

Geosci. Model Dev. Discuss., referee comment RC1
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Comment on gmd-2021-45

Anonymous Referee #1

Referee comment on "RHEA v1.0: Enabling fully coupled simulations with hydro-geomechanical heterogeneity" by José M. Bastías Espejo et al., Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2021-45-RC1>, 2021

This is a good description of what sounds like an elegant and useful numerical tool for modelling coupled hydro-geomechanical processes in heterogeneous subsurface environments. I like the model. I think other researchers in the field will find great value in it as well. The modelling results are impressive.

My point of concern is that the authors, in justifying the *raison d'être* of this publication, seem to imply that the list modelling platforms they discuss in the build-up is exhaustive. I know this is not stated explicitly. It is implicit though. In fact, the authors list is, I presume, simply based on their experience. My point is that the list does not have to be exhaustive (in my opinion), but I would advise the authors to state this more clearly.

I cannot seem to find any statement regarding the computational effort of this code. I would consider this important information.

The examples are in 2D. What is the practical feasibility – both in terms of availability of information/data and in terms of computational effort -- of such simulations in 3D?

Line 74: " However, a more robust implementation is Porous Flow, ..." I cannot say whether this statement is true or not, but I suggest that the authors buttress such statements with facts. Why is PorousFlow the more robust implementation and where has this been shown?

Line 82: I cannot see why the MOOSE naming convention or which kind of bird Rhea is should be relevant to the reader.