

Interactive comment on “A Field Evidence Model: How to Predict Transport in a Heterogeneous Aquifers at Low Investigation Level?” by Alraune Zech et al.

Anonymous Referee #1

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The manuscript presents a hierarchical approach for modeling flow and transport in heterogeneous aquifer. The approach is applied to the now classic MADE macrodispersion experiment, and it is focused on the modeling of longitudinal mass distribution, as observed during the course of the experiment. The paper is very well written and the method is clearly illustrated. The topic is relevant, and I do believe that approaches like the one envisioned here are very important to reduce the complexity of natural groundwater systems. I think that the work deserves publication. A few minor comments follow.

- Abstract: I find unusual to start new paragraphs within an abstract.

C1

- Eq.1: why the ADE is presented in one spatial dimension? This may be misleading, also considering that hydraulic conductivity $K(x)$ is variable in x only under such conditions (line 32)

- Figure 1. The position of the boundary between orange and green is not clear: where does it derive?

- Line 155: is there any evidence of such large differences in hydraulic conductivity among zones (several orders of magnitude, line 157)?

- Line 164: “reproduce” instead of “reprocude”

- Line 175: why the choice of l_h and l_v ?

- Line 181: please elaborate more on the “expert knowledge” for assessing the range of reasonable l_h values estimated

- Line 189: please define ergodicity, and briefly explain (possibly with references) why it is assumed when the plume has travelled 10-100 characteristic lengths.

- Line 248: I don't see a clear transition at $x=20$ from Fig.1

- Line 250: I don't recall the contrast described here in Boggs et al (1992), please elaborate more

- Line 257: “designed” instead of “design”

- Line 272: please explain the heuristic approach with some more detail.

- Line 275: why 600 realizations?

- Line 294: so the model is 2d? why not working with the more realistic 3d setup? Do you expect differences in the results? I guess that the additional degree of freedom brought by 3d could make a difference.

- Line 296: how is the solute injected? Does the local injection rate depend on local hydraulic conductivity?

C2

- Figure 6. Please introduce a legend.

- Conclusions: the first item of the list (line 396) is a rather well known and general statement, I would not add it as one of the conclusive statements of the work.

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