

Interactive comment on “Natural laws of precipitation, great cycle, infiltration overland and groundwater runoff with a new formulas” by A. Dj. Valjarevic and D. J. Valjarevic

Anonymous Referee #2

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Review comments on: Natural laws of precipitation, great cycle, infiltration overland and groundwater runoff with a new formulas by A. Dj. Valjarevic and D. J. Valjarevic

Summary

I agreed to review this paper because I was intrigued by the title, and because I have recently had reason to follow the L'vovich theory.

Please note that the name is spelt as L'vovich in the West, following his book translated into English by AGU. I will continue to use the L'vovich spelling, because I am familiar with it, and I believe that is how it is spelt in Russian too.

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That being said, I am totally disappointed with this manuscript. It is poorly written (both in terms of English, but also in terms of general presentation). It only includes obscure references and not one reference to L'vovich himself.

Even more importantly, the paper misinterprets L'vovich's theory and contributions, and displays a lack of understanding of the applicability of his method. I will present detailed comments below, as I understand the paper. I am very doubtful that this paper can be accepted for publication in HESS (unless the authors make substantial improvements – this will be not be easy).

In hindsight, I suspect that this paper should not even have reached the HESS(D) stage until all of these problems had been addressed.

Detailed Comments

1. I agree with the authors that L'vovich is an eminent Russian hydrologist, who is much less known in the West, except through the following book (which I bought in 1983): L'vovich, M. I. (1979). *World Water Resources and Their Future*. Translated into English, American Geophysical Union.

The work of L'vovich is also referred to in two other publications in the *Journal of Hydrology*:

Ponce, V. M. and A. V. Shetty (1995a). A conceptual model of catchment water balance. 1. Formulation and calibration. *J. Hydrol.*, 173, 27-40.

Ponce, V. M. and A. V. Shetty (1995b). A conceptual model of catchment water balance. 2. Application to runoff and baseflow modeling. *J. Hydrol.*, 173, 41-50.

These papers did not have any impact on Western literature until last year. The authors may want to look at two papers that appear (in press) in *Water Resources Research*.

Sivapalan, M., M. A. Yaeger, C. J. Harman, Xiangyu Xu, and P. A. Troch (2011). Functional model of water balance variability at the catchment scale. 1: Evidence of hydro-

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logic similarity and space-time symmetry. *Water Resources Research* (in press).

Harman, C. J., P. A. Troch, and M. Sivapalan (2011). Functional model of water balance variability at the catchment scale. 2: Elasticity of fast and slow runoff components to precipitation change in the continental United States. *Water Resources Research* (in press)

2. I do like the L'vovich approach. However, one should be aware of the limitations of the approach. The L'vovich approach (if you want to call it a theory) is only applicable for (1) annual water balance, and (2) for natural (pristine) catchments which have self-organized over long periods through co-evolution.

The method (being purely empirical) is not valid for time or space scales other than for which they were derived: annual and pristine catchments

I would be very hesitant to use big words like "natural laws" and "great cycle" etc. L'vovich theory is entirely based on empirical analysis of observed data – and developed almost 50 years ago when data was much more limited than even what we have.

3. I have tried to follow the mathematical development presented in the paper: it looks rather trivial. To call it even mathematical development is a huge claim.

4. Even if I understand their theory, what is the extension that the authors have made to warrant publication of their paper? I cannot understand what they are doing. Did they collect new data to validate their analysis? Where do the numbers that they are presenting come from? I see a few data points in the figures, but no explanation where they came from.

I see mention of whole continents, such as Africa, South America: no mention where they got their data from. It appears that the authors are extending the theoretical development, just on the basis of data presented in L'vovich's original work published 50 years, and in a new context. But I am concerned that they have not done much original work.

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5. They claim to be applying their theory to permeable terrain. What do they mean by permeable terrain? This is not explained well, in a satisfactory manner for me to understand. There may be something here (I am aware of some of L'vovich's thoughts based on what appears in the book I have), but I cannot grasp it with what is presented here. It is up to the authors to present their work in a style that the average reader can understand. The paper fails in this respect.

6. For the paper to be considered further, the authors should (i) reformulate the paper to bring out the novel elements they have introduced, and motivate these better, (ii) remove the trivialities of the mathematics, bring out the hydrology more, and (iii) improve the presentation (including English, but not exclusively).

Interactive comment on *Hydrol. Earth Syst. Sci. Discuss.*, 8, 59, 2011.

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