

SPECIFIC COMMENTS

Comment #1: *“Before reaching the climactic phase... the eruption perhaps caused such a phenomenon. What is the phenomenon referred to? This is not clear.”* for lines 133-134 in section 2 on page 5.

Response: As pointed out by the referee, we found that we did not put a clear description of the referred phenomenon. The phenomenon here refers to the massive ash deposits found in Bonin Islands (Ogasawara), located 1222 km from the volcano. Therefore, we will revise the sentence to explain the Taisho eruption description better.

Comment #2: *“The average velocity of the winds carrying tephra was found to be around nine m/s. First, how do we know the average wind velocity from this period in 1914? And what elevation does this refer to? Surface winds?”* for lines 135-136 in section 2 on page 5.

Response: As pointed out by the referee, we found that we did not put a clear description of the referred wind speed. The winds here refer to the calculation done by both Omori (1914) and Todde et al. (2012) based on the arrival of ashes in cities reported by the meteorological office at that time and sightings in the tobacco plantations. Both publications explained the calculation in detail. We will revise the sentence to explain the Taisho eruption description better.

Comment #3: *“This description allows us to find similar weather between the dates used in simulation and the day of the eruption, even though further decreasing the number of dates used in the searching process (1996-2021, 3120 days). This sentence is not clear. The span of 1996-2021 contains >9000 days. Are the authors trying to convey that certain days have very similar weather conditions, and therefore the number of days considered can be reduced? If so, what exactly allows two days' weather to be considered similar enough that one can be eliminated from consideration?”* for lines 427-429 in section 5.2.1 on page 13.

Response: We found that our explanation regarding the validation is not well-structured, and we plan to explain it better. Due to seasonal differences and the data availability, we only used the weather charts on winter days (Dec, Jan, Feb, and Mar) from 1996-2021 to find similar weather to the eruption weather. As we explained in Sect. 5.1, we assume that the meteorological features of the eruption day (calm and clear sunny days with high pressure and weak winds) over Japan during winter is rare but can exist in the future. Therefore, the uncommon atmospheric features during winter are crucial factors; hence we only used winter days and not all seasons. Based on this assumption, the similarity in weather is determined by matching the features found in the weather charts with the feature described in multiple reports on the eruption.

Comment #4: *“Furthermore, we conduct the validation procedure by identifying the similarity in the weather pattern at the time of eruption and proving that similar weather conditions will bring identical ashfall distribution, thus verifying the dataset. This sentence highlights much that I see problematic in this paper. Validating the results provided by the PUFF model is not necessary. Identifying days with unusual weather conditions similar to those present during the Taisho eruption is unimportant, because there is no need to validate that PUFF produces a similar ashfall distribution under those conditions present during the 1914 eruption. Finally, the PUFF simulations do not agree well with the observed 1914 distributions, so the attempted validation was not successful.”* For lines 622-624 in section 6 on page 20.

Response: Following the prior response to RC #3 in the general comments, we acknowledged the reviewer's comment that the PUFF model performance for ash dispersal simulation from a volcanic eruption is well-established.

Our initial intention in presenting the validation section is to check the model's performance for replicating the past large-scale eruption; if given the precise wind data, the model will produce a relevant ash distribution. For smaller-scale eruption cases, the validation of ash dispersal simulation using the PUFF model for Sakurajima eruptions has been done successfully before (e.g. Tanaka and Iguchi, 2019; Tanaka et al., 2021). We think providing a validation framework for the large-scale eruption in Sakurajima is also necessary. For this case, we assume that if we could simulate the Taisho eruption using complete wind data at the time the eruption took place, we could produce a similar ash distribution for entire Japan. However, we found that complete wind data at the eruption time are not entirely available for us to replicate the eruption. To alleviate the issue, we tried to find the dates with similar weather to the time of the eruption, expecting it to have a similar wind pattern. Finally, we checked the simulation result of the selected dates with the available ground reports.

Besides the intention, we understand that the mechanism we utilised is complicated and has limitations, so it may not yield perfect results, both in the wind speed found through the searching process and the ash distribution from the simulation. Therefore, we can follow your recommendation to, perhaps, remove the validation section, but it is also fair for us to show some level of validity for the ash dispersal simulation on a large-scale eruption case like the Taisho eruption. Following this, we would like to revise the validation structure of the dataset in the paper, specifically in Sect. 5.

TECHNICAL CORRECTIONS

Comment #1: *“The ash dispersal map showing the eruption impacts in the southern Kyushu region... I do not see this map in the paper. If it is in the paper, specify which figure it is.”* for line 142 in section 2 on page 5.

Response: As pointed out by the referee, we found that we did not put a clear description of the referred map. The ash dispersal map mentioned in the sentence is referred to as the map in Figure 2.2, page 8 in Mita et al. (2018) and supplementary materials in Todde et al. (2012). We will revise the explanation and refer to the source map more precisely.

Comment #2: *“Line 232 refers to Figure 4 for the first time. This figure requires improvement. The resolution is too small and the figure text is not readable. The figure has two columns and five rows. Line 235 says the first row indicates the upper altitude winds and the second row the surface winds. This is opposite what the figure caption states. Line 236 says “from the second column onward...” but the figure has only two columns. The figure caption alone does not convey complete information to understand the differences between the five rows.”* for Figure 4 description in section 3.3 on page 8.

Response: We acknowledge the low resolutions of the figure and the mistake in the figure captions in the manuscript. We will modify the figure and give it a more appropriate description in the text following the correction.

Comment #3: *“the acronym ESP. This needs to be defined.”* for line 318 in section 5.1 on page 11.

Response: We will clarify the acronym following the recommendation.

Comment #4: *“...weather phenomenon on a particular. I believe this should read particular day.”* for lines 386-387 in section 5.2 on page 13.

Response: We will change it following the recommendation.

Comment #5: *“... the date 5 March 1997. This date/year is mentioned several more times on this page. However, Figure 14 and its caption use the date 5 March 1995. Clarify whether the date of interest is in 1995 or 1997.”* for line 516 in section 5.2.3 on page 17.

Response: The selected date is supposed to be 5 March 1997. We will modify the figure and fix the caption in the text following the recommendation.

Comment #6: *“...the heading for Section 5.3. It is mislabelled as 5.2.”* for section 5.3 title on page 17.

Response: We acknowledge the mistake on section's heading in the manuscript. We will change it following the correction.

Comment #7: *“...both refer to Figure 6. I believe they should refer to Figure 7.”* for lines 542 and 555 in section 5.3 on pages 17-18.

Response: We acknowledge the mistake on refereed figure in the manuscript. We will change it following the correction.

Comment #8: *“part of the caption for Figure 11, has a reference to Japan Meteorological Agency, 2022. This reference is not in the reference list.”* for the caption of Figure 11.

Response: We will add the reference following the recommendation.

Comment #9: *“It reads, the grey-stripped area indicates the original areas affected by the Taisho eruption, and the dark grey colour represents the ash dispersal from the simulation. After examining figure 15, I believe grey-stripped should be red-stripped, and dark grey should be light brown.”* for the caption of Figure 15.

Response: We will change it following the recommendation.

Comment #10: *“This caption is incorrect, as it is the same caption as Figure 15.”* for the caption of Figure 16.

Response: We will change it following the recommendation.

Comment #11: *“...contains a thick black line with an arrow. The caption does not explain this line. I believe it may be the latitude of maximum wind velocity each month, but the caption should explain the thick black line.”* for the content of Figure 8.

Response: We will add the explanation of the black arrow in the caption following the recommendation.

Comment #12: *“...differs from the caption explanation. The caption explanation of 14b appears to be the wind rose labelled as 14c. Likewise, the caption explanation of 14c appears to be the wind rose labelled as 14b.”* for the caption of Figure 14.

Response: We acknowledge the mistake on figure captions in the manuscript. We will modify the description in the text following the correction.