Hydrology and Earth System Sciences

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Discussions

Interactive comment on "The effective porosity and grain size relations in permeability functions" *by* K. Urumović and K. Urumović Sr.

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Below you will find author's responses to the comments of the Anonymous Referee #1. Corrected sentences, as will be put in manuscript, are inclosed in quotation marks. We hope that our responses answer her/his questions. We would also like to thank Anonymous Referee #1 for her/his help and effort in contributing to this manuscript.

Comment 1 – General comments: The presented research study aimed to investigate the relation between mean grain size and effective porosity with permeability. It discusses an interesting idea to evaluate different indication of grain size which can be used as universal parameter for all grain type ranging from gravel to silty clayey deposits. The manuscript, however, requires a significant revision to be read and un-

derstood clearly. The body of manuscript needs to be reconsidered to be more intuitive and consistent and it also needs proof reading.

Answer: This article was designed to please two target groups of readers and researchers. The first group was experts interested in practical reliability and applicability of studied methods. This target group's requirements should be met in summary, Equations 11, 12 and 13, Figures 5 and 14 and conclusions. The second target group was researchers of various provenances, interested in researching permeability and effective porosity of diverse clastic materials. The specific surface area is also a parameter that is of special interest and is directly linked to before mentioned parameters This target group would probably be interested in argumentation of given solutions. Interest of both mentioned target groups should be satisfied through the complete text and therefore the authors believe that shortening and/or deleting any part of this manuscript would maim the integrity of conducted analyses and arguments of conclusions.

Specific comments:

1. The information provided into the manuscript by section 3-1 and specifically equations 1 and 2 are not clear and if true it is suggested that they are removed.

Answer: Section 3.1 is very important, since it describes the mechanism of water flow through the porous media and relations of forces. Above mentioned topics are the bases of flow through the porous media. The section is rather short and concise. Equations 1 and 2 should be clear, since they are mathematically correct and describe above mentioned mechanisms.

2. The parameters of Daa, Dag and Dah were used in text, table and figures but were never defined in text.

Answer: The parameters Daa, Dag and Dah are results of different ways to calculate mean grain as relation between separate sieves and whole sample. The authors agree that it would be smart to describe them explicitly. Therefore the authors propose that

following sentence should be added in revised text (page 6683, row 10): "Arithmetic mean of grain size for every sample is calculated for arithmetic Daa, geometric Dag, and harmonic Dah mean grain size of individual sieve in every separate sample, respectively."

3. Figures caption needs to be more informative with detailed explanation of each graph. Figures 2,8 and 10 do not seem to be required.

Answer:Figure 2 presents graphical explanation of section 3.1, specially equations 1 and 2, therefore the authors believe that it is needed in text. Figure 8 and 10 are also very important. These are the photos of the very sediments that were analyzed. Analyses of the materials presented on these photos results with largest errors at determining K using "mean" or "effective" grain size, as a consequence of specific texture of sediment. Results of analyses are given on figures 7 and 9, and tables 1 and 2. Therefore, these figures (8 and 10) additionally contribute to credibility of all the analyses in this article. Since the authors are applied hydrogeologists, and were present during the core drilling with sampling we believe that it is very illustrative to present such photos, with means to visualize analyzed materials.

4. Figures 11 and 12 are not used!!

Answer: The figure 11 is described as a summary of correlations of all the incoherent materials. It will be stated on page 6690 line 7 The figure 12 is described as a presentation of graphical correlation between the tested (Kt) and the predicted hydraulic conductivity using geometric K(Dlng), and arithmetic (K(Daa) and K(Dah)) mean grain size. This explanation will be used on page 6691 line 15

5. Table 1:Please provide absolute values not percentage in difference

Answer: In table 1 percentage of difference is presented because this is the way of evidently indicating precision of respective procedures. Tested value of K is also presented, so that interested reader can easily calculated absolute values.

6. Table 2: Better to keep the same parameters presented in Table 1. What Geom. and Arithm. means and where they come from? It needs to be explained in the text or preferably in the caption of the table.

Answer: The authors believe that it is very important to keep Table 2 as is. It does not present the same parameters as Table 1, therefore it cannot be presented equally. Geom. and Arithm. means stand for ways of calculating hydraulic conductivity in the borehole e.g. as a result of determining mean value of all the samples from every specific borehole (SPB-1, 3, 4, 5, 6.), along with average K of all the wells. This value (Aver.) is compared with K value of the aquifer determined using pumping test analyses (K/Kt). Table indicates that K(Dlng) is the most precise way of calculating K.

7. Section 4.1.3 and Table 4: It would be easier and more informative if these data are presented in a figure. No need for table as it does not provide any information more than R value.

Answer: The authors believe that Table 4 is needed because it clearly presents R values for separate materials and for bulk of analyzed materials. It is linked with Figure 14 and presents graphical correlation for all the samples, from clay up to gravel. It is very much needed because it is the summary of all the conclusions.

Detailed comment:

6677: Line 1-3: Needs to be rewrite.

Answer: "An effect of granulometric composition of granular porous media on its basic hydrogeological properties, e.g. transmissivity, accumulation and suction parameters is both a practical issue and the permanent scientific challenge."

6678: Lines 14: Average mean or mean?

Answer: Mean

6678: Lines 18-20: Long sentence needs to be re-write to be read easier.

Answer: OK, long sentence will be shortened into two sentences. "In hydraulic conductivity calculations Kozeny-Carman equation was used, with means to discover the algorithm for calculating the referential mean grain size. Referential mean grain size, along with effective porosity, generates harmonious parametric concept of porous media geometrics impact on its transmission capacity."

6678: Line 22: researches =>research studies

Answer: OK, will be corrected

6681: Line 11: specific surface area

Answer: OK, will be corrected

6681: Line 16: end => and

Answer: OK, will be corrected

6683: Line 11: specific surface area

Answer: OK, will be corrected

6683: Line 18: then => than

Answer: OK, will be corrected

6684: Lines 19-24: duplicated

Answer: Confirmed, sentence in lines 19-23 will be deleted

6684: Line 20: Fig 4 is used before Fig 3

Answer: Figure 3 will be quoted on page 6682 line 10

6690: Table 4 comes before Table 3

Answer: Table 4 presents common view of R2 values of all the analyzed materials, both incoherent and coherent. That is the reason why it is mentioned at the end of the

section describing correlation of incoherent materials, e.g. before Table 3. Results of analyses of coherent materials are presented in Table 3.

Appendix to these corrections

Table 3 is not correct. Dah is noted as form of geometric mean grain size. It should be together with Dag and Daa, as Arithmetic mean grain size. This mistake was made during typesetting but the authors did not notice this mistake. Table 3, as it should look like is in the supplement file (Table3.pdf).

Please also note the supplement to this comment:
http://www.hydrol-earth-syst-sci-discuss.net/11/C4103/2014/hessd-11-C4103-2014-supplement.pdf

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 11, 6675, 2014.

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Discussion Paper