

Interactive comment on “Probabilistic assessment of field-scale CO₂ generation by Carbonate/Clay Reactions in sedimentary basins” by Giulia Ceriotti et al.

Anonymous Referee #3

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This manuscript provides a three-dimensional test case study to assess the generation of CO₂ by carbonate/clay reactions in a statistical framework. The authors extend the work of Ceriotti et al (2017) to a synthetic field setting. The article provides nice insights about the generation and source location of CO₂. I think that the article deserves publication after some minor corrections that should address several points: (1) the authors should take some time to explain the source of uncertainty in equilibrium constants. Explain why the coefficients associated with equilibrium constants are random and which is the underlying process. Also, it is important to discuss the parameters describing this uncertainty from a realistic point of view. Are these values realistic? Do they compare with a real field? It is not clear why the authors state that equilibrium constant

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K_s,_{ph} depends on pressure and temperature but equation (1) only has temperature and is valid only for p=1 bar; (2) some of the assumptions are not clear but from the introduction I was expecting some two-phase flow simulations besides generation; (3) the authors state too many times that something can be found in Ceretti et al (2017), this makes the description of methods not self-contained; (4) not clear what do you mean by phases in equation (2) and reaction CCR, may be this is too abstract, and the authors should give an example to follow; (5= sorry if I miss this one but I do not see the definition of C_A, not clear how is it calculated. Other than this, I think that the manuscript is well written and organized and will be a nice contribution for HESS. I did not see typos except in line 162 where you are missing “it is”.

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