

Atmos. Chem. Phys. Discuss., referee comment RC1
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Comment on acp-2022-253

Anonymous Referee #1

Referee comment on "Measurement report: Plume heights of the April 2021 La Soufrière eruptions from GOES-17 side views and GOES-16–MODIS stereo views" by Ákos Horváth et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2022-253-RC1>, 2022

Review of "Measurement report: Plume heights of the April 2021 La Soufriere eruptions from GOES-17 side views and GOES-16-MODIS stereo views" by A. Horvath et al.

General Comments

In this new study, Horvath et al. present a comparison of plume height estimates of a series of eruptions of La Soufriere in April 2021. The study compares the results of different measurement techniques and methods to estimate the plume heights, including side views and stereoscopic satellite imaging in both, visible and Infrared spectral bands as well as plume height estimation based on the minimum brightness temperature of the volcanic clouds. The study provides practical advice on how to interpret and possibly resolve ambiguities in height estimation related to the brightness temperature method.

Overall, this is an interesting and carefully conducted study, which fits well into the scope of ACP. The manuscript is very clear and concise. I would like to recommend the paper for publication in ACP subject to just a few minor corrections and clarifications as listed below.

Specific Comments

l41-43: Although it is a classical method, can you provide some references/examples of earlier studies using the brightness temperature method for volcanic plume height estimation?

l90-91: It would be good to add a reference for the ERA5 data:

Hersbach, H, Bell, B, Berrisford, P, et al. The ERA5 global reanalysis. Q J R Meteorol Soc. 2020; 146: 1999– 2049. <https://doi.org/10.1002/qj.3803>

l603-605: Based on recent findings from the Tonga eruption, I was also wondering why one would always necessarily pick the minimum brightness temperature of a volcanic plume to estimate the plume height. For the Tonga eruption, this approach would estimate a layer height close to the tropopause and significantly underestimate the heights of the upper layers of the plume. Upper layers would have to be estimated by inspecting the maximum brightness temperature near the center of the cloud, as suggested here. Perhaps, this aspect could be mentioned/discussed more early in the paper, when first introducing the brightness temperature method.

l641-651: This paragraph provides some interesting information on the 1979 eruption of La Soufriere, but it became not so clear to me, how it relates to the present study? Do you like to compare earlier methods for plume height estimate with present state-of-the-art methods in general?

Supplements: The videos/animations for the different eruptions are very nice, but could you possibly make them run a bit more slowly? (On my notebook, each of the animations takes only 2-3 s to run.)

Technical Corrections

l271: fix/explain "put oft-present cirrus"?

l353: "a nice mushroom cloud" -> "a mushroom cloud"