SOIL Discuss.,
https://doi.org/10.5194/soil-2017-41-AC1, 2018

Interactive comment on "Uncertainty indication in soil function maps ndash; Transparent and easy-to-use information to support sustainable use of soil resources" *by* Lucie Greiner et al.

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Received and published: 23 February 2018

We thank the referee for his/her feedback and the helpful comments. We refer to the comments below and propose adjustments to the manuscript, see supplement.

RC = referee comment

AR = authors response

P = page

L = line

General Feedback

Comment 1

RC: Not very informative abstract.

AR: We revised the abstract and provide more information with regard to the context of our study, see manuscript in the supplement.

Comment 2

RC: Conclusions presented are unfocused, although supported by the data.

AR: We have to agree and tried to provide a better structure in the conclusions by being more focused on the objectives of the study presented in the introduction, see supplement. Further, we tried to prevent a possible misunderstanding by renaming chapter 3.3 "Uncertainty communication" to "Thoughts on uncertainty indication" and eliminating the term "communication" from the conclusions. We renamed chapter 3.3., also in view of your comment about the unclear goal of our paper (comment number 4). We formulated two goals, chapters 3.1. and 3.2. answer to these two goals, chapter 3.3. shortly discusses more general thoughts on the topic of uncertainty indications.

Comment 3

RC: Figures are not all necessary and informative, for instance Figure 1 should be replaced by a kmz file and geographical coordinates clearly indicated.

AR: We include the kmz-file in the supplement and added the coordinates in the legend of Figure 1, see manuscript in the supplement. We presume that that Figure 1 helps the reader to understand the subsequent figures presenting the soil function maps. We agree that Figure 2 is not really necessary and eliminated that Figure.

Comment 4

RC: The main goal has been not accomplished as unclear. If the main goal is communi-

cation, the experiment should have been conducted (and then described) by measuring audience reactions.

AR: For our study, we formulated two objectives: 1) to indicate uncertainty in soil function maps that are caused by informational uncertainty and spatial variation of soil properties and 2) to show how sensitive the chosen SFA methods are to error propagation. The revised abstract and conclusion sections should be now more informative and providing in a better way the context of our objectives. Moreover, we used the general term “communication” in chapter 3.3 to address stakeholder demands. We are now more precise and avoid that general term (see as well 2nd comment). Communication is an important aspect in assessing soil functions though, as the aim of soil function assessment is to simplify the medium “soil” and provide information in an easy-to-understand (and thereby easy-to-communicate) form for non-soil scientists. We therefore adapted and slightly expanded the discussion-chapter 3.1. “Mapping uncertainty of soil functions” also naming possible advantages of our approach, see supplement, in order to provide more context to our goal and clarify the aspect of communication. Furthermore, we added in chapter 3.2. “Cumulative distribution functions of SFF scores” a short discussion section providing more details.

Comment 5

RC: This is, actually, a methodology paper. But, the Authors must clearly explain what the innovative part of the proposed method is.

AR: To our knowledge, uncertainty propagation in static soil function assessment has not been performed yet. In addition, we are not aware of any recommendations how to visualize uncertainties in soil function maps. So, the methods applied are not new and are standard in other science disciplines but have not been applied for the assessment of soil functions. We refer to that aspect in the introduction chapter (P3L14).

Comment 6

RC: The paper does not fully discuss the limitations of the approach and potential biases due to the assumptions made.

AR: We chose the topic to foster information on accuracy of soil function maps in spatial planning programs. By covering a set of 10 soil functions, we tried to consider a broad part of soil multifunctionality and each soil function assessment method contains limitation. Also, uncertainty indication is restricted to four soil properties used in soil function assessment. We tried to clarify these main limitations in the conclusions-chapter, see supplement.

Comment 7

RC: The article does not adhere at all to appropriate reporting guidelines and community standards for data availability for replication purposes, the full raw experimental database must be available or deposited to relevant data repository (e.g. Zenodo). / a lot of data Weaknesses: reproducibility

AR: We used soil property predictions provided by Nussbaum et al. (2017). In the study of Nussbaum et al. (2017) soil data were used under a non-public data licence (Canton of Zurich, contract number TID 22742; WSL). We refer now to the data availability in on P8L1.

Line-specific Feedback

P1L20

RC: SFA, please spell all the acronym out the first time they appear in the text

AR: Corrected.

P3L25

RC: Please, describe the soils according to last edition of the WRB soil classification system (IUSS WG WRB, 2015). Main WRB Great Group probably deserve consideration at keyword level.

AR: We used the last WRB edition (IUSS Working Group WRB, 2015) and agree on the degree of detail: we included the most common principal qualifiers per Reference Soil Group for our study area in the manuscript P3L31, see supplement

P5L5

RC: “The capacity of the soil to filter and buffer trace metals (R-icont) were assessed for cadmium, copper and zinc.” A potentially misleading choice of elements in agricultural context. Please, explain why this choice.

AR: We added reasons why these trace elements are relevant for arable and grassland soils addressing the fertilizer types containing these elements. Furthermore, we provide now references to some relevant studies to underpin the choice of the three trace elements, see manuscript P5L17.

P9L5

RC: Soil depth was treated as fixed value per raster cell. Quite strange choice in this geomorphological setting. Please, clarify maybe I did not understand well

AR: This was probably formulated in a misleading way. We did not use soil depth as a random variable and used the mean predictive value (SPm) for soil depth per raster point instead. To be clear, we eliminated the formulation “treated as fixed value” from P9L10.

P11L5

RC: The percentage of total variance attributed to internal variability and model uncertainty in the land carbon cycle comes normally mostly from model structure (e.g.DOI> 10.1126/science.aam8328) AR: We did not model C-pools but simply calculated C-pool to 1m or soil depth from data on soil organic matter, stone content, bulk density obtained from DSM by Nussbaum et al. (2017).

P10L21

RC: “Mapping the ten soil functions for the agricultural soils.” Soil functions include the production (agriculture) function. This definition is highly confusing.

AR: We meant to stress that we only assessed soils under agricultural use and excluded soils under forests, in settlements, parks etc.. We adapted the sentence to “Mapping the ten soil functions for the study area. . .” to avoid this double meaning.

References

Nussbaum, M., Walthert, L., Fraefel, M., Greiner, L. and Papritz, A.: Mapping of soil properties at high resolution in Switzerland using boosted geoadditive models, SOIL , 2017, 1–32, doi:10.5194/soil-2017-13, 2017b.

IUSS Working Group WRB. 2015. World Reference Base for Soil Resources 2014, update 2015 International soil classification system for naming soils and creating legends for soil maps. World Soil Resources Reports No. 106. FAO, Rome.

Please also note the supplement to this comment:
https://www.soil-discuss.net/soil-2017-41/soil-2017-41-AC1-supplement.zip

Interactive comment on SOIL Discuss., https://doi.org/10.5194/soil-2017-41, 2018.