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

Anonymous Referee #2

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This paper addressed an important problem for groundwater protection: contaminant source localization, and the authors proposed that this problem can be transferred into an optimization problem with highly non-linear objective functions, furthermore, they can use Bayesian global optimization approach to find the minimum of the objective function then thus localize the polluter. The authors then implemented the proposed optimization method into two realistic 2D synthetic cases to test and demonstrate its efficiency.

I do think the idea of this paper which uses global optimization method for finding contaminant source is interesting. However, this paper needs to be improved, and more work are needed, as listed below.

Comments:

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Discussion paper

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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).

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.

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

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?

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?

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

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

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