

Review of “The 2019 Raikoke eruption as a testbed for rapid assessment of volcanic atmospheric impacts by the Volcano Response group” by Vernier et al. for publication in EGU sphere.

The paper presents a sort of process/discussion event of the rapid analysis of the June 2019 Raikoke volcanic eruption through the perspective of the “Volcano Response” group, a grassroots community communicating via an email list and attempting to provide information quickly to the scientific community following volcanic events. Several datasets are synthesized toward providing initial and later, refined estimates of the volcanic plume vertical profile and loading of sulfur dioxide (SO₂) and aerosol. Impact of initial and refined inputs for plume altitude and loading of SO₂ (and so resulting aerosol) are presented in Figure 7, and the impacts on temperature and radiative forcing are presented Figure 9. Overall it is argued that the Raikoke eruption has small radiative forcing impact and so small impact on surface temperature.

As a process the paper is of sufficient interest to warrant publication after minor revisions. The paper does need a pretty thorough reading for copy editing. I note below a number of places where clarity of the text can be improved and further clarifying information should be provided instead of leaning so heavily on community jargon. Some of the figures are lacking in legends or labeling so as to not be intuitive what is being shown.

[We would like to thank reviewer 1 for his comments for which responses are provided below.](#)

4: affiliation #3 arrives after #4 in the ordering. Please revise.

[Corrected](#)

56: “hellmouth,” — add comma

[Corrected](#)

60: “(SVERT),” — add comma

[Corrected](#)

64: “red warnings for aviation” — what does this mean, please explain

The following text was added to the paper to further explain the role of KVERT

“In addition, KVERT which issue volcano observatory notice warning for aviation had flagged with an aviation color code red which signifies that an “eruption was underway with significant emission ash into the atmosphere” (see KVERT webpage for more information <http://www.kscnet.ru/ivs/kvert/van/index?type=1>)”

67: Figure 1 needs some work to be understandable. There are no axis labels or units on the top panel, and neither does the text or caption explain what “Infrasound Signal” means. Further, eleven explosive episodes are mentioned in the text, but only the first 9 are labeled in the panel. I have no idea how to interpret the bottom panel. Is the blue line the cloud-top temperature and goes with the lefthand axis? What do the orange and grey dots represent? This needs a much clearer legend and further explanatory text in the caption at least.

Figure 1 has been improved to respond to these comments and addition text in caption is provided.

69: Please explain more clearly what “(1,2,3,7,9 and 10)” refers to. I think these are the explosive events. #10 is not labeled in Figure 1a (although I can count, so I suppose...) but I’m still not sure if it is meant that this group of episodes is “vent outflow” or the other kind.

Yes, 1,2,3 refers to explosive events. Indeed #10 and #11 have been added the figure caption was modified as well as the text.

83: “(SSIRC),” — add comma

added

89: This is a different URL than in line 104, though they go to the same place. Suggest you state same URL for less confusion. Also, as written here there is an extraneous superscript “2” at the end of the URL that should be removed. And I note the page was initially confusing as it does not appear to show any meaningful content on mobile browser, but does on desktop.

This was fixed.

105: I note here that you refer to Table 2 before you ever refer to Table 1 (line 196). Suggest you reorder the tables accordingly.

Yes, tables have been reordered.

120: “Precursor satellite,” — add comma

added

120: "on board" — line 127 writes "onboard" while 140 and 148 both write "on board" as here. Be consistent.

This is been corrected by using "onboard"

141: "equatorial" — do not capitalize

Corrected.

151: "Cloud layer products," — add comma

Added.

152: CAD "less than -100 or greater than -20" — expand on what this means or otherwise clarify. This is not meaningful to the average reader.

We expanded about the CAD in the text and provided additional reference

154: "0, 1, 16, and 18 are rejected" — same comment as above, what does this mean?

Additional information is provided in the main text.

157 - 171: This is a repeat of the text in 66 - 80 and should be removed.

This was removed.

173: I note here you skip to Section 4 and there is no Section 3. Subsequent numbers follow Section 4.

This is now fixed.

183: "as will be discussed" — add "be"

Fixed.

185: Suggest start a new paragraph at "Figure 2 shows..."

Changed.

188: "temporal evolution than the one" — replace "than" with "as"

Replaced.

227: What does “bulk height” mean? Center of mass?

This refers to the mean position of the plume height in terms of mass.

So it was changed by “center of mass” for clarity.

232: “effective heights” — again, what does this mean? Here and previous comment please establish a definition and be consistent so that data are not mis-applied.

Regarding the wording 'effective height', it comes from the fact that the retrieved height is the result of a minimization process between simulated and measured radiances. Any SO₂ height algorithm considers a simplified model of the radiative transfer in the atmosphere. Therefore, it is unable to represent fully the observation condition and complex photon path in a volcanic plume (multi-layered, mixture of aerosols of different types, sizes, etc). IR and UV have different sensitivity to different influence parameters so we should not expect that the retrievals give the same results

256: “eruption, allowing” — add comma

Added.

258: I would say “low spatial coverage” is more appropriate than “low horizontal resolution.” It’s a coverage matter rather than a resolution issue.

Yes, we agree with this comment and modified the text accordingly with the term “low spatial coverage”.

269: Here and throughout paragraph, since you labeled Figure 5 in parts a, b, c, ... suggest you refer explicitly to those panels by letter so it is clear what to look at. Figure 5c I don’t understand what the red line is, and there are no units given for the y-axis (I infer K).

An explanation is provided in the caption about the red line. We also added the unit for y-axis of figure 5c.

275: “second orbit” — not clear what you mean, as this is the third orbit from left to right. You describe the leftmost (latest) orbit first. Maybe the plume was encountered on “a second orbit”?

Labelled about orbit number has been added to the figure to clarify this and the text has been modified to reflect which orbit is referred to.

281: Suggest start a new paragraph at “We visually inspected...”

We started a new paragraph.

290: “aerosol loading,” — add comma

Added.

312: “Ghassan Taha” and “Clarissa Lieven”

Apostrophe.

315: “times, randomly” — add comma

Added.

354: You do not appear to refer to or discuss the left hand panel in Figure 9. Omit.

We refer to the number in that panel in section 6.2-6.3 but had not linked it explicitly to the figure. This has been corrected.

434: “HTHH” is being used, but has not explicitly been connected to the Hunga Tonga Hunga Ha’apei eruption and should be noted.

Now explicitly connected.

768: In the legend for Figure 1 there are parenthetical notations ([FP], [NT], ...) with no explanation. Please either remove or explain.

Now fixed

808: Should be “particulate” instead of “particular”

Fixed.

826: I believe the figure and legend are correct, but caption refers here to the yellow line when the orange line is meant, and vice versa on the following line. Please correct or clarify.

Yes, this is now corrected.

872: Label or add in caption that altitude is in km.

Now added.

Citation: <https://doi.org/10.5194/egusphere-2023-1116-RC1>

Review 2

I agree with the comments of the other reviewer overall and have little to add. I highly recommend that the manuscript be professionally copy-edited.

Citation: <https://doi.org/10.5194/egusphere-2023-1116-RC2>

Thanks for this comment. We are not planning to have a professional editor other than ACP before publishing this paper.