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Discussions

Interactive comment on "Generating a global gridded tillage dataset" *by* Vera Porwollik et al.

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Thank you very much for providing helpful feedback. Please find below a point by point response to your comments.

Referee #4: I have read the manuscript with much interest to understand the importance of the work and if it really fills a gap in our knowledge. Reading the manuscript has not been much easy because it is too complex because of both the way of presenting the topic and the proposed methods. Soil tillage is an important research issue for its effects on soil conservation and carbon sequestration but the described approach at global scale is not much suitable to help in quantitative assessment of biophysical and bio-geochemical impacts of land use and soil management as claimed by Authors. They have pointed out clearly the many factors and properties, which can determine the type of soil tillage. Among these are included soil type and depth, climate, crops, rain-

fed and irrigated crops, socio-economic factors determining the mechanization level of agriculture, etc. Consequently, it results extremely complex and difficult to model all factors and properties.

Author's response: Indeed, the decisions made by farmers on which type of tillage to use are complex, substantially more complex than reflected by our rules. We will revise the structure and text of the article where suitable to improve the readability of the article. We do think that providing an explicit data set on tillage types is helpful in the quantitative assessment of biophysical and biogeochemical effects of land use and soil management, as the alternative is to use implicit model assumptions.

Referee #4: Particularly, the Authors have used data much different that have required to be resampled and aggregated (Line 220) but no detail has been provided on how that has been made.

Author's response: Until now we refrained from describing too many technical details concerning the coding as we thought that would blow up and complicate the text even more. For us it was more important to explain the general concept. Indeed, substantial harmonization steps of data formats were necessary to process the different data sources. We have now expanded the description of theis harmonization procedure. Full detail on the data data processing steps is also provided through the accompanying published source code (Porwollik et al., 2018).

Referee #4: Many rules have been used for mapping and downscaling but it is not much clear how the Authors have statistically validate them.

Author's response: We derived rules from qualitative statements found in relevant literature (for CA – erosion, CA- aridity, and CA- crop type, the threshold of 2 ha per ha to distinguish between small and large scale farming). For downscaling CA rather to large than to small field size we approved of the relation between CA area and farm size found via a statistical assessment shown in Figure S3 with the coefficient of determination r^2=0.66. Further prove of statistical relations among mapping variables

definitely are an interesting challenge to be explored but are momentary outside the scope of this mapping exercise. In order to capture the uncertainty of the logit model we included the sensitivity test with different variable combinations and functional parameters. In the manuscript we will more explicitly describe which rules are based on qualitative relations found in the literature and the ones we proved statistically.

Referee #4: The manuscript should be organized better to allow readers to follow the development of the objectives in materials, methods, and results. The quality of writing should be checked and improved.

Authors' response: We will revise the manuscript for better streamlining the narrative.

Referee #4: There is an excessive use of first person: we ....

Authors' response: There are different perspectives on the use of active and passive voice in articles. We find that active voice makes articles substantially easier to read, but will reduce the occurrence of 'we-formulations' in the manuscript.

Referee #4: The title should be made more effective and to reflect better the objectives.

Authors' response: We improved the title of the manuscript as following: Generating a rule-based global gridded tillage dataset.

Referee #4: The abstract should summarize better the whole manuscript. Referee #4: The Introduction section should be made more fluent and readable. Referee #4: The novelty should be explained better and the objectives made clearer. Referee #4: Methods should be organized better to allow readers understanding how methods have been used. Referee #4: Too short subsections should be merged. Referee #4: Results and Discussion sections would require to be supported by improved Methods and data section.

Authors' response: We improved the manuscript in terms of structural adjustments and better separation into sections. Further we improve the abstract, introduction, data and method, and the discussion in the course of this review process as suggested by all

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referees.

References

Porwollik, V., Rolinski, S., and Müller, C.: A global gridded dataset on tillage area - R-code. V. 1.0., GFZ Data Services. http://doi.org/10.5880/PIK.2018.013, 2018.

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