

Interactive comment on “Added value of geophysics-based soil mapping in agro-ecosystem simulations” by Cosimo Brogi et al.

Anonymous Referee #1

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General comments This paper investigates the added value of geophysics-based soil mapping in agro-ecosystem simulations. This is an interesting work that provides insights on how geophysics-based soil mapping can help improve the outputs of agro-ecosystems simulations. It is well written and the results are of good quality. However, I have some comments below that I think would help increase the quality of the paper and the interest of potential readers of the SOIL journal.

Specific comments First, the authors evaluated the added value of the geophysics-based soil mapping based on crop leaf area index (LAI) simulations and generated interesting results. However, I wonder why in this paper the authors did not simulate

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the crop yield as an additional parameter. I think that it would be of great interest to the reader to assess the added value of the geophysics-based soil mapping on the simulation of the yield of the studied crops using the agro-ecosystem model AgroC. Results with crop yields would help determine e.g. if the added-value of geophysics-based soil mapping could be economically interesting to potential farmers. Sugar beet would be a good case study for yield simulations with the AgroC model as it represents 31.7% of the study area.

Second, the “Conclusion” section is just a summary (repetition) of the key results and provides no perspectives for future research. I am quite convinced that readers of the SOIL journal would be interested to know what would be the next step(s).

Technical corrections L12: “km2” instead of “km²”

L14: “R2” instead of “R²”

L19: “...; Stafford”

L19: “...; Sylvester-Bradley”

L21: “...; Sylvester-Bradley”

L21: “...; Chartzoulakis”

L26: “...; Nussbaum”

L26: “...; Pätzold et al., 2008”

etc. Please check the above typos through the whole text.

L65-66: Could the authors name those few published studies that linked geophysics-based soil maps and crop growth model?

L74, L81, L465: “1 x 1 km” or “1 km x 1 km”?

L81: Could the authors provide the geographical coordinates of the study area?

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L97-98 and similar: top soil or topsoil?

L121: What is the scale of the national soil and yield potential map (NRW, 1960)?

L160-162: Does the description of the four sub-areas (A, B, C and D) refer to a previous work? If so, please provide the references.

L163: I would suggest: "...as a single sub-area BC in this study (Fig. 3)."

L186: Is α the inverse of the air entry pressure or a parameter related to the inverse of the air entry pressure?

L190: The Q term has already been described in L179-180.

L198: "...in dependence of pressure head" or "...dependent of the pressure head"?

L200: The "=" sign next to $\bar{\Gamma}(h)$ is missing in Equation 7. Moreover, Equation 7 needs to be much more clearly written to avoid confusion.

L208: "...using pedotransfer functions (PTFs)" instead of "...using a pedotransfer function (PTF)"

L234-235: "the PTFs of..." instead of "the pedotransfer function of..."

L238: "where" instead of "were"

L242: "...is of primary importance" or "...are of primary importance" (if you refer to both the coarse sand and the gravel horizon 2C)

L255-256: Why starting from 1st of January 2015 instead of 1st of July 2015 for the spin-up simulation?

L267: "leaves" or "leafs"?

L279: The authors should mention what do "Obsi," "Simi" and "n" refer to (see Equation 10).

L300: "This is a consequence of" instead of "This is as a consequence of"

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L310: "values" instead of "vales"

L318: I would suggest: "...topsoil (at 0.30 m depth) in the three..."

L324: I would suggest: (results not shown)

L328, Figure 5: I cannot tell the difference between "soil layer thickness" and "depth" in Figure 5.

L330-331, Figure 5: The figures of the depth range in the text and in Figure 5 are a bit different: 0.47-1.34 m (in the text) vs 0.49-1.34 m (in Figure 5) for the geophysics-based soil map; 0.30- 1.40 m (in the text) vs 0.40-1.40 m (in Figure 5) for the soil taxation map.

L332-334: I am missing something here. It seems to me that the depths (range) of the coarse horizon in the 1:5000 regional soil map (i.e. 0.30-1.50 m in Figure 5) were closer to that of the soil taxation map (i.e. 0.40-1.40 m in Figure 5) compared to the geophysics-based soil map. Please could you confirm?

L354: For sake of uniformity, I would suggest: "mean LAINDVI" instead of "average LAINDVI"

L368: I would suggest: "great water stress" instead of "strong water stress"

L374: I would suggest: "...was the greatest" instead of "...was strongest"

L382: "0.58 m in A1c" instead of "0.58 in A1c"

L385: "matched well the observations" or "well matched the observations"?

L393: I would suggest: "a greater water stress" instead of "a stronger water stress"

L396-397: It seems to me that the error bars in Figure 8c rather show low variability within each unit compared to the error bars in Figure 8b. Please could you confirm?

L407: "LAINDVI reached"

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L420: “results” instead of “result”

L425: “based on the RMSE” instead of “based on to the RMSE”

L425: “consists” instead of “consist”

L427: I would suggest “for both dates” instead of “for both days”

L459: “this reduction in performance was caused...” instead of “this reduction was caused...”

L464: “Conclusion” instead of “Conclusions”

L689: 1:5000 instead of “1.5000”

L695, Figure 4: I would suggest: “...at 0.30 m depth and at 1.50 m depth in the...” instead of “...at 0.30 m and at 1.50 m in the...”

L700, Figure 6: I would suggest “Mean observed LAINDVI” instead of “Observed LAINDVI” as the X-axis title.

L704, Figure 7: “R2= 0.741” (i.e. 3 digits) instead of “R2= 0.741126” (i.e. 6 digits)

L705-706, Figure 7: “. . .representing the highest density and blue the lowest density.”

L709, Figure 8: I would suggest: “the simulated LAI (lines)” instead of “the LAI (lines)”

L710, Figure 8: d, e, f are not mentioned in Figure 8 and are not referred in the caption

L713-714: “on 12th August 2016” instead of “at the 12th August”

L714, Figure 9: “on 8th September 2016” instead of “at the 8th September 2016”

L730, Table 5: “1:5000 Soil map” instead of “1:500 map”

L731, Table 5: I would suggest “12th August 2016” and “8th September 2016”

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