Response to Sergey Gromov

We thank the editor Sergey Gromov for his thoughtful comments and verdict in response to our revised manuscript. In the following, we address the remaining concerns. Please note that we use the abbreviation **EC** for editor comments and **AR** for authors' response in what follows. Removed text is shown in red, e.g., ~~this text has been removed.~~. New text is shown in blue, e.g., this text has been added.

EC: Thank you very much for preparing the revised manuscript, which in my opinion got certainly improved after you have sufficiently addressed referees' comments. I find the issue of selecting the complexity of the examples presented/statements regarding RHEA capabilities (one of the major concerns raised by one of the Reviewers) is important however likely out of 'Development and technical' scope of this paper – it should certainly be addressed/demonstrated in subsequent studies. I suggest clarifying a few minor and technical remarks (listed below, line nos. refer to the Author's tracked changes manuscript, gmd-2021-45-ATC1.pdf), after which we proceed to the publication in GMD.

> **AR:** We thank the editor for the time and effort in evaluating the manuscript and for providing constructive feedback. Please find a detailed response to every comment below.

EC: L124-125: You are very welcome to keep the statement regarding the name Rhea in the model manual/website, however there is no context for this statement in this manuscript (furthermore, the abbreviation RHEA is introduced and is sound). Please remove.

> **AR:** We agree and have deleted this statement in the manuscript.
>
> Line 124-125: ~~The name Rhea depicts a flightless bird that is native to the South American continent.~~

EC: L134 "results (verify)" is somewhat ambiguous; is there any intention in using parentheses here? For the Introduction section, a mere statement "evaluate RHEA 1D and 2D simulation results" (even omitting details regarding analytical solutions) will suffice.

> **AR:** We agree and have revised this.
>
> Line 134: We then compare RHEA's simulation results ~~(verify)~~ with one and two dimensional analytical solutions, (...)

EC: L345,388,392,393: Please use consistent numbering according to GMD requirements (there are stops and commas used in reported nodes/elements nos.).

AR: We agree and have revised this accordingly.

EC: L352-353: I suggest using "facilitate presentation" or similar here – for the sake of argument, one may facilitate visualisation of a simulated 3D field by plotting a mere 2D section of it.

AR: We agree and have changed this.

Line 352-353: While the Herten analog is a 3D data set, the example was reduced to two dimensions to facilitate ~~visualization~~ presentation.

EC: L438: Does not "and three dimensional simulations" reiterate the statement of the last sentence in previous paragraph?

AR: Agree and have changed this accordingly.

Line 438: Our current work focuses on hydro-geomechanical coupling of heterogeneous systems. However, RHEA could potentially be extended to include also thermal processes~~. and three dimensional simulations~~.

EC: L441-442: Please rephrase the statement indicating which repository was used for results presented in the manuscript. E.g., "The code and examples presented in this study are available at Zenodo repository(..). The continuous development of RHEA code is maintained at the GitHub repository (...)."

AR: We agree and have clarified this in the revised manuscript.

Line 441-442: ~~The RHEA code is available in the GitHub repository https://github.com/josebastiase/RHEA and Zenodo repository: https://zenodo.org/record/4767832.YKKPjyaxVhE. Verification and examples included in this work are found in the examples folder. The Herten analogue data set is available on https://doi.pangaea.de/10.1594/PANGAEA.844167. three dimensional simulations~~.
The code and examples presented in this study are available at Zenodo repository: `https://zenodo.org/record/4767832#.YKKPjyaxVhE`. The continuous development of RHEA code is maintained at the GitHub repository `https://github.com/josebastiase/RHEA`. The Herten analogue data set is available on `https://doi.pangaea.de/10.1594/PANGAEA.844167`.

EC: Non-public comments to the Author: L451 The Author's tracked changes manuscript does not have added/removed references marked up – I did not check References section thoroughly.

AR: Thanks. We have added the references to the tracked changes version.