

Reply to reviewer n.2: unknown

“Evaluating performances of simplified physically based models for landslide susceptibility”

G. Formetta, G. Capparelli, P. Versace.

We thank the reviewer n. 2 for the revision and the suggestions. We replied in bold below each comment.

GENERAL COMMENTS

This manuscript (MS) presents an interesting and important topic on GIS-based landslides susceptibility mapping. However, the MS has some flaws that need to be taken care of.

Q1) Geology, hydrogeology and land cover are important factors in landslide susceptibility study. As mention in the Abstract of this MS, the authors only mentioned “hydrology, geotechnical science, geomorphology, and statistics.”

A1) We agree with the reviewer’s comment and we revised the sentence in the abstract adding geology and hydrogeology as important factors in landslide susceptibility analysis:

Old sentence: “Prediction of shallow landslides susceptible locations is a complex task that involves many disciplines: hydrology, geotechnical science, geomorphology, and statistics”.

New sentence: “Prediction of shallow landslides susceptible locations is a complex task that involves many disciplines: hydrology, geotechnical science, geology, hydrogeology, geomorphology, and statistics”.

Moreover in the introduction we took into account of the importance of geology on landslide susceptibility. Specificatally in the sentence: “Geo-environmental factors such as geology, land-use, vegetation, climate, increasing population may increase the landslides occurrence (Sidle and Ochiai 2006).”

Q2) The MS has never mentioned the types of landslide (or failure

mechanisms), e.g. translational or rotational landslide that they were modeling. It is important to identify the landslide type first and then select the proper physical model.

A2) We agree with the reviewer's suggestion and we added the following sentence to specify for what kind of failure mechanism the models are more suitable. Moreover the new sentence answer also to the Q3 reviewer comment where is asked to define what a shallow landslide is:

New sentence: "Those models are suitable for shallow translational landslides controlled by groundwater flow convergence. Shallow landslides usually have a very low ratio between the maximum depth (D) and the length (L) of scar ($D/L < 0.1$, Casadei et al., 2003), involve small volume of the colluvial soil mantle and present a generally translational failure mechanism (Milledge et al., 2014)"

Q3) The MS keeps referring to "shallow landslide". What is the definition of "shallow landslides"? What is the failure mechanism of a "shallow landslide"?

A3) We hope that in the answer A2 we have meet this reviewer request.

Q4) There are so many grammar errors and typos, which distract me from reading the MS. I list examples of these errors and typos under "**Suggested Edits**". I don't think I found all of them. I strongly suggest that the authors should have someone editing their writing carefully in order to make this MS publishable.

A4) We revised all the grammar error suggested by the reviewer 2. Moreover, we revised again the language and the typos in the paper taking into account the typos that also the reviewer 1 pointed out.

SPECIFIC COMMENTS

Here is a list of additional items need to be addressed:

Q5) As stated in the MS

"The model M2 considers both soil properties (as degree of soil saturation and void ratio) and the soil cohesion as stabilizing factors. The model output is a

map of safety factors (FS) for each pixel of the analyzed area.”

However, degree of soil saturation could either be a stabilizing or destabilizing factor depends on the geomorphology, e.g. slope angle. 2

A5) We agree with the reviewer’s suggestion. In the sentence we wanted to point out two features of the model M2: 1) the fact that consider the effect of the degree of soil saturation and void ratio above the groundwater table and ii) the fact that consider the stabilizing effect of the soil cohesion. We revised the sentence according the reviewer’s suggestion:

New sentence: “Differently from M1, the model M2 considers: i) the effect of the degree of soil saturation (S_r [-]) and void ratio (e [-]) above the groundwater table and ii) the stabilizing contribute of the soil cohesion. The model output is a map of safety factors (FS) for each pixel of the analyzed area.”

Q6) Equation (3) – the meanings of symbols need to be explained.

A6) We partially agree with the reviewer’s comment. There were only two symbols in eq. 3 that were not explained: degree of saturation and void ratio. We hope that the sentence that we added in A5, were we specify the symbols S_r and e , has met the reviewer suggestion.

Q7) Appendix A and Table are redundant

A7) We thank the reviewer for the comment but we believe that table are useful to quantify the model performances that sometimes are not easily distinguish in the plot and the appendix A is useful to show the behavior of all the optimized indices in the roc plan for different models.

SUGGESTED EDITS

Q8) Line 8

a fundamental tools

a fundamental tool

A8) We revised the sentence according the reviewer’s suggestion:

New Sentence: “but also a fundamental tool for the environment preservation and a responsible urban planning”

Q9) Line 10

During the last decades

During the last decade

Or

During the last few decades

A9) We revised the sentence according the reviewer's suggestion:

New sentence: "During the last few decades many methods for landslide susceptibility mapping"

Q10) Lines 18-19

to link instability factors (such as geology, soils, slope, curvature, and aspect) and past and present landslides.

to link instability factors (such as geology, soils, slope, curvature, and aspect) with past and present landslides.

A10) We revised the sentence according the reviewer's suggestion:

New sentence: "use different approaches such as multivariate analysis, discriminant analysis, random forest to link instability factors (such as geology, soils, slope, curvature, and aspect) with the past and present landslides."

Q11) Lines 24-25

The soil-stability component simulates the safety factor of the slope safety factor (FS) defined as ratio of stabilizing to destabilizing forces.

The soil-stability component simulates the slope safety factor (FS) defined as ratio of stabilizing to destabilizing forces. 3

A11) We revised the sentence according the reviewer's suggestion:

New sentence: "The soil-stability component simulates the slope safety factor (FS) defined as ratio of stabilizing to destabilizing forces"

Q12) Line 5

For these reason,

For these reasons,

A12) We revised the sentence according the reviewer's suggestion:

New sentence: "For these reasons,"

Q13) Lines 20-23

The procedure is implemented in the open source, GIS based hydrological model, denoted as NewAge-JGrass (Formetta et al., 2014) that uses the Object Modeling System (OMS, David et al., 2013) modeling framework.

The procedure is implemented in the open source, a GIS based hydrological model, denoted as NewAge-JGrass (Formetta et al., 2014) that uses the Object Modeling System (OMS, David et al., 2013) modeling framework.

A13) We thank the reviewer for the suggestion we modified the sentence using an “and” between open-source and GIS based because they both are adjectives of hydrological model. The new sentence is:

New Sentence: “The procedure is implemented in the open source and GIS based hydrological model, denoted as NewAge-JGrass (Formetta et al., 2014) that uses the Object Modeling System (OMS, David et al., 2013) modeling framework.

Q14) Lines 24-26

OMS a Java based modeling framework that promotes the idea of programming by components and provides to the model developers many facilitates such as: multithreading, implicit parallelism, models interconnection, GIS based system.

OMS is a Java based modeling framework that promotes the idea of programming by components and provides the model developers with many facilitates such as: multithreading, implicit parallelism, models interconnection, and GIS based system.

Or

OMS, a Java based modeling framework, promotes the idea of programming by components and provides the model developers with many facilitates such as: multithreading, implicit parallelism, models interconnection, and GIS based system.

A14) We revised the sentence according the reviewer’s suggestion:

New sentence: OMS is a Java based modeling framework that promotes the idea of programming by components and provides the model developers with

many facilitates such as: multithreading, implicit parallelism, models interconnection, and GIS based system.

Q15) Lines 13-15

Comparing the results obtained for different models and for deferent GOF metrics the user can select the most performing combination for is own case study.

Comparing the results obtained for different models and for deferent GOF metrics the user can select the most performing combination for one's own case study.

Or

Comparing the results obtained for different models and for deferent GOF metrics the user can select the most performing combination for his or her own case study.

A15) We revised the sentence according the reviewer's suggestion:

New sentence: Comparing the results obtained for different models and for deferent GOF metrics the user can select the most performing combination for his or her own case study.

Q16) Lines 19-21

Thus deferent LSA configurations can be realized depending on: the landslide susceptibility model, the calibration algorithm, and the GOFs selected by the used.

Thus deferent LSA configurations can be realized depending on: the landslide susceptibility model, the calibration algorithm, and the GOFs selected by the user.

A16) We revised the sentence according the reviewer's suggestion:

New sentence: "Thus deferent LSA configurations can be realized depending on: the landslide susceptibility model, the calibration algorithm, and the GOFs selected by the user. "

Q17) Lines 24-26

the Montgomery and Dietrich (1994) model (M1), the Park et al. (2013) model (M3) and the Rosso et al. (2008) model (M3).

the Montgomery and Dietrich (1994) model (M1), the Park et al. (2013) model (M2) and the Rosso et al. (2008) model (M3).

A17) We revised the sentence according the reviewer's suggestion:

New sentence: the Montgomery and Dietrich (1994) model (M1), the Park et al. (2013) model (M3) and the Rosso et al. (2006) model (M3)

Q18) Line 5

a [-] is the slope gradient

a α [-] is the slope angle

A18) We revised the sentence according the reviewer's suggestion:

New sentence: " α [-] is the slope angle"

Q19) Lines 12-13

In order to assess the models' performance we developed model that computes the most used indices for assessing the quality of a landslide susceptibility map.

In order to assess the models' performance we developed a model that computes the most used indices for assessing the quality of a landslide susceptibility map.

Or

In order to assess the models' performance we developed models that compute the most used indices for assessing the quality of a landslide susceptibility map.

A19) We revised the sentence according the reviewer's suggestion:

New sentence:

In order to assess the models' performance we developed a model that computes the most used indices for assessing the quality of a landslide susceptibility map.

Q20) Lines16-17

This is possible because each model is an OMS component and can be linked to the calibration algorithms as it is, without rewriting or modifying their code.

This is possible because each model is an OMS component and can be

linked to the calibration algorithms as it is, without rewriting or modifying its code.

A20) We revised the sentence according the reviewer's suggestion:

New sentence: "This is possible because each model is an OMS component and can be linked to the calibration algorithms as it is, without rewriting or modifying its code".

Q21) Lines 7-8

Secondly, we verified if each OF metric has own information content or if it provides information analogous to other metrics (and unessential).

Secondly, we verified if each OF metric has its own information content or if it provides information analogous to other metrics (and unessential).

A21) We revised the sentence according the reviewer's suggestion:

New sentence: "Secondly, we verified if each OF metric has its own information content or if it provides information analogous to other metrics (and unessential). "

Q22) Lines1-2

Slope gradients, computed from 10m resolution digital elevation model, range from 0 to 55o, while its average is about 26o.

Slope, computed from 10m resolution digital elevation model, ranges from 0 to 55o, with its average is about 26o

A22) We revised the sentence according the reviewer's suggestion:

New sentence: "Slope, computed from 10 meters resolution digital elevation model, range from 0° to 55°, while its average is about 26°."

Q23) Lines 7-9

The first unit is a Lower Pliocene succession of conglomerates and sanstones passing upward into silty clays (Lanzafame and Tortorici, 1986) second unit.

The first unit is a Lower Pliocene succession of conglomerates and sanstones passing upward into the silty clays (Lanzafame and Tortorici, 1986) second unit.

A23) We revised the sentence according the reviewer's suggestion:

New sentence: "The first unit is a Lower Pliocene succession of

conglomerates and sandstones passing upward into silty clays (Lanzafame and Tortorici, 1986) second unit”.

Q24) Lines 11-12

as also suggested by data provided by Young and Colella, 1988.

as also suggested by data provided by Young and Colella (1988).

A24: We revised the sentence according the reviewer’s suggestion:

New sentence: “as also suggested by data provided by Young and Colella (1988)”

Q25) Lines 15-16

All the data were digitized and stored in GIS database (Conforti et al., 2014) and the results was the map of occurred landslide presented in Fig. 2d.

All the data were digitized and stored in a GIS database (Conforti et al., 2014) and the result was the map of occurred landslide presented in Fig. 2d.

A25) We revised the sentence according the reviewer’s suggestion:

New sentence: “All the data were digitized and stored in a GIS database (Conforti et al., 2014) and the result was the map of occurred landslide presented in Fig. 2d”

Q26) Line 26

the parameter kept constant during the simulation and their value.

the parameters kept constant during the simulation and their values.

A26) We revised the sentence according the reviewer’s suggestion:

New sentence:” the parameters kept constant during the simulation and their values. ”

Q27) Lines 13-15

This suggests that the variability of the optimal parameter values for model M1 and M2 could be due to compensate the effects of important physical processes neglected by those models.

This suggests that the variability of the optimal parameter values for models M1 and M2 could be due to compensate the effects of important physical processes neglected by those models.

A27) We revised the sentence according the reviewer’s suggestion:

New sentence: "This suggests that the variability of the optimal parameter values for models M1 and M2 could be due to compensate the effects of important physical processes neglected by those models"

Q28) Lines 23-24

For the model M2 and M3 is clear that ACC, HSS, and CSI provides the less performing models results.

For the models M2 and M3 it is clear that ACC, HSS, and CSI provide the less performing models results.

A28) We revised the sentence according the reviewer's suggestion:

New sentence: " For the models M2 and M3 it is clear that ACC, HSS, and CSI provide the less performing models results."

Q29) Lines 4-5

Results presented in Fig. 3 and Table 4 shows that:

Results presented in Fig. 3 and Table 4 show that:

Or

Result presented in Fig. 3 and Table 4 shows that:

A29) We revised the sentence according the reviewer's suggestion:

New sentence: " Results presented in Figure 3 and Table 4 show that:"

Q30) Line 26

for each model M1, M2 and M3.

for each model M1, M2 or M3.

A30) We revised the sentence according the reviewer's suggestion:

New sentence: " for each model M1, M2 or M3."

Q31) Lines 1-2

The more is prominent as the less the vector are correlated;

The more prominent the less the vectors are correlated;

A31) We revised the sentence according the reviewer's suggestion:

New sentence: "The more prominent the less the vectors are correlated; "

Q32) Lines 6-7 7

This confirms that an optimization of AI, D2PC, SI and TSS provide quite similar model performances,

This confirms that an optimization of AI, D2PC, SI and TSS provides quite similar model performances,

A32) We revised the sentence according the reviewer's suggestion:

New sentence: "This confirms that an optimization of AI, D2PC, SI and TSS provides quite similar model performances"

Q33) Line 12

In this step we focused the attention on the models M2 and M3

In this step we focused on the models M2 and M3

Or

In this step we put our attention on the models M2 and M3

A33) We revised the sentence according the reviewer's suggestion:

New sentence: "In this step we focused on the models M2 and M3"

Q34) Lines 4-5

Results where presented in Figs. 5 and 6 for model M2 and M3 respectively.

Results were presented in Figs. 5 and 6 for models M2 and M3 respectively.

A34) We revised the sentence according the reviewer's suggestion:

New sentence:" Results were presented in Figures 5 and 6 for models M2 and M3 respectively. "

Q35) Lines 6-7

Each column of the figures represents one optimized index and has a number of boxplot equal to the number of model's parameters (5 for M2 and 6 for M3).

Each column of the figures represents one optimized index and has a number of boxplots equal to the number of model's parameters (5 for M2 and 6 for M3).

A35) We revised the sentence according the reviewer's suggestion:

New sentence: "Each column of the figures represents one optimized index and has a number of boxplots equal to the number of model's parameters (5 for M2 and 6 for M3)"

Q36) Lines 7-9

Each boxplot represents the range of variation of the optimized index due a certain model parameters change.

due? – can't understand

A36) We revised the sentence according the reviewer's suggestion:

New sentence: "Each boxplot represents the range of variation of the optimized index due to a certain model parameters change"

Q37) Lines 9-10

The more narrow are the boxplot for a given optimized index the less sensitive is the model to that parameter.

The narrower the boxplot for a given optimized index the less sensitive is the model to that parameter.

A37) We revised the sentence according the reviewer's suggestion:

New sentence: "The narrower the boxplot for a given optimized index the less sensitive is the model to that parameter"

Q38) Lines 17-18

The selection of the more appropriate model for computing landslide susceptibility maps is based on what we learn from the previous steps.

forms the previous steps – can't understand

A38) We revised the sentence according to the reviewer's suggestion:

New sentence: "The selection of the more appropriate model for computing landslide susceptibility maps is based on what we learn from the previous steps"

Q39) Line 4

For this reason we used the combination of the model M3 with parameters obtained

For this reason we used the combination of the model M3 with parameters obtained

A39) We revised the sentence according to the reviewer's suggestion:

New sentence: "For this reason we used the combination of the model M3 with parameters obtained"