

### RC3: 'Comment on egusphere-2024-1688'

The paper presents a good radiative characterization of the Hunga Tonga Hunga Ha'apai eruption. The authors present measurements and observations obtained at Reunion Island with Lidar and satellite measurements.

In the work an analysis of the results is presented in an analytical but very clear way making the paper clear and sequential in reading. Regarding the methodological part I think that some more details without having to resort to the references indicated would have been useful to make the reader easily informed on the observational capabilities. Specifically a more exhaustive description of the lidar system would give the reader the possibility to understand the characteristics and observational potential of the Reunion observatory. Even a few brief additions on why certain assumptions were chosen in the data analysis would have provided the reader who is not an expert in Lidar with a more comprehensive explanation of the work (e.g. Line 91 LR=30).

**Reply:** Thank you very much. We greatly appreciate the reviewer feedback and critical comments.

A more exhaustive description of the lidar system has also been requested by Referee #2. A full description of the lidar systems and their aerosol products at OPAR (Observatoire de Physique de l'Atmosphère à La Réunion) has just been accepted for publication in ESSD journal (Gantois et al., 2024). The last sentence of the first paragraph of Section 2.1 has been replaced by:

“A full description of the system is available in the data paper of Gantois et al. (2024).”

Gantois, D., Payen, G., Sicard, M., Dufлот, V., Bègue, N., Portafaix, T., Marquestaut, N., Godin-Beekmann, S., Hernandez, P., and Golubic, E.: Multiwavelength, aerosol lidars at Maïdo supersite, Reunion Island, France: instruments description, data processing chain and quality assessment, Earth Syst. Sci. Data Discuss. [preprint], <https://doi.org/10.5194/essd-2024-93>, Accepted, 2024.

In addition, a sentence summarizing the finding of Baron et al. (2023) for justifying the choice of the lidar ratio at 355 nm has been added. It reads:

“Indeed the latter found values of LR at 355 nm in the range 29 – 35 sr with small standard deviations (< 7 sr) by applying the transmittance method during several nights in January 2022.”

Finally, as volcanologist recently updated the name of the volcano to “Hunga”, the name was updated everywhere in the manuscript, including in the title.

From my point of view therefore the work is important to be published also given the low frequency of these events which as illustrated by the authors see in literature still relevant presentations of the eruption of Pinatubo and El Chichon underlining to the scientific community the importance of these ground and satellite observation systems for the study and characterization of these events.

**Reply:** We do also hope that our work will be published in order for our results to serve as constraint reference points for future works estimating HTHH forcing impact at larger scales.