

Response to the comments from Alan Robock.

This looks like an excellent paper, but I noticed a few things that could be improved.

We thank you for taking time to improve the manuscript. We will revise the paper according to the suggestions.

In the abstract, change “The frequency of eruptions larger than the typical VEI-7 (VEI-8) eruption by the comparison of sulfur emission strength is found to be 5.3 (7) times higher than estimated from geological evidence.” to “The frequency of eruptions with sulfur emissions larger than the typical VEI-7 eruption is found to be 5.3 times higher than estimated from geological evidence, and for VEI-8 eruptions it is 7 times higher.” Using parentheses to save space only serves to confuse and make it difficult to read.

This sentence has been deleted in the abstract and reformulated in the section 4.3. It now says: ‘The average rate of volcanoes in the 60-9 ka interval with a climate forcing larger than the 1815 AD Tambora eruption (VEI-7) is 1.60 per millennium (Table 1). In the same interval, we have 4 eruptions with a climate forcing larger or equal to the 25.32 ka BP1950 Taupo Oruanui (VEI-8) eruption.’

Furthermore, the sentence is awkwardly constructed. But VEI is not an index of sulfur emission. Why use VEI at all when discussing the impacts of volcanic eruptions on climate?

Thank you for the suggestion. Indeed, VEI is an index of the volume of ejected magma. We have included a sentence in section 4.3 ‘From ice-core records, we cannot directly derive the VEI index, but the estimated volcanic forcing is likely to be another good indicator of volcanic eruption magnitude. The average rate of volcanoes in the 60-9 ka interval with a climate forcing larger than the 1815 AD Tambora eruption (VEI-7) is 1.60 per millennium...’.

It would be much easier for reviewers if you put the table and figure captions on the same page as the tables and figures.

Indeed, we have included the table and figure captions on the same page as the figure/table.

Table 1 uses acronyms that are not defined. What are NHHL, SH, or LL?

Those are now defined in the caption of Table 1.

Table 2 needs to be corrected. Radiative forcing from volcanic eruptions is negative. For example, for those with forcing larger than Tambora, they are for forcing $< -17 \text{ W m}^{-2}$.

This has been corrected.

The notation in Fig. 6 needs correction. The correct unit for radiative forcing is W m^{-2} , with W capitalized, and m not in italics. Italics are for variables, and not for units. Similarly, km should not be in italics.

Thank you for the clarification. This has been corrected.

Review by Alan Robock