

Replies to reviewers' comments:

We thank the reviewers for the additional reviews requested and the effort taken over them. For both reports, of which we have accepted all suggestions, our responses are as follows (in black), in order of the written comments (in blue):

Section 4: I think it would be good to add a brief description about Shots 3 and 9. It is not clear where they are from.

Reply 1:

Thank you for this suggestion; we shall include a brief description as such at L304:

“Data from shots 3 and 9, individual explosive tests within the experimental series, are chosen to test the numerical method against.”

L44 and L64: Please check the order of the references, as they are currently not in alphabetic or chronological orders.

Reply 2:

This has been resolved now in the LaTeX manuscript for these instances. See also reply ???

L205: Please give the full name of “NH” first (probably on L61) and then use its abbreviation.

Reply 3:

Thank you for this technical correction, this has been added at the point specified.

L242: In the entire manuscript, you switch between “Fig.” and “Figure” several times. Please make them consistent.

Reply 4:

Thank you, we have chosen to change all instances to “Figure” throughout the manuscript.

L329 and L330: Physical variables should be written in Italic to be consistent with other places in the manuscript.

Reply 5:

Thank you, this has been rectified.

L492: The issue number C5 is missed. References list: A careful revision of this part is recommended. I noticed that some references are given with the DOIs but others are not. It would be good to try to give the DOIs for at least all the peer-review journal articles. Furthermore, please give the full lists of authors for some references (e.g. on L545, L548, L571).

Reply 6:

Thank you for noticing this; it seems that Copernicus' provided bibtex style is the issue with limiting printing full author lists over some specified limit - however the full author lists are indeed in the manuscript file. We have also adjusted and cleaned the bibtex entries to ensure that all DOIs (where available) are printed and shown, as well as issue numbers and volume numbers. A further issue was some middle initials being skipped which has also been solved.

Line 9: "Magnitude range" - you only present 1 example now. Remove range. It is also a little confusing to state total eruption volume here when you are only modeling 1000s using a mass eruption rate that might be expected for this size. Perhaps replace eruption volume with eruption rate?

Reply 7:

Thank you for these suggestions, we will remove "range" from this line as it was an oversight. However, we insist that inclusion of the modelled equivalent ejecta volume is more pertinent in the abstract than the eruption rate as, in lieu of any other comparison which is not made in this work, a comparison against historical eruptions is the most relevant.

Line 360: "Taupo volcano offers great opportunities for investigating post-supereruption magmatic system..." You are not investigating the magmatic system. Reword. Actually you could probably reduce the amount of information in the following paragraph given that you only now model 1 eruption size.

Reply 8:

We shall rephrase from L360 to:

"Taupō volcano and its post-supereruption magmatic system have been extensively studied because of how recently the event occurred, along with the volcano's relatively high activity. As a result..."

Line 367: Volume of dacites. Check these numbers and state if bulk or DRE (dense rock equivalent) magma. Should be 0.01 to 0.1 volume bulk (not magma). Also check for rhyolites on line 369.

Reply 9:

To keep consistency with modelled values, we shall remove inconsistencies and prefer to use DRE. We will define the acronym at L368, and use it at the instances at L368, L370, L445 and L446.

Line 373: Horomatangi Reefs were technically post-Taupo eruption by 20-30 years. See Barker et al. (2016). doi:10.1130/G37382.1

Reply 10:

Thank you for this point; we shall amend the end of this paragraph as such:

“...and resulted in the further collapse of the caldera beneath the lake and, afterwards, the formation of the Horomatangi Reefs (Davy and Caldwell, 1998).”

Line 383: You should finish off this paragraph with something like "Here we model a single eruption from Taupo to demonstrate the multilayer model, but highlight that future work will be required to provide an assessment of tsunami hazards from this volcano".

Reply 11:

Thank you - we shall accept this suggestion as it is written.

Line 397: "Endure for hours to days" Reference?

Reply 12:

The following reference has been added at this point:

Pyle, D. M.: Chapter 13 - Sizes of Volcanic Eruptions, in: The Encyclopedia of Volcanoes (Second Edition), edited by Sigurdsson, H., pp. 257–264, Academic Press, Amsterdam, second edition edn., <https://doi.org/10.1016/B978-0-12-385938-9.00013-4>, 2015.

Line 405: "Larger simulation": You only show 1 example now!

Reply 13:

This oversight has been removed, thank you.

Line 444: Taupo eruption volume: Should be 35km³ magma or ~105km³ bulk. Note that the 0.1km³ you state for the smaller size

Reply 14:

Thank you, this has been amended. Please see also Reply 9.

Line 455: This is a great way to finish the paper now.

Reply 15:

Many thanks for the kind comments.

Line 469: Replace "These were then used" with "The multilayer scheme was then used..."

Reply 16:

This has been changed as written.

References: These are still a bit of a mess. I've noticed on quite a few papers (just of mine) that people with 3 initials have been reduced to 2 and sometimes 1. E.g. C.J.N. Wilson (sometimes C. Wilson), A.S.R Allan etc just to name a few I know. Some papers have DOI's, others do not. Some journal names are in caps, some are all lowercase. Check throughout.

Reply 17:

Please see Reply 6 for the response and resolution to these issues.