

Interactive comment on “Contaminant source localization via Bayesian global optimization” by Guillaume Pirot et al.

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The original comments of referee 2 are in black and [our answers to these comments are in blue](#).

General comments:

1. The grammar of this manuscript needs some polish, there are some grammar errors and weird expressions in the manuscript (e.g., the usage of “firstly”, “secondly” in the second paragraph of Page 3).

[We carefully proofread our manuscript, but English being not the mother language of the authors, some grammatical errors might persist. We will let our manuscript proofread again by a native English speaker.](#)

C1

2. The novelty and objectives of this research need to be improved, clarified and emphasized. Although the authors used test cases with more “realistic” hydrogeological property comparing with the previous works, they are still synthetic (no fundamental difference in my opinion). And I believe the test of efficiency for a long existing optimization algorithm is unnecessary. The necessity and novelty of this work need to be clarified.

[The novelty and objectives of this research are stated in the introduction \(page 3, lines 14 to 22\). We can add some clarifications in the introduction if necessary.](#)

3. I am not sure the differences between two synthetic test cases, why did the authors use two very similar synthetic cases?

[We propose two synthetic cases because different geological settings can lead to very different objective functions and it is important to test the robustness of the optimization method. We will add this explanation in the description of the synthetic test cases. Though the geological maps are obtained from the same training image, they are pixel-wise very different, which implies different flow-paths, specific contaminant transport and results in objective functions with different structures of local minima.](#)

4. The second paragraph of Introduction on Page 1: is it necessary to introduce the other three methodologies of groundwater pollution source identification? Why did the authors bring them up in the third paragraph of Page 2? And what are the relationships between them and optimization method?

[We are simply reviewing previous work to clarify the relations between our work and previous research. We believe that this is useful for readers who may not be familiar with the details of this topic.](#)

Specific comments:

5. Line 9 in Page 2: the meaning of term “latter” is unclear, do the authors mean the second sub-class or the third one?

C2

We mean the last (third) sub-class and we will clarify it in the manuscript.

6. Line 33 in Page 2: please define “realistic” and explain why the previous work are not “realistic” but this study is “realistic”.

We wrote “geologically realistic medium”, so we mean realistic from a geological point of view, in contrast to constant parameter fields or realizations of stationary Gaussian random fields. In the definition of our objectives (page 3, lines 14 to 22), we also made it clear what we mean by the term realistic: “property contrasts” and “connected structures”.

7. Line 10 in Page 5: please explain why and how did the authors use the multi-Gaussian distributed initial contaminant mass.

The initial contaminant mass distribution is chosen as following a multi-Gaussian distribution as a simple way to model surface spills that usually present some diffusion characteristics in their shape and can cover different geological features. We will clarify this in the manuscript.

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