Hydrol. Earth Syst. Sci. Discuss., 5, S1256–S1258, 2008
www.hydrol-earth-syst-sci-discuss.net/5/S1256/2008/

Hydrology and Earth System Sciences Discussions

Interactive comment on "Influence of aquifer and streambed heterogeneity on the distribution of groundwater discharge" *by* E. Kalbus et al.

M. Westhoff (Referee)

m.c.westhoff@tudelft.nl

Received and published: 26 September 2008

General comments

The paper discusses the importance of heterogeneous aquifer and streambed layers for the spatial distribution of groundwater discharge to the stream. As the authors address, this heterogeneous streambed layer is often not applied in regional scale groundwater models. Therefore it is a relevant scientific question, and suitable for HESS.

The structure of the document is clear and it is written in proper English.

However, there are a few things I would like the authors to give some extra attention to:

1: I miss some discussion about the chosen variance of ln(K). Why can the measured variance of ln(K) not explain the variance in the groundwater distribution? It seems to me that certain processes are missing (e.g. preferential flowpaths), which makes the basic assumption of matrix flow arbitrary. So, please explain in more detail why it is valid to adjust the variance of ln(K) to 2.1.

2: Both case C and case D use a heterogeneous streambed with the same stochastic parameters (mean, variance and correlation lengths of K). Of all the possible K-fields, case C uses the special case that the streambed is fully connected with the aquifer, while case D uses just one other (I suppose) randomly chosen connectivity with the aquifer, which results in a different groundwater discharge distribution. The questions which remains is how well (or bad) the streambed is connected with the aquifer, and what will be the result of different connectivity values. I would like to see a relation between a measure of connectivity and the groundwater discharge distribution (expressed in, for example, the variance of Q).

Specific comments

P2203 line 5-8: "the temperature distribution... ...respective point in time". It wasn't clear to me what you mean with this.

P2203 line 16: What was the variance of the observed ln(K)?

3.2 Scenarios: Are for the different cases, where a heterogeneous K-field was applied, the K-fields exactly the same as in the base case, or were only the same mean, variance and correlation lengths used?

4 Results and discussion: The different discharge distributions are only shown in figures . It would be useful for comparison if you quantify the distribution by, for example, the variance.

P2208, line 5: How large should the variance of ln(K) be in order to mimic the base case?

HESSD

5, S1256–S1258, 2008

Interactive Comment

Fig 4: Why is the range of case C bigger than the range in case B. Please discuss this difference.

Technical corrections

P2202, line 14: "averave" should be "average"

P2203, line 19: Add unit after "variance=2.1"

P2207, line 4: "close to the mean". Better is: "with a small variance" or "standard deviation"

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 5, 2199, 2008.