

Response-to-reviewers

Dear Dr. Ramos,

Attached, please find the revised version of our manuscript. We are grateful for the constructive comments from the reviewer and editor. We have modified the text and figures to address these comments and believe the manuscript is now clearer and easier to follow, with no changes to the main goals or conclusions of the software report. We have highlighted the changes in the manuscript using track changes. Responses to each comment are provided below in red, with details of the changes made to the manuscript.

In addition to the manuscript edits, we issued a new release of the platform incorporating the changes suggested, and some minor ameliorations developed since the submission. We changed the zendo DOI to point to this latest release.

Many thanks,

Loïc Bachelot

Detail response to comments:

Reviewer #1

As earthquake modeling software continues to evolve, it becomes increasingly crucial to develop a public platform for benchmark exercise and build trust in numerical simulation results. Two tsunami benchmark problems have been implemented and accessible through this new-developed platform. I tried using this platform, and it's quite user-friendly.

This software platform is timely and represents a meaningful contribution to the field. I appreciate the authors' efforts. The manuscript is clearly written, technically sound, and well organized. The methods are appropriate and described with sufficient detail to support reproducibility. Overall, I believe the work will be of broad interest to the earthquake modelling community.

Comments/suggestions:

Line 36: “study spontaneous earthquake and slow slip events driven by tectonic loading” sounds better. Earthquake and slow slip events are still the focus of cycle models.

We changed the sentence as suggested for clarity and to better emphasize that earthquake and slow slip events remain the focus of the models.

Line 38: “the effects of fault bends on rupture arrest”. Be more specific. Rupture arrest can be caused by many kinds of traction heterogeneities.

We revised the sentence to make clear that this benchmark focuses specifically on the role of fault bends in rupture arrest.

Line 89: “, built to” Fixed

Line 92: “event-driven tasks” Fixed

Line 92-94: This sentence is not readable. Maybe replace it with “They help reduce costs while remaining extremely scalable, since you can run many Lambdas in parallel during periods of high demand.”

We revised the sentence following the reviewer’s suggestion for better clarity.

Line 99: “they”-> “that” Fixed

Line 105: “single” -> “new” Fixed

Line 158-159: “first/then in a second step/finally” can be replaced with (1), (2), (3) to be more readable. The original single sentence is too long.

Changed to a numbered list for clarity as suggested by the reviewer.

Line 160: “has been”-> was Fixed

Line 161: “This approach has been developed with the modelers...”-> This approach has been developed in collaboration with the modelers...” to be clearer. Fixed

Line 162: “cross-sections”. Please be consistent as that in line 204. Fixed

Line 166: “validation”. What does this mean? Is this related to “Validate their tabular structure against...”?

Yes, we were referring to this step. We added "validation of the file format" to make this clearer.

Caption of Figure 1: “as the files are being processed-> “As...”. “Diagram of the simulation results upload and processing workflow” may be a better title.

We updated the title as suggested.

Line 195: “15-degree-dipping” Fixed

Line 203: “Each solver” or “Each benchmark problem/model”? What kind of solver?

We changed this to "Each modeling software" for clarity.

Caption of Figure 3: in the terminology DET, earthquake cycle is used. This is inconsistent with the paper title where “seismic cycle” is used. Either is fine but please be consistent. Also, I suggest introducing the figure 3 earlier (e.g. accompanied with line 147) so that reader can find this platform quickly.

We changed the title of the paper to use "earthquake cycle" for consistency across the paper but also the CRESCENT website and materials. We added the links to the two sides of the platform at the beginning of section 2, referencing their respective figures (3 &4).

Caption of Figure 5: “Not the different...”. Please revise this sentence and make it clear. I understand that each panel represents different components/variables and should have different y-axis ranges. But what does this mean by “automatically scaled by the maxima of the underlying data”. Did you normalize the amplitude of the data with its maxima among all 3 lines in each panel?

No, we do not normalize the underlying data. What we meant is that the y-axis range is automatically calculated when the plot loads to best fit the data, so it varies independently for each plot. But since the platform allows for interaction with the plots, we decided to remove the sentence that was more confusing than adding information.

I have one final comment about the webpage’s response time. It’s like that accessing some data and plotting may take up to 1 minute. Future optimization might be needed.

We agree that future optimization would be useful. We are considering ways to optimize the surface plots because the underlying matrices are large. These high-resolution matrices are useful for detailed comparison, but loading the full matrix for the overview is not efficient for the initial page load.

Editor's comments:

Thank you for a well written software report that documents a DRT and Tsunami modeling framework that can be used for code validation. This is timely and needed and I especially like the concept of hosting these exercises on the cloud, enabling access by anyone from

anywhere to (potentially) large simulation datasets.

I echo several of the suggestions made by reviewer #1, but in addition to that, I have the following suggestions (after implementing, this paper is ready for publication in my view).

Lines 63 - 65: I think this sentence can be re-written. There is an element of code validation that this software report touches on, but perhaps you meant to say that this framework won't attempt to use independently determined parameters for rupture simulations? I suggest re-writing this sentence, or adding language beforehand that clearly defines validation from verification for these types of simulations

We rewrote this paragraph to explicitly define both code verification and code validation in the context of this report. We clarified that this software report focuses on verification through benchmark problems where different numerical software solve the same equations for the same model setup, and that validation against observed seismic, geodetic, tsunami, or paleo-data is outside the scope of this work.

Figures 4 and 5 could be cited more in section 2.3

We added the reference to the figure where appropriate in the section 2.3

I agree with the reviewer's comments regarding Figures 3 and 5. In addition, for figure 5, is the numerical noise important to point out when comparing various simulation outputs? I suggest visualizing the displacement time series at a smaller scale (e.g., 50 or 25 seconds as this is when the bulk of static displacement occurs, allowing readers to appreciate the differences). Also, label the units of the y axis (e.g., displacement in meters).

We updated Figure 5 to zoom in the first 40 seconds to have more detail in the static displacement. With updating the figure, this also now includes the y axis label and unit that we added in the latest version of the platform as suggested.