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Why do they keep rejecting my manuscript – do's and don'ts and new horizons in pedotransfer studies

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Introduction

Pedotransfer-related research, involving both the development and practical application of these functions, appears to be gaining speed internationally. As cited in this volume (PACHEPSKY et al. 2015), a growing number of studies related to pedotransfer functions (PTFs) have been published world-wide in recent decades. New mathematical techniques are being introduced, new data are increasingly available in terms of data type, quantity and geographical coverage, and there is a greater scope/range and extent of potential applications than ever before. These developments are reported in newly published literature and are periodically summarized in review articles and books (e.g. WÖSTEN et al. 2001; PACHEPSKY & RAWLS, 2004; MINASNY, 2007; VEREECKEN et al., 2010; MINASNY & HARTEMINK, 2011; PACHEPSKY et al., 2015).

What is usually not visible to the reader and the interested (young) scientist is that the number of submissions in this subject area well exceed the number of papers eventually published, and that authors often face the frustrating and disappointing experience of their study being rejected by international journals, possibly recurringly, prior to successful publication, if that happens at all.

All too often there is pressure on scientists to increase the number of scientific papers they publish. To meet this demand, compromises are often made on how much scientific content is to be included in a research paper and to what depths the analysis and discussion of findings goes. When these driving forces are combined with relatively small publishing experience by the author or the team, the author(s) may receive disappointing feedback from reviewers and eventually from the editor of a journal.

Since it is the joint interest of readers, authors, reviewers, editors and publishing houses that scientific results should be reported as high impact, high quality studies without unnecessary, avoidable delay, it seems sensible to try and support authors in developing and reporting their PTF-related research efficiently, so that the overall value of their work, together with their publishing experience, will improve.

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The information reported in this paper is based on an anonymous online survey of a group of scientists with substantial experience in publishing and/or reviewing and/or as editors of PTF-related papers, and is intended to assist authors in executing and reporting PTF studies successfully.

Materials and methods

Twenty scientists were asked to participate in an anonymous online survey in 2012 using the Qualtrics online survey platform. These scientists were selected from a pool of scientists who were known to have extensively published, reviewed and/or served as journal or book editors of soil PTF studies internationally. The names of the invited scientists are provided in the Acknowledgements.

The respondents received 12 questions, which were focussed around establishing their reviewing/editorial experience, collecting information on their recommendations/decisions and the reasons behind them, and asking their opinion about the future of PTF-related publishing, and their advice to authors on directions/aspects they encourage authors to pursue. The questions were a mix of simple choice, multiple choice and free text response questions, with the option that the respondent could raise new subjects or new response options to certain questions.

The respondents were asked how long they had been reviewing/editing PTF- related papers, approximately how many they had evaluated, what percentage they thought they had rejected and what the main reasons for rejection were (multiple choice + free style). They were subsequently asked if they saw PTFs as having a future in main-stream journals/conferences, with the option of commenting on their simple choice. The survey asked whether they felt some aspects of PTF research were overrepresented, or on the contrary, underrepresented, in main stream publishing.

The respondents were subsequently asked to give their views on what direction PTF research should take in the near/intermediate future and what advice they would give to less experienced authors, and to raise any further subjects they would like that belonged to the subject but was not covered by the survey.

Results

Nine of the invited scientists responded with a fully completed survey. One scientist felt he was not sufficiently experienced in the subject in terms of judging papers, and at least two scientists indicated that they could not respond within the admittedly short timeframe given to the respondents to complete the survey. The author has no additional information on why others elected not to (or were unable to) participate in the survey.

The responding scientists reported a reviewing/editing experience of between eight and 30+ years in the subject area, with a mean and median of 15 years. Three respondents reported reviewing less than 10 PTF-related papers in this period, two

reported having reviewed/edited 10–25 such papers, three reported having reviewed/edited between 25 and 50 PTF-related submissions and one scientist reported completing more than 50 such reviews/edits. These statistics would appear to establish the credibility of the opinions given on this subject.

Three, one, three and two scientists reported having suggested rejection for less than 25%, 25–50%, 50–75% and more than 75%, respectively, of submissions they had to make a recommendation or decision about. It was a notable trend that the least experienced PTF reviewers/editors (i.e. less than 10 reviewed papers) reported suggesting rejection of the smallest proportion of papers (i.e. less than 25%). There was no other notable trend among the other six respondents, but it is important to note that three of the six more experienced reviewers/editors rejected at least 50% of the submissions, and two more rejected at least 75% of them. It is difficult to assess the history of papers resubmitted to different journals, as their reviewing history rarely follows them, but it is very likely that several studies were rejected by several different journals, whether seen by the same reviewers or different ones.

The reason(s) for recommending rejection is perhaps the most important information for authors. This question was presented as a multiple-choice question, with the option of adding more reasons than were offered by the survey. First and foremost, 89% (i.e. eight out of nine) of the respondents reported having rejected a paper in which, in their judgement, the authors utilized an "insufficient amount or quality of data". Four additional reasons for rejection were marked by the majority (67%) of the respondents: lack of novelty, lack of innovation, lack of depth in the analysis, and inappropriate or insufficient use of statistical tools. Furthermore, 56% were critical of the presentation and discussion being too specific for the given data set, i.e. not allowing much generalization of the results. Additionally, 33% of the respondents judged a submission negatively for presenting a very weak discussion, or no discussion at all. These major points were marked by the respondents across the board, i.e. no relationship could be shown with the degree of reviewing/editing experience.

All respondents agreed that PTF-related studies have a future in mainstream journals and conferences. This is confirmed in practice, as new PTF-related studies have been abundantly published since 2012 (the year of the survey), be those developments in methodology, new variables used to develop PTFs, or other new aspects. Some such examples include, but are not limited to those by HAGHVERDI et al. (2012), introducing a new approach; TÓTH et al. (2012), introducing a new method and working with a specific group of soils; LAMORSKI et al. (2014), introducing a new data source for a known soil property; TÓTH et al. (2014), introducing a "customer-first" approach to develop new PTFs for Europe; BABAEIAN et al. (2015), introducing a new data type; and GHANBARIAN et al. (2015), introducing a new method and examining a scale issue. The respondents were also asked to provide their view on what subjects are over- or under-represented in current PTF studies and what new aspects they would recommend for study. Their views are embedded in the discussion section below.

Discussion

Reviewers and editors often see a recurring scheme in submitted and negatively judged pedotransfer development studies, with many or most of the following elements: a dataset consisting of a few dozen samples is assembled locally, and multiple linear regression (MLR) equations are subsequently developed to estimate, e.g., field capacity and/or wilting point from commonly used variables (i.e. sand, silt, clay content, and bulk density or organic matter content). These endemic PTFs are then compared, using the endemic data set (or part of it), to one or more well-known foreign PTFs, using R^2 or RMSE metrics in a generic manner as the sole criterion to judge their performance on local data. Often minimal differences are claimed to present improvement, without any statistical test being performed. Conclusions on the "superior" performance of the endemic PTF are presented as a result that confirms the findings of other, earlier publications.

The most common reasons for manuscript rejection in PTF research often go together, and the above pattern carries multiple aspects that reviewers continue to see negatively. For example, it is important to think of the statistical support that the data allow, as well as the range of soil properties that the data cover. In a growing number of PTF studies the use of only 30–40 soil samples is reported – often including the validation data. This does not usually lend reliable statistical support to a PTF study, especially if subgroups are formed within the data, and does not allow the drawing of generic conclusions that are of interest to most international readers.

The reader needs to learn new information that has relevance, and provides new information for his studies. What is of the utmost interest to the international readership is, for instance, the ability to isolate the real reason for a statistically supported improvement in PTF performance. When, for example, an endemic MLR equation is compared to a foreign artificial neural network (ANN) model that was developed from a differing set of input variables, there are already three factors that were not kept the same: each single factor or their combinations could be the reason for any differences. Therefore, no general conclusions can be drawn as to which of these factors was the reason for any improvement in performance. The study should be designed to allow factor-by-factor comparisons, which may ask the authors to reconsider what method or data/variable set they use, or what foreign PTF they should compare their study to – if they are comparable at all.

The statistical evaluation of the findings (i.e. significance testing) is increasingly important, especially when the claimed improvement – if any – is fairly small. The use of resampling techniques (e.g. LILLY et al., 2008) shows that an R^2 or RMSR (or other metric) may vary over a relatively wide range, using a resampled subset of the same master data set. This warrants that authors need to be able to distinguish "chance" improvements from real, statistically significant improvements. Splitting a master data set into a development and validation data sets only once is likely to be seen negatively by the reviewer.

When the available data set is indeed rather small, it may have to be conceded that the statistically supportable conclusions will be rather limited, so reviewers/editors may judge that the study will not move the state of the art forward, and

thus is not of substantial interest to the international readership. Nevertheless, many studies may need to find solutions for estimating soil properties for practical local applications. In that case, authors are encouraged to include PTF development of local interest in a wider application study, and to publish it as part of that, rather than as an individual research paper.

Regardless of the final purpose – whether it is a research PTF paper or a PTF study for practical applications – a set of advice was formulated from the responses to help authors infuse more innovation and depth into their PTF-related studies.

The first group of advice focusses on what novel aspects to cover, keeping in mind that (1) some of these have already been covered by a limited number of studies, and (2) the list provided cannot possibly be all-inclusive, given that new knowledge, data types and quantities, as well as measurement and PTF techniques will constantly arise.

- While water retention and saturated hydraulic conductivity are overwhelmingly the variables of focus – and there is a good reason for this – authors are encouraged to explore the estimation of other properties as well, such as e.g. unsaturated hydraulic conductivity. There are also vast areas for which even simple-to-measure properties are missing, but are needed for various assessments, such as e.g. soil bulk density. Nevertheless, the choice of a PTF-estimated property should be driven by practical considerations, i.e. what are those properties that users/applications need, but that are not available and are difficult to collect by other methods.
- Research towards and improvement of any existing soil inference system is encouraged. These systems allow a cascading estimation of several soil properties, using not only hard input but also estimated properties to estimate additional soil properties. One very important aspect of inference systems that needs wide attention is the potential propagation of estimation error and uncertainty.
- Growing interest is shown by stake-holders in seeing a quantification of uncertainties in impact studies as well as in mapping applications. Since any study that uses PTF-derived soil information inherently includes some degree of uncertainty, the exploration and quantification (reduction) of this uncertainty should be a topic of research.
- Help fill knowledge gaps in underrepresented areas, soil, vegetation, land-use types, etc., and contribute to filling world databases with the underlying data.
- There is still insufficient focus on utilizing simple data that are available from field surveys. Even many of the large, internationally collected databases show severe limitations in describing field survey data for many samples. Strive to collect and document such information in any new data collection, and use it if the data quantity/quality allows.

- Soil textural properties and generic and/or qualitative structural properties dominate the soil data used as inputs to PTFs. The benefit of using quantitative soil structure-related information in PTFs should be widely assessed, especially since many existing studies report greater PTF inaccuracy in the wetter part of soil hydraulic characteristics.
- Capturing variability in soil hydraulic properties is a coveted subject at all scales and dimensions. There should be more research on the extent to which PTFs can capture and describe spatial variability in soil hydraulic properties. In certain land-use systems, there is substantial temporal variability in soil hydraulic properties, which has not yet been sufficiently studied.
- It would also be worth exploring whether PTF-derived data could help delineate functionally more uniform mapping units, aka hydrologic response units.
- The effect of measurement scale and measurement methodology should be further addressed. Information on measurement scales and methodology should be posted along with the data and derived PTFs for future reference. The field-scale relevance of laboratory-derived data also still requires more attention.

The second group of advice is more related to how to infuse innovation into PTF studies, including new types of data, new methodology, etc.

- Seek additional, innovative tools to derive PTFs. While doing so, however, strive to find real justification for why a certain method may work better than those tried earlier. Such justification can be established e.g. from the aspect of its flexibility to cover multi-dimensional relationships, but may also be rooted in its simplicity or transparency in handling the same task. Try to avoid delivering a simple method comparison study only using the best-documented techniques.
- Tools to derive PTFs are not the only way to infuse novelty into PTF studies. Strive to widen your scope and outlook at the various ends of PTF research. Find new applications that can benefit from PTF-derived data. Keep it in mind that PTFs are not an aim in themselves. They are meant to improve our ability to fill in data gaps for applications.
- Test and report the functionality of PTF derived information in the application it is meant to serve. Use the derived data in the planned modelling and/or mapping study and check its performance against ground data, where possible.
- Novel indirect measurement or imaging techniques can yield inputs that are worth exploring. Proximal sensing and remote sensing techniques as well as laboratory-scale imaging techniques, e.g. MRI or X-Ray computed tomography, are technologies that provide increasingly available and affordable data. Before using any such data as inputs, establish the hypothesis of why they are expected to be related to the variable that is estimated.

The third group of advice is intended to suggest some practical considerations while executing and reporting PTF research.

- When choosing candidate PTF development tools, consider their main limitations. Some tools are better for research purposes, but are not transparent and are too complex to be widely applied, while others are too simplistic to offer much improvement, but are simple to apply.
- Making improvements in a statistical metric on PTF accuracy or reliability is not the only way a PTF can benefit the scientific community or application studies. Strive to find simple models that work as efficiently as more complex ones do. This may, for example, entail isolating inputs that can be disregarded without loss to the PTFs functional performance, or proposing a simple, rather than a more complex model type or structure.
- Do not perform a simple statistical exercise, but rather seek a deeper understanding of interactions between soil/environmental variables. Do variance/covariance analysis. Analyse the estimation residuals and examine what they may relate to. These may help delineate patterns of improvement for certain data subsets.
- Be creative and go beyond the data-analysis pattern that many submissions present (and was schematized above). Use an innovative mix of statistical tools along with the commonly used ones, which can still serve comparative purposes.
- While using any statistical tool, learn and understand its Achilles heel! Use it to its full capacity, but understand and consider its limitations. Examining, reporting and discussing performance differences by soil groups or by ranges in continuous variables may present very useful information to the reader. Fig. 1c schematically demonstrates why an overall RMSR, ME or R^2 will not necessarily be conclusive for any PTF performance. The "X" and "O" schematized error populations will have fairly similar RMSR, ME and R^2 metrics, while performing completely differently for the different ranges of data along the axes.
- Remember that PTF methodology is a variable in itself, which needs to be accounted for when comparing PTFs.
- Provide as much meta-data on the soil, the environment, land use, methodology and its settings as you can, for future reference.
- Try to adhere to international standards, so that comparisons and cross-study testing remain possible.
- Explore and discuss reasons for different model performances, whether it be a comparison with an external PTF, or a more detailed examination of your own data. Explanations can often be found in the underlying data, whether they are part of the strictly used data set or only used as metadata. One popular explanation for findings is that foreign PTFs cannot be applicable for a given geographic area. While this statement may be true in the overwhelming majority of cases, a difference in the geographic area is not the true reason for a PTF to fail. Usually, little is presented about the underlying

data, while differences in underlying correlation patterns are the true reason for a PTF performing well or failing. Fig. 1a,b shows examples of schematic data populations where one may find completely different data ranges that show very similar linear correlation (plot a), while plot b depicts a scheme in which the "X" and "O" populations cover the same data range along the x and y axes, while they have completely different correlation patterns.

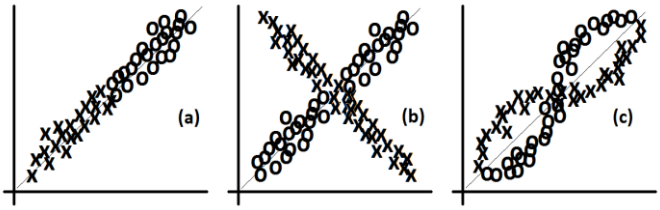

Fig. 1
Schematic representation of data populations: (a) two different data ranges that show similar linear correlation; (b) two very similar data ranges along x and y that present greatly different correlation patterns; (c) two data populations (e.g. error patterns) that will be difficult to differentiate using simple overall RMSR, ME or R^2 metrics.

- Support any claims of performance improvement with significance testing. This will also require weighting the amount of data one has vs. what result one intends to conclude about. It should not be forgotten that if a simpler model seemingly performs better than a complex model (e.g. a simple model leads to an RMSR that is not significantly different, but smaller than that of the complex model), it may not be necessary to conclude that the simple model is better in order to claim an interesting result. If a simple model is no worse than the complex model, as supported by the error metrics scheme presented in the previous sentence, the reader (reviewer, editor) may still be interested.
- Keep the general idea of PTFs in mind, which is to estimate expensive and difficult-to-measure properties from simple, available, and/or cheap-to-collect variables. Exceptions may exist, when e.g. a study points towards innovative future applications, anticipating advancements and/or changes in data availability or cost. With the arrival of new data collection techniques, the old mantra of some variables being "difficult and costly to measure" may also need reconsideration in some cases.

Conclusions

This paper aimed to summarize advice from an experienced pool of reviewers and editors of PTF research papers on what it takes today to publish advanced, innovative PTF-related papers, and what the most common bottle-necks are.

These guidelines are neither exclusive nor all-inclusive. It is possible to publish without all the above being met, but certain aspects of a study should still carry above average value.

It must be kept in mind that reviewers, editors and publishers look at research material from different angles than the authors themselves usually do. A study is placed in the wider context of the state of the art, which often points well beyond the cited literature. Studies that are rejected are sometimes resubmitted to another journal without any meaningful consideration of earlier comments that were noted as reasons for rejection. Today, the reviewer pools that different journals use greatly overlap, so there is a substantial chance that the authors will receive very similar or the same feedback, while they risk damaging their reputation, if the review process is not anonymous.

The suggested topics and aspects cannot be all-inclusive, and they will need to be updated as progress is made. However, advice on what patterns to avoid is likely to remain applicable longer. Admittedly, advances have taken place in PTF research since the year of the survey, some of which were cited earlier and tend to justify the call formulated by the survey responses.

As a final remark, it should be noted that while proper language, organization and writing style should be and are expected from international submissions, the respondents did not cite the lack of these as reasons for rejecting a manuscript. It is well understood that non-native speakers face greater linguistic challenges when attempting to publish their research in international journals. However, when the scientific aspects in a paper are positively judged, reviewers and editors often help chisel the language and style of a manuscript. Authors should also be aware that editorial offices are increasingly able to point the authors towards affordable text editing services, when there is no native speaker among the co-authors who can take that responsibility.

Summary

Research on pedotransfer functions (PTFs) is still gaining speed, as witnessed by recent publication statistics. What those statistics do not show is the volume of manuscripts recommended for rejection in this subject area across scientific journals of relevance. In order to help future authors of PTF manuscripts to publish their studies more effectively, an anonymous online survey asked scientists with experience in the subject area for insights into their reviewing/editing portfolio and to give advice on how to improve submissions. Nine of the 20 invited scientists, with a median experience of 15 years in judging PTF manuscripts internationally, responded. The majority of them, especially the most experienced reviewers, reported having rejected at least 50% of the manuscript submissions they judged up till the date of the survey. Eight of the nine respondents marked the insufficient amount or quality of the data as a reason for rejection, making this the most frequent reason for a negative recommendation, while 2/3 of the respondents also specified the lack of novelty, lack of innovation, lack of depth in the analysis and the inappropriate or

insufficient use of statistical tools as reasons for the eventual rejection of the manuscript. The responding scientists were asked to provide advice to future PTF manuscript authors on what aspects of PTF research they thought worthy to pursue further and to provide some practical tips towards executing studies. The resulting set of advice is presented as part of the discussion. While the suggestions formulated in this publication are by no means exclusive or all-inclusive, authors of future PTF studies are encouraged to consult them prior to submitting their manuscripts to an international journal.

Keywords: pedotransfer function, manuscript rejection, innovation, statistics, data quality

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