

Solid Earth Discuss., author comment AC1
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Reply on RC1

Alessandro Tibaldi et al.

Author comment on "Mapping and evaluating kinematics and the stress and strain field at active faults and fissures: a comparison between field and drone data at the NE rift, Mt Etna (Italy)" by Alessandro Tibaldi et al., Solid Earth Discuss.,
<https://doi.org/10.5194/se-2020-211-AC1>, 2021

Dear Dr Tripanera,

thanks for the very useful suggestions, which have been all taken into account in the new version of the manuscript. The point-by-point replies to all suggestions are listed below. The Editor advised me that we will be allowed to upload the new version of the manuscript only in a successive stage when we will have received all the reviews.

Replies point-by-point:

The manuscript is overall well-written and data support the discussion. In general, it would be better if the paper is more focused on scientific outcomes than on the Structure From Motion Technique itself (the details about the processing set up can be moved in the supplementary material if the authors want to keep them).

Reply – We shortened this description, but according also to the other reviewers, we would prefer to maintain the description of the Structure from Motion technics in the main text, because it is an important piece of work of the methods used in this paper.

Minor comments

line 20: maybe "injectionS"?

Reply - Corrected

line 29: this conclusion is quite obvious nowadays. The SfM is quite well established. Maybe the authors should tell us here, the meaning of their data in the context of the volcano-tectonic structure of the volcano.

Reply – The conclusion about the efficacy of the SfM has been substituted by a conclusion about the meaning of our structural data in the volcano-tectonic context.

line 37: It could be useful to cite more paper about drone applications to structural geology in the introduction.

Reply – Some references have been added at lines 62-64.

lines 84-86: this can be deleted or integrated below within lines 87 to 94.

Reply – Done

Figure 1a: I suggest explaining in the caption that this map shows the geodynamic context where Etna Volcano locates.

Reply – Done

line 115-117: Is there any paper to cite here?

Reply – The reference (Tibaldi and Groppelli, 2002) has been added.

line 121: middle, upper and lower is not really intuitive in Fig. 2.

Reply – In reality we are referring to the central part of the rift and its northeastern part, so we corrected the text.

line 123: since you use elevation references, I suggest to show them in the related figure. This will help to identify better the locations on the map.

Reply – Our previous version of the text was not clear since we were not referring to elevations. We thus corrected the text according to reference to the central and northeastern parts of the rift.

Lines 186-189: Are you talking about Fig. 1c. If yes, please cite it.

Reply – Done

Line 203: see my comments about Fig. 2

Reply – We changed the text as explained above.

Lines 234-242: these lines are not needed.

Reply: we deleted them.

Did you use a terrain-following technique? How did you manage to keep the drone at the same altitude from the ground in this steep morphology?

Reply - We did not use a terrain-following technique. We have carefully planned every mission to avoid any possible collision and to follow the topography by direct piloting the drone, in order to obtain a ground resolution of about 2-3 cm.

Lines 263-264: not needed.

Reply - We deleted them accordingly.

Lines 267-269 and lines 273-284: I don't think this is relevant info for the paper's scope.

Reply - We deleted lines 267-269, and lines 273-284 were severely reduced down to a couple of lines.

Table 301: Maybe it is useful to specify that the time is hh:mm:ss.

Reply - Done

Line 332 - 333: do you mean 54 craters or merged vents or line segments in GIS? Please clarify this point. I do not see 54 eruptive fissure in Fig. 5.

Reply - We mean 54 line segments in GIS; we have checked and in Fig. 5 we have actually 54 yellow lines. Some of them are very close to each other, and in the figure they seem like a single one.

Line 337: Could be useful to indicate the name on the map.

Reply - Done

Line 339: the faults segments dipping NW are much shorter than the others. Is this just a local topography or not? From Fig. 5a these seem local structures.

Reply - We agree with the reviewer's comment and added the following sentence here: "Both structures are quite short and developed only locally".

Line 407 - 409: This has been seen commonly even elsewhere (e.g. Mount Laki in

Iceland for the graben, or along the Harrat Lunayyir fault for a single fault). You may also cite some papers here.

Reply – References have been added at lines 419-420.

Line 442 -423: Using drone images, it is possible to look at tiny structures also. The risk could be that minor structures may result "more prominent" than bigger ones, just because they are more in number. Did you take into account the dimensions (or "importance") of the structures? How? It could be useful to see if any correlation exists between the kinematic and the dimension (or "importance") of faults/fractures.

Reply – In the new version of the paper we added a new section presenting data on: length distribution of fissures and faults, relationships length-offset for both structure types, relation fracture strike-offset, and relation fracture strike-length, adding also three new graphs. The various correlations have been discussed.

Line 479: You could also cite Trippanera et al., 2019 as an example of a drone survey over a linear longer fault in Harrat Lunayyir.

Reply – Done.