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Hydrology and Earth System Sciences Discussions

Interactive comment on "Linking hydropedology and ecosystem services: differential controls of surface field saturated hydraulic conductivity in a volcanic setting in central Mexico" *by* A. Gómez-Tagle

Anonymous Referee #1

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General comments

1) Does the paper address relevant scientific questions within the scope of HESS? YES

2) Does the paper present novel concepts, ideas tools, or data? The data are from a poorly studied, but pedologically interesting area in Mejico.

3) Are substantial conclusions reached? NO. That current land cover and land use alone do not explain the variability in Kfs is hardly a new insight. The ode to the

'hydropedological approach' is entirely out of order and most embarrassing. It seems that a disciple of the hydropedology cult is trying to please his guru.

4) Are the scientific methods and assumptions valid and clearly outlined? NO.

5) Are the results sufficient to support the interpretations and conclusions? NO, see specific comments

6) Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists? NO.

7) Do the authors give proper credit to related work and clearly indicate their own new/original contribution? YES.

8) Does the title clearly reflect the contents of the paper? NO. The title is completely misleading. It should read: The effects of land use and land cover on near-surface hydraulic conductivity in central Mejico.

9) Does the abstract provide a concise and complete summary? NO. It is too long and misleading in that is gives about as much space to the actual study as it does to unwarranted speculation not borne out by the data.

10) Is the overall presentation well structured and clear? YES and NO: the hypothesis is poorly phrased.

11) Is the language fluent and precise? NO. See technical corrections below.

12) Are mathematical formulae, symbols, abbreviations, and units correctly defined and used? YES.

13) Should any parts of the paper be clarified, reduced, combined, or eliminated? N/A
14) Are the number and quality of references appropriate? YES.

Specific comments

L12-15: This paragraph, apart from being unintelligible (see below), is but a random

sequence of catch phrases ('hydropedologic approach', 'critical zone', 'spatial and temporal scales') that is best omitted. L15: What are 'regulation ecosystem functions'? Please explain. L12-22: This paragraph is so fuzzy that it may well be omitted; it certainly does not entice the reader to continue. L23: 'regulation ecosystem functions ' – see above: what is this supposed to mean?

Chapters 2.3.2 and 2.3.3 Here's the crucial problem of this manuscript: the author decided on ANOVA as the tool of choice for analysing the data, but the sampling design does not accord with this choice. Put another way, it appears that ANOVA was an afterthought – "now that I have collected the data, what should I do with them?" A less charitable interpretation is that the author is not entirely comfortable with this aspect of data analysis. According to the author, there are two variables that bear on Kfs: Land cover and soil type, the latter encompassing Acrisols, Cambisols, and Lixisols (see p. 2505). Taxonomic units per se do not affect Kfs, but some diagnostic properties used to differentiate among those three do happen to affect Kfs, e.g., changes in clay content with depth or clay mineralogy. To sort out the respective influences of land use/land cover and of intrinsic soil properties (i.e., independent of land use), all land uses/land covers must be available on all soil types. Without an attempt to achieve this, ANOVA is not applicable, and if it is applied nonetheless, its results are difficult to interpret, if not meaningless. Furthermore, to account for variability within soil types, there must be repetitions, e.g. several 7x7 grids per land use-soil type combination. The only way to get past this, and then only barely, is by showing that all land uses/land covers are on the same soil type, and even then there is no way to avoid the problem of pseudo-replication. But this does not seem to be the case; worse yet, in 2.3.1 the author explicitly refuses to provide this crucial information – one wonders why. It is not obvious how this fundamental flaw in the sampling design might be overcome, short of rethinking the sampling design and sample again. Therefore, I refrain from further specific comments (apart from those already provided) because I fail to see how this ms can be 'rescued'.

P2508, L21. The cited references do indeed show lognormal behaviour of Ks at some soil depth, but that doesn't apply here because this manuscript deals with near-surface Ks, which is not necessarily distributed in a lognormal fashion, see Elsenbeer, H., D.K. Cassel, and J. Castro. 1992. Spatial analysis of soil hydraulic conductivity in a tropical rainforest catchment. Water Resour. Res., 28 (12), 3201-3214. The author should present a visual summary of the data sets (e.g., grouped box plots) in addition to, or even instead of, numerical summaries in tables, or at least augment those summaries with non-parametric estimates of location and spread.

Chapter 3.2.2 It is not surprising that 'Geostatistical analysis of data did not yield good results', for the same reason that ANOVA did not yield good results: just as the sampling design does not accord with the objective of detecting differences in Kfs as a function of land use, it does not accord either with the objective (which was not explicitly stated as such anyway) of detecting spatial patterns!

Technical corrections

This is but a small collection (it covers 30 lines on one page!) of language-related problems to give an idea of the extent of this problem. It is not a reviewer's job to rewrite a manuscript, so I leave it with this small sample and conclude that a major rewrite is in order, preferably with the assistance of a native speaker.

L2-3: This paragraph must end with a period. L4: This paragraph is then a new clause, and must begin with In. L9: '. . ..that ecosystem services got into public and government concern worldwide'. Poor semantics, consider instead '. . .that ecosystem services received global concern.' L10: Poor choice of tense – it should read 'has lead' instead of 'had led' L10: Poor semantics – it should read 'natural and transformed ecosystems' instead of 'the natural and transformed ecosystems'. The proper use of articles in English is, for example, explained on p. 51 and onwards in Swan M. 2005. Practical English Usage, 3rd edition, Oxford University Press. L12: Poor syntax: what exactly does the hydropedological approach do? Embrace a link or build a bridge, or both?

And if both, what's the difference? What is doing the 'studying' – the hydropedological approach? And whatever is doing the studying, what exactly is it studying – the critical zone? Its functioning? If the latter, what does 'its' refer to? L17: The term is 'vadose', not 'vado'. L24: Replace 'varies for each event ' with 'varies from event to event'. L25: 'it's' is short and colloquial for 'it is', which does not make any sense here. What does make sense here is the possessive pronoun 'its'. L27/28: 'importance FOR', NOT 'importance TO'

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 6, 2499, 2009.