

Reply to comment on se-2021-75

Anonymous Referee #2

Referee comment on "GPR signature of Quaternary faulting: a study from the Mt. Pollino region, southern Apennines, Italy" by Maurizio Ercoli et al., Solid Earth Discuss., <https://doi.org/10.5194/se-2021-75-RC2>, 2021

Ref#2: In this manuscript the Authors describe and interpret the Ground Penetrating Radar profiles acquired in different campaigns along a splay of the Fosso della Valle - Campotenese fault (VCT) in the Pollino Range (Northern Calabria, Italy), well known as a seismic gap region. Among the major objectives are the finding of evidence in the subsurface for Quaternary faulting along this buried fault and also the characterization of peculiar GPR signature of faulting in order to build a powerful methodology for areas of similar characteristics. Lots of data are produced on GPR acquisition and I found very interesting results and interpretation for the subsurface imaging of a sector of the Fosso della Valle-Campotenese fault (VCT) at the local scale. Manuscript provides a very high-quality data, and the inferences derived from the 3D are very well constrained. However, in my opinion several issues affect the manuscript and need to be fixed.

Authors:

Dear Referee #2,

we really thank you for your positive and very accurate revision of our manuscript. We're glad to hear that you like the data and results, and we are sure your corrections and suggestions will improve our work after the end of the revision process.

Ref#2: In general, i) the Authors use large parts of text, even redundantly and not always clearly, to refer to some general concepts not linked to the acquired data and to the aim of the manuscript. In different sections, there is confusion between what was found in the previous geological studies of the fault and what is new. This criticism has to be addressed to make the work sound in terms of objectives to be reached with the GPR acquisitions, the work core. ii) Similar problem occurs for the section GPR data description and interpretation that is very long and I would clean it by sentences on generic technical references (possibly to be insert into the methodology chapter) and shed light to the interpretation of the data.

Authors: Such a request is provided also by referee 1 and by the editor. The paper core is to provide not only hints on the structural setting and paleoseismicity of the study area but also to define and discuss, supported to proper literature references, a methodological workflow that can be widespread across similar regions and situations. We'll make our best to shorten the text where necessary and as requested.

Ref#2: Moreover, iii) at least the fault portion surveyed by GPR is claimed to be a buried fault, but then there is no a clear presentation on the mapping of the fault pattern at the surface and on which evidence it is based.

Authors: We display a 3D representation of the reconstructed fault pattern in figure 9c, aiming to provide a complete reconstruction of the main interpreted synthetic (i.e. W- to SW- dipping) and antithetic (E- to NE- dipping) structures, obtained by interpolating the GPR evidence of figure 8b (extended to other lines) and remarked in figure 9b. However, also following the comment of #Rev1, we figure out that it is not very clear. We'll surely update it, or adding a basemap to figure 9c or possibly providing an updated figure 9c. In the latter case, the figure will include the fault pattern, obtained by intersecting the subsurface fault model with the topography, displayed as a detailed structural map of the surveyed area.

Ref#2: This is critical also iv) to fully discuss the seismic hazard implication of the VCT fault based on the GPR results, as offset estimation, fault zone width, etc...rather than citing already well-established statements. Here, I expect you to explore the potentiality of the data relative to hazard assessment on the fault, including the definition of limits of the GPR approach on the recognition and dating of discrete events of faulting. This is why GPR signals remain very important for the preparatory phase of further investigations.

Authors: we agree with this consideration, and we think that, as we replied to Referee#1, based on the interpreted GPR profiles we can provide a reasonable estimation of GPR displacements, as well as an estimation of average fault zone width. The only possibility of going further, in evaluating the seismic hazard of the area, would require attributing the highlighted offset to a single coseismic displacement event. Evidently in the absence of direct subsurface data, this assumption would be too uncertain based only by using our data. As suggested, we agree it is an important point to specifically discuss the potentiality and limits of the GPR approach, particularly if without chronostratigraphic constraints and ground-truthing, as presented in this study.

Ref#2: v) Figure and figure captions need revision in order to become self-readable images.

Authors: We will revise the figure and figure captions also using your detailed comments

Ref#2: For the above criticisms in my opinion the manuscript is suitable for publication in SolidEarth with major revision. You may find several detailed comments, questions and proposed changes in the annotated attached file.

Authors: Again, many thanks for your effort, such detailed corrections and comments will considerably aid us during the revision process. We will provide a point-to-point reply to detailed comments together with the revised manuscript.