

Mass movement mapping and their impact analysis on the upper Tayyah valley's bridge along Shear escarpment highway, Asir region (Saudi Arabia) using remote sensing data and field investigation

Anonymous Referee #1

Received and published: 23 February 2015

Dear Reviewers and Editor,

This paper is a basic description of some gravitational processes occurring over a 2km long road section in Saudi Arabia. However the site seems very prone to mass movements and the road potentially at risk, this contribution is only a very superficial report on the area.

- 1- No significant scientific or technical question is addressed.

Reply: Thank you for your comment. We have substantially revised the manuscript. We Fixed that and addressed some new points in the manuscript.

- 2- In particular, section 5 (Results and Discussion) is a mixture of generalities (definition of "dips" (509)

Reply: We have thoroughly revised the Results and Discussion section. We deleted the definitions of dip and dip direction.

- 3- or "circular failure") which have nothing to do here, with basic observations simply referring to pictures.

Reply: We have this information as important observations from the field investigation for the readers.

- 4- Some kinematic tests for planar failures have been done, but only data of one single discontinuity set are shown for each of the 3 sites.

Reply: Thank you. Only data of single discontinuity is shown because of the impact of this direction on the bridge.

- 5- There is no way to understand the fracturing of the rock, which looks much more complicated on the picture than it appears in the text.

Reply: Thank you for your comment. Yes, you are absolutely right. There are many sets of the discontinuities; however we considered only the set that has the main impact on the bridge and road where most of the failures detected in the area are related to planar failure that occurred towards the highway and bridge.

- 6- The authors claim that shear tests and many structural measurements have been done (p502), but these data do not appear anywhere.

Reply: We mentioned that the friction angle related to the shear test data shown in Table 2. Kindly refer to the revised manuscript.

- 7- It is question of a fault crossing the site, but it is not shown in any figures.

Reply: Thank you very much for this observation. We added some figures showing the Fault zone as in Fig 3b, 3c.

- 8- Presently, the data presented in this paper are much too patchy or superficial to support any interpretation.

Reply: We have rewritten the manuscript and some of the section have been thoroughly revised and explained in detail.

- 9- In its present state, this text is more a report about some observations done along this road section than a scientific contribution.

Reply: As said earlier, we have revised the manuscript to look it more as a scientific paper.

- 10- There is no original contribution in terms of methods, processes, susceptibility mapping, hazard or risk assessment.

Reply: We fixed the methodology and the revised manuscript clearly indicates the new contribution.

- 11- The quality of the text is very uneven, with numerous mistakes in basic slope stability terms (planner for planar for instance). Even though the area looks interesting for slope stability and risk assessment along roads, more work has to be done to get a significant contribution.

Reply: We fixed planner to be planar.

Anonymous Referee #2

Received and published: 25 February 2015

This manuscript comprises descriptions of gravitational slope deformations along a road section in Saudi Arabia. However, this manuscript is clearly lacking innovation. It is just a report of slope stability problems along a road section in Saudi Arabia.

- 1- Additionally, there are important weaknesses in the English language, which make many parts difficult to understand. There are numerous basic grammatical errors in the English language (wrong verb forms, problems with singular vs plural, use of “the”, fragmental sentences etc).

Reply: We completely improved the English language of the manuscript. Also, the revised manuscript is proof read by a colleague who is English native. We fixed planar to be planar.

- 2- In several cases technical terms are wrong or used unusual (like for example “raveling failure” instead of rock falls), which again complicates the understanding of the entire text.

Reply: We changed raveling failures to rock falls.

- 3- Furthermore, there are serious problems with the structure of the manuscript (see the comments in the following paragraphs). One existing classification scheme should be consistently used to group the different landslides in the study area. This should be described and cited. At the moment the used classification is not consistent, neither internally within this manuscript nor with existing classifications.

Reply: We changed the structure of the manuscript in this revision.

- 4- The conducted kinematic tests are not sufficient. Structures should not be limited to one joint set (I suppose that there are more than one joint set or foliation in the rock mass) and different kinematics should be tested (like wedge and toppling failure besides planar sliding). By the way, the kinematic test for planar failure gets clearer in a figure with plotting poles instead of great circles for the planes.

Reply: These joint sets only responsible for the planar failure in the area. We measured only one joint set for each site that has main influence on the road and bridge section. We did not recognize any wedge or toppling types from our field investigations.

- 5- The “Introduction” is rather poor. There is no clear structure and it leaves the reader without any clear aim for this study. Several parts seem not to be relevant for the following content of the manuscript.

Reply: We fixed this part to make it more concise.

- 6- The literature review should be extended with respect to international publications as well as more recent publications.

Reply: We fixed this part to add more new references.

- 7- One important technical point is that the authors seem not to be aware of the difference in between susceptibility and hazard. I got the feeling that those terms are used simultaneously.

Reply: We fixed that as the road and bridge section are facing landslides susceptibility.

- 8- The “Method” section is insufficient and should be structured better.

Reply: We fixed the method section in detail and have improved in this revision.

- 9- As it is now, the applied methods are not clear to the reader. Just to give some examples: What type of structural data have been collected and how? What do the authors expect as “standard field investigations”? Many parts of the “Results and discussion” section contain descriptions of methods and should actually be placed here.

Reply: We fixed that.

- 10- Furthermore, there are some contradictions in between the described methods in the “Method” section and in the “Results and discussion” section. On the other hand, the “Results and discussion” section describes far too few real results.

Reply: Results and Discussion section is thoroughly revised.

- 11- The map with the inventory should be presented first as a main result, making all following results easier understandable. It would be beneficial to summarize the inventory with some basic statistics. At least a table with all mapped landslides and their basic characteristics is necessary.

Reply: The inventory map is presented in detail in this revision.

- 12- I do not see a difference in between section 5.1 and 5.5 and recommend combining them as a first results section.

Reply: We have rewritten this part.

- 13- Section 5.1 can probably almost entirely be moved to the “Method” section.

Reply: As per your suggestion, section 5.1 is moved to the Method section.

- 14- I think this manuscript could be improved significantly by (1) a rigorous restructuring (2) an extended introduction (including a clearer aim) and (3) a language check by a native speaker. This may be enough for resubmitting this manuscript to a regional journal. However, for an international journal it needs to be extended by innovative approaches or techniques.

Reply: We did many changes and improved the manuscript significantly. Thank You for your valuable comment.