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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "The influence of the grain-size, mineralogical and geo-chemical composition on the Verdesca landslide" *by* V. Summa et al.

V. Summa et al.

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Dear Editor,

On the behalf of my co-authors, I would like to thank you and the Referees for the suggestions aimed at improving the proposed study. Following the suggestions, we have carefully revised the manuscript. We hope that the manuscript in its revised version will meet your approval and that it will be accepted for publication in the Natural Hazards and Earth System Sciences journal. Thank you in advance for your attention. Kind regards Vito Summa

ANONYMOUS REFEREE # 3

REPLIES TO THE GENERAL COMMENTS

1. The title of the Manuscript does not express the content of the Manuscript. It is not possible to ïňĄnd the inïňĆuence of the grain-size, mineralogical and geo-chemical composition on behavior or trigger of the Verdasca landslide in the manuscript. The title should be changed or the manuscript should be amended.

Reply: We believe that the title is relevant to the content of the manuscript. Compositional anomalies of some grain-size, mineralogical and geochemical characters at the slip zone are in accordance with their negative correlations to mechanical properties (such as residual shear strength and residual friction angle), demonstrating that these compositional characters can negatively influence the mechanical behavior of sediments and trigger the slip.

2. The Verdasca landslide is very slightly described. Landslide description should be better and detailed ïňĄgures should be added (especially cross-section).

Reply: The aim of our paper is not the geomorphological description of the landslide. Some indications have been provided but a more detailed description of the Verdasca landslide was carried out in another manuscript (Gueguen et al.), submitted to the same special issue. In this manuscript a geomorphological profile was inserted. This manuscript is cited in our paper.

3. Better presentation of shear strength testing is needed.

Reply: Shear strength tests were carried out by shearing the specimens over 6mm, at least 6 times until the minimum strength was obtained. Tests were performed on specimens reconstituted with distilled water. We will add this information in the paragraph concerning materials and methods. The large amount of data and the available space do not allow us to insert all the graphical outputs from the several mineralogical, granulometric and geotechnical analyses carried out.

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Changes to be made to the manuscript

Page 5 Line 25 of the proof: To be added: “Tests were performed on specimens reconstituted with distilled water.”

4. Correlations between mineralogical composition and shear strength are very week and should be better explained.

Reply: All the correlations considered in the paper were deemed statistically significant when R > 0.81. This value was chosen taking into account table 13 of Biometrika tables for statisticians (Pearson e H.O. Hartley; Cambridge University Press, NY, 1970), with freedom degrees dfr = 4 and significance level α = 0.05.

REPLIES TO THE SPECIFIC COMMENTS

1. Page 5049, line 4: What does it mean term “land degradation process”? Please explain or ïňĄnd better and appropriate term.

Reply: We used the term “land degradation” referring in particular to soil erosion processes, frequent and widespread in the Agri Valley, especially in the form of gullies and biancane. We will add these specifications to the manuscript.

Changes to be made to the manuscript

Page 3 Lines 3-6 of the proof: “Our attention has been focused on a pilot area in the Agri Valley, an intermountain basin in the Southern Apennines (Basilicata, Italy), often affected by land degradation processes (especially in the form of gullies and biancane) and mass gravitational movements mainly involving fine sediments with clay components.”

2. Page 5049, line 8: What does it mean term “geochemical and mineralogical hazard factors”? Please explain or ïňĄnd better and appropriate term.

Reply: The geochemical and mineralogical hazard factors with respect to the slope stability are those compositional characters able to influence the physical-mechanical

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behavior of the sediments and trigger the slip zone. The purpose of this study was to precisely identify these factors.

3. Page 5050, line 1: “peaty levels” or “peaty layers”?

Reply: We will replace the term “levels” with the term “horizons”, as indicated in the detailed stratigraphies reported in the cited paper of Zembo (2010).

Changes to be made to the manuscript

Page 4 Line 1 of the proof: “horizons” in place of “levels”

Page 6 Line 14 of the proof: “horizons” in place of “levels”

4. Page 5050, line 8: Mechanism of the landslide should be better explain. It should be related to Figure 1 which should be improved or another one ïňĄgure of landslide engineering-geological map should be added.

Reply: All additional information requested and a more detailed geomorphological description of the landslide are present in Gueguen et al.’s paper, as indicated in the manuscript.

5. Page 5050, line 17: “. . .residual shear strength, residual friction angle”. Friction angle is strength parameter. Better term is Residual shear strength parameters.

Reply: As suggested by the Referee, we will insert the term “Residual shear strength parameters”.

Changes to be made to the manuscript

Page 4 Lines 14 - 18 of the proof: “A geognostic hole equipped with an inclinometer tube (S1, Fig. 1-2) was used to reconstruct the stratigraphic sequence of the deposits involved in the landslide and collect the sediment samples submitted for physical-mechanical characterization (Atterberg’s limits and residual shear strength parameters) and compositional analyses (grain-size, mineralogy and geochemistry).”

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6. Page 5051, line 21: Please present results of shear strength testing. What does it mean term shear strength? See also SpeciïňĄc Comment 6.

Reply: Shear strength results are reported in table 1. The large amount of data and the available space do not allow us to insert all the graphical outputs from geotechnical tests and the several mineralogical and granulometric analyses carried out. Residual shear strength was calculated considering friction angle values, obtained from shear tests, and litostatic loads in situ, determined for each sample on the basis of sampling depth, groundwater depth, stratigraphies and unit weight of sediments, also compared with those indicated in the geotechnical literature.

7. Page 5051, line 26: Please present results of Atterberg's Limits values.

Reply: Atterberg's Limits values determined are reported in table 1. As indicated in reply 6, the large amount of data and the available space do not allow us to insert the graphical outputs from geotechnical tests.

8. Page 5054, line 27: See SpeciïňĄc comment 6.

Reply: See reply 6.

9. Page 5054, line 27: This conclusion is too general and it is well know in landslide science.

Reply: It is a synthetic sentence summarizing what was discussed in detail in our manuscript.

10. Figures 13 and 14: It is not clear what does it mean residual shear strength. Correlations are based on only few points and obtained correlation coefficient are very doubtful.

Reply: Residual shear strength was calculated considering friction angle values, obtained from shear tests, and litostatic loads in situ, determined for each sample on the basis of sampling depth, groundwater depth, stratigraphies and unit weight of sedi-

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The English has been edited by an English native speaker.

Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 2, 5047, 2014.