

Reply to Reviewer 1

UAV survey method to Monitoring and analysing geological hazards: The Case study of mud volcano of Villaggio Santa Barbara, Caltanissetta (Sicily)

Fabio Brighenti et al.

A pdf file of the reviewed manuscript is attached as supplement file. The changes in the text are marked with red for rephrasing, reorganized and the changes suggested by the referees.

General comments:

The manuscript has significantly improved. Very interesting read. I only have few minor comments.

Reply: Thank you for reading our work with interest. We have improved the quality of the manuscript through the advice of all the reviewers. It was a great help in improving our manuscript.

Specific comments:

Line 12: "Nowadays ~~the~~ remote sensing...."

Reply: Word deleted.

Line 13: ".... and monitoring of ~~the~~ natural hazards."

Reply: The sentence has been changed.

Line 47: " ... spatial and temporal resolution-~~s~~"

Reply: The letter has been deleted.

Figure 2 & Figure 3: *Just a suggestion:* it would be nice to combine the two figures into one.

Reply: Thanks for the suggestion but, we considered not to merge the two figures.

Line 197: "...but we modified ~~same~~ some parameters during the cleaning procedure of the sparse point cloud."

Reply: The word was changed, and the article has been added.

Line 60/61, 254 and 262: Unify the formatting of LoD percentage font size

Reply: The font size was unified.

Line 270: “On the upper part of the figure the dense point clouds of the two surveys of the same area carried out on 2019/07/29 (left).....”

Reply: The sentence has been corrected.

Line 277: Rewrite this sentence. Here is a suggestion: “As illustrated on in the section 2.2, the results show that using a percentage between 40 and 60 % of the GCPs (considered as control points) between 40 and 60, the RMSE value has a slight minimal variation.”

Reply: The suggestion was followed; the sentence was rephrased.

376: “After ~~that~~ the uncertainty and sensitivity of the surveys were computed, the time series were made.”

Reply: The sentence has been corrected.

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Reply: Thank you for your careful reading and suggestions, we think the discussion with you was helpful in improving the quality of the submitted paper.

Specific comments:

Change title to 'UAV survey method to monitor and analyze geological hazards: '

Reply: The title has been modified

Line 13: Change in 'of geological hazards'.

Reply: We followed the first referee's suggestion.

Line 14: Remove 'and monitoring'.

Reply: We have removed the part of the sentence.

Line 20: Structure from Motion (SfM). Correct this also in the other parts of the manuscript.

Reply: We have checked the entire paper and corrected the typo.

Line 25: Softwares.

Reply: The word has been corrected.

Lines 27-30: Citations should be ordered by year of publication.

Reply: Citations have been sorted in chronological order

Line 35: Add papers from Bonali et al. which are based on Structure from Motion techniques and drone surveys applied to active volcanic areas.

Reply: Bibliography was improved with recommended author.

Line 43: Remove 'in'.

Reply: It has been removed.

Line 47: What do you mean by high 'temporal resolutions'? Please detail better.

Reply: By this phrase we meant data acquisition frequency in the order of magnitude of hours to a maximum of one day.

Line 54: 'to georeference'.

Reply: The verbal tense was changed.

Line 55: in other parts of the manuscript, you speak about DEMs, not DSMs. Please make the text more homogeneous.

Reply: The term DEM has been replaced by DSM throughout the paper and in Figure 6.

Line 72: Fold and thrust belt. Correct also in 'gradually deformed'. Remove 'and moved'.

Reply: The sentence has been reworded according to suggestions.

Line 74: they 'represent' a preferential way.

Reply: The word has been changed.

Line 94: 'outside the volcano area'.

Reply: The sentence has been modified.

Line 96: Why are you supposing that these structures are active? Please specify.

Reply: We believe that the structures are active from the surveys carried out on 2002 and 2008, other evidence is the deformed athletics in the eastern part.

Line 104: 'in particular ensuring i).....'

Reply: The sentence has been rearranged.

Line 119: '0.016 m'.

Reply: Unit of measurement added.

Line 121: 'to compute'.

Reply: The verb has been corrected.

Line 123: '0.024 m'.

Reply: Unit of measurement added.

Line 131: 'GCPs'.

Reply: The typing error has been corrected.

Line 142: The sentence is not clear, please rephrase.

Reply: The sentence has been rephrased.

Line 144: Please rephrase.

Reply: The sentence has been rephrased.

Line 156: Please specify the acronym 'TST'.

Reply: The acronym has been reinserted.

Line 158: Remove the comma after 'network'. Also 'Fig. 5A'. Same in line 161 '(Fig. 5B)'.

Reply: Corrections have been made throughout the paper.

Line 161: What do you mean by 'verticality'? What is a bubble level?

Reply: The sentence has been rewritten, by "verticality" we meant a measurement perpendicular to GCPs. A spirit level, bubble level, or simply a level, is an instrument designed to indicate whether a surface is horizontal (level) or vertical (plumb).

Line 166: The sentence is not clear, please rephrase.

Reply: The sentence has been rephrased.

Line 170: Change 'we have done' in 'we performed'. Also, what do you mean by 'compared with the SfM software data'?

Reply: The verb has been changed. The sentence has been rewritten, explaining that the comparison was with the previous results of PhotoScan.

Line 175: Remove

'during'.

Reply:
Removed.

Line 186: 'Nadir'.

Reply: The word has been corrected.

Line 190: '2.4 Data processing through Structure from Motion (SfM) techniques'.

Reply: The title of the paragraph has been changed.

Line 192: 'Steps of the processing chain regarding Tie Point Accuracy and Marker Accuracy have been performed according to James et al. (2017) (Fig.6)'.

Reply: The advice was followed.

Line 196: we modified 'some' parameters.

Reply: The word has been corrected.

Lines 195-200: These sentences can be improved.

Reply: Sentences have been rephrased and improved

Line 206: Remove the comma after James.

Reply: Removed.

Line 229: is usually detected from 'sparse point clouds'.

Reply: The typo has been corrected.

Line 233: Dense point cloud. Also, 'is the most suitable'.

Reply: The suggestions were followed.

Line 235: Dense point clouds. Also in line 243.

Reply: The typo has been corrected.

Lines 250-252: Remove the space between 10 and A,B,C. Same in all text.

Reply: The space between the numbers and letters have all been eliminated.

Line 253: 'which exceed'.

Reply: Was correct.

Line 267: 'of the measurements'.

Reply: Has been corrected word

Line 276: '3. Results'.

Reply: has been corrected the title

Line 277: 'As shown in section 2.2, using a percentage of GCPs...'.

Reply: The sentence has been modified.

Line 278: 'GCPs'.

Reply: The typo has been corrected.

Line 279: 'When the threshold of 60% is exceeded,

Reply: The sentence has been modified.

Line 315: 'on the whole mud volcano area'.

Reply: The suggestion has been made in the text.

Line 316: 'In order to visualize important deformations....'

Reply: The sentence has been modified.

Line 345: 'Figure'. Same in line 346.

Reply: The capital letter has been added.

Line 360: Change 'questions' in 'issues'.

Reply: The word has been changed.

Line 366: 'the second aspect to be considered is the evaluation....'.

Reply: The sentence has been amended.

Line 371: What do you mean by 'volcano shell'?

Reply: The sentence has been changed. We meant the bare mud surface.

Line 375: 'at least of...'

Reply: The advice was followed.

Line 398: 'In hazards management,...'. Remove comma after 'technique'.

Reply: The suggestion has been made in the text.

Line 403: 'can occur up to one year before...'

Reply: Has been added in the paper.

Line 415: 'in the case of anomalous values detected, the monitoring campaigns must be improved'.

Reply: The sentence has been modified.

Figure 1: Add a scale and an orientation to the figure.

Reply: The scale in Figure 1 cannot be included, as it is a perspective photo, but we have added bar scales to give an idea of the size of the mud volcano. North has been added.

Figure 2: North and scale are missing.

Reply: North and scale have been added.

Figure 3: Correct 'local' in the legend.

Reply: The legend has been corrected.

Figure 6: Correct 'Adjustment' and 'Reconstruction'. In Step 3, the white box is missing the word 'Point' in 'Build Dense Cloud'. Also, specify the acronym DEM.

Reply: The text within the Figure has been corrected.

Figure 17: in the legends, correct 'Area', sometimes written as 'areae'.

Reply: Typing errors have been corrected.