

Interactive comment on “Very high-resolution terrain surveys of the Chã das Caldeiras lava fields (Fogo Island, Cape Verde)” by Gonçalo Vieira et al.

Pablo J. Gonzalez (Referee)

pjgonzal@liverpool.ac.uk

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Dear Authors,

Review for the manuscript #essd-2020-289 "Very high-resolution terrain surveys of the Cha das Caldeiras lava fields (Fogo Island, Cape Verde)" by Vieira et al., submitted to ESSD.

The manuscript presents new drone-based very-high-resolution terrain/orthomosaic models in part of Cha das Caldeiras that suffered from topographic changes due to the lava flow produced by the 2014-2015 eruption. This dataset will be of high value for local/regional/global scientists and authorities for planning and research.

First, I am sorry for the delay to provide you feedback. However, I noticed that there

are already many good comments made by other researchers. So, I try to propose additional suggestions to improvement your manuscript.

In general, it is a good data contribution but it needs some clarifications. Currently, the manuscript leans towards a main conclusion that is scientific (mapped lava flow areas were smaller with respect to previous studies), rather than methodological or about data processing. The main conclusion could be well the case, but currently it does not provide sufficient evidence to support it. The section 4.5 on mapping and identification of the 2014-2015 lava flows field is too brief to understand well what the authors did and what the limitations or uncertainties are. It must be expanded and described in more detail.

In addition, I would like to draw your attention the following minor issues that should be addressed:

- In the current PDF, the format of the exponentiation does not render well. Please, revisit this aspect in the final version so “10⁶” or “km²” is clearly and correctly written, regardless of evil PDF generators.
- Although, I inferred from the context what kipukas are. It is not described until page 23. A description should be added in the abstract.
- The introduction has a very interesting and powerful argument to carry out the study and data collection, but it is hidden in its final lines (lines 105-109). I think it will be more effective if you highlight it in the first sentences and abstract. As I side note this will easy help to address some comments from other reviewers – “what is the objective of the study?”. In my opinion, filling the gap identified by the UN report is very relevant.
- Probably the manuscript was written before the publication by James et al., 2020 (<https://www.jvolcanica.org/ojs/index.php/volcanica/article/view/48>). But, please consider using this reference to synthetize the main challenges of the use of UAV in volcanic areas. This will complement excellently the nice compilation of studies presented

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in section 2.

- Please, add the landing sites locations in figure 3 with a clear symbol.
- Accuracy of the GNSS sites (Ground Control Points):
 - o The pictures (Fig. 4) give the impression that the authors did not use a tripod or bipod to hold the GNSS antenna during the GNSS signals data acquisition. I must point out that it is not trivial to maintain the GNSS antenna stable in the displayed way. Considering the very-high resolution drone imagery (5-10 cm), I would suggest in the future to collect multiGNSS constellation data to carry out post-processing to achieve the best precision and accuracy.
 - o Please add the list of coordinates of those GCPs, and its uncertainties/accuracy. If the information is not available or was not collected, I suggest report the distance to the base station to have a sense of the possible uncertainties.
- Consider adding tables with the survey acquisition parameters, and also a table with the main parameters of the processing performed by PIX4D.
- Please clarify if the “independent check points” were on the list of GCPs, and how its coordinates were determined (e.g., GNSS RTK mode, rapid-static, other?). I wonder if the type of terrain was correlated to the larger or lower accuracy in the check point. Can you check/comment on that? It might be useful to plan/design quality assessment strategies.
- From Figure 10B, it seems that a post-processing outlier filtering could be useful to remove many artefacts. Please, explore options with e.g., CloudCompare software.
- Section 4.5. needs a thoughtful revisit. The matter of fact is that we are challenging previous results, so it is necessary to have a description of the criteria to identify the lava flow and quantify the uncertainties on your new estimate.
- Section 5. Add a file with the list of coordinates of GCP and independent check points.
- I disagree that this survey is “unprecedented”. I agree that it is of highly valuable, as it will be widely available as an open source dataset. However, it is not unprecedented

even for Cha das Caldeiras (note that Bagnardi et al., 2016 used a drone DSM model for validation purposes of their satellite DEM results).

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