

***Interactive comment on “Geochemical inverse modeling of chemical and isotopic data from groundwaters in Sahara (Ouargla basin, Algeria)” by R. Slimani et al.***

**Anonymous Referee #2**

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Understanding the reactive transport processes and parameters is very important for chemists, hydrologists and environmental scientists. This paper tries to interpret the geochemical measurements from different locations by inverse modeling, which is a standard numerical method for estimating geochemical parameters and simulating the fluid-rock interaction in heterogeneous aquifer systems. The results demonstrate that the geochemical reactions between minerals and fluids in saturated porous media are controlled by reactive mineral (e.g., gypsum and calcite) distributions and all Phr waters are resulted from the mixing of the two poles together with calcite precipitation and ion exchange processes. This is an improvement in the field-scale reactive chemical transport modeling.

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The analytical results presented in this paper are convincing to me, and I have not seen these results being published elsewhere in literature. The work presented in this paper will have a solid contribution to the study of the reactive chemical transport in field-scale porous media. The scientific community (especially people interested in reactive chemical transport modeling, environmental quality assessment, geochemical parameter characterization, and multiple-scale stochastic modeling) may find interest in the analysis and results of this manuscript.

The reviewer suggests the manuscript be accepted for publication after some minor revisions:

1. The authors used lots of “bullets” in the manuscript to describe the modeling works. This kind of descriptions is usually used in technical reports other than an academic paper. I am wondering if the authors can incorporate them in a paragraph?
2. In “Introduction”, the authors should expend the literature review to include more recently published papers relevant to reactive chemical transport modeling. You may conduct a Google Search of “inverse modeling of reactive transport” to find the recently published papers such as (Dai and Samper, 2004).
3. The authors may need more explanation about what measured geochemical data and how these data are used for inverse modeling.
4. In “Conclusion”, the authors may discuss more about the scientific importance of this study, which may strengthen the conclusions and this paper.

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