggestions: Change wording for better clarity. For example: "The three classes represent the transition from "good" (or "improved") to "very poor" (or "degraded") chemical fertility potential. Most elondo are fine sandy soils, in which coarse texture (>90%) would indicate ongoing or past degradation because elondo is described as a fertile soil.

Reviewer's comment: Maybe replace "evolution" by "transition"?

Author's answer and suggestions: Accept the suggestion.

Reviewer's comment: Improvement in this context is are to follow, it seems to imply that improvement has taken place over time, but without reference in the past? What were the conditions before the improvement?

Author's answer and suggestions: There is a lack of data to support the assumption of soil degradation or improvement. However, these processes were perceived and explained by some farmers during the interviews. Add this explanation after P15 L9.

Technical/textual points:

Reviewer's comment: P3L20: "have been developed and discussed, and yielded" ...

Author's answer and suggestions: Suggested correction accepted.

Reviewer's comment: P4L1: "farmers and technical assessments"

Author's answer and suggestions: We suggest using "between technical and farmers assessment".

Reviewer's comment: P6L2: remove space after "Sandveld"

Author's answer and suggestions: Suggested correction accepted.

Reviewer's comment: P6L15: insert second closing bracket after 2005.

C5

Author's answer and suggestions: Suggested correction accepted.

Reviewer's comment: P7L26: replace "that" by "when"

Author's answer and suggestions: Suggested correction accepted.

Reviewer's comment: P10L32: "various entities" ...

Author's answer and suggestions: Suggested correction accepted.

Reviewer's comment: P13L5: "meaning"

Author's answer and suggestions: Suggested correction accepted.

Reviewer's comment: P13L11: "play an important role in fixing"

Author's answer and suggestions: Suggested correction accepted.

Again, we appreciate all your insightful comments and are thankful to you for taking the time and energy to help us improve the paper. We hope that the answers and the suggested revisions improve the paper.

Interactive comment on SOIL Discuss., <https://doi.org/10.5194/soil-2017-10>, 2017.

C6