**Hydrology and Earth System Sciences Discussions**

# *Interactive comment on* "A structure generator for modelling the initial sediment distribution of an artificial hydrologic catchment" *by* T. Maurer et al.

**B. Kelly**

bryce.kelly@unsw.edu.au

Received and published: 3 June 2011

# General Comments

This is a very detailed geological modelling paper. It is novel because of the extensive knowledge of the catchment architecture. The methods adopted are rigorous and with some additional work it will be suitable for publication.

# Specific Comments

Principle Criteria,

Scientific Significance: Fair – This research is of local importance.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

Scientific Quality: Good – all steps are discussed in good detail, methodology is robust.

Presentation Quality: Good/Fair – in the reviewer version the font size is too small in most figures.

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? YES. The approach for modelling the heterogeneity of the fill is novel, and the method is rigorous. However, the scale and site specific methods of filling and modelling will most likely mean that the method presented will not be adopted internationally.

3. Are substantial conclusions reached? YES. The approach presented has characterised the geological structure well, and the gross features of the heterogeneity.

4. Are the scientific methods and assumptions valid and clearly outlined? YES.

5. Are the results sufficient to support the interpretations and conclusions? YES.

6. Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)? YES.

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? YES.

9. Does the abstract provide a concise and complete summary? YES. The abstract clearly describes the scope of the problem, methods used and a justified conclusion.

10. Is the overall presentation well structured and clear? YES

11. Is the language fluent and precise? Mostly – there are still minor grammatical errors throughout the manuscript.

12. Are mathematical formulae, symbols, abbreviations, and units correctly defined

Interactive
Comment

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

and used? YES

13. Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated? WES – refer to comments below

14. Are the number and quality of references appropriate? Almost – refer to comment below

15. Is the amount and quality of supplementary material appropriate? Not applicable.

Suggested Major Edits

This paper should focus on what is done well, that being the modelling of the structural setting and the spatial heterogeneity. The details on the modelling of the bulk density and the sections that discuss these results (3.3 and 3.4) seem too preliminary. It could be published in its current form, but it would be shorter, clearer, and more engaging to read if the paper focused on modelling of the geological structure and heterogeneity.

The conclusion is trying hard to link to future work that cannot be justified by what has been presented. Suggesting that this model will be usable for developing pedotransfer functions and modelling ecosystem behaviour seems premature. A more detailed discussion on the structure generator heterogeneity patterns and the impact on developing the hydrological framework would be a more desirable finish.

Fig. 13. In image D on the right hand side there is a clear top to bottom feature. This is not adequately discussed in the text. Either link the aerial photograph into the discussion or remove it. If the aerial photograph really does give support to how well the texture has been captured in the modelling, quantify this success. Compare the spatial continuity in D and E and to F. I do not feel a visual comparison with a tiny aerial image is adequate.

# Technical Corrections

A mixture US English (characterized), and British English (neighbouring, programme)

has been used throughout the manuscript.

P4643

L2 "consolidated or un-consolidated rock", why not also add sediments ?

L13/14 geophysical surveys should be added

L18 Original reference to the Hill-Vi model required,

P4644

L12 The geophysical references are very modern, and are not the major references. There are numerous near surface geophysical papers and books that provide better examples and more details than the two referenced papers. Start with Reynolds book "An Introduction to Applied and Environmental Geophysics".

P4644

This summary is good, but I was surprised that there was no reference to: Murray et al. (2009) Geomorphology 103:486-505 Pyrcz et al. (2009) Computers and Geosciences, 35(8), 1671-1685. Teles et al. (2001) Sedimentology, 48, 1209-1224.

P4647 L20 delete "initially"

P4650 L12 replaced "digged" with scrapped

P4651 L10 "The programme" replace with "A programme"

P4654 L20 "direction as the" should this be "direction to the" ?

P4655 L1 delete "respectively the geographical"

P4655 L6 – 11 This is too much detail. The coordinates were then flipped to match the ....

P4658 L13 "Layer thickness was defined ex ante" – based on what ?

Interactive
Comment

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

P4600 L17 "exportation" replace with "exporting"

P4661 L1 "cells in cluster lies" replace with "cells in a cluster lie"

P4661 L10 Deterministic 8 – more details about this algorithm are needed.

P4661 L15 How many arc seconds is the DEM?

P4662 L21 "DEMs are for one that of the clay" replace with "DEMs are the clay"

P4663 L3 "filled up from" delete "up"

P4663 L22 Replace "implied" with "caused"

P4668 L20-27. This paragraph is poorly linked to the proceeding paragraph. What are you trying to say? "To resolve the problem of poor density estimation we need to condition the modelling using .......

Figure Corrections:

Fig. 1. The black text on the dark gray background is too hard to read.

Fig. 4. The elevation labels on the geological cross section makes this image too busy. A clear depth axes on either side of the section would be better.

Fig. 5. The fonts are too small.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 8, 4641, 2011.