Anonymous Referee #3

We thank the reviewer for the comments and suggestions. Our answers to the reviewer comments are in italic, and the corrections included in the new version of the manuscript are in ***bold black italic***

Here below a list of my major comments:

a) The introduction should be rewritten in order to focus better on your objectives and the methodology you use. In my understanding the objective of this work is to assess the stability of slopes considering the effect of the anthropic factors. I would avoid (at least reducing) in the introduction the description of rainfall thresholds since this is not the focus of the paper. I would instead describe state of the art of physically based modelling, moving here the first part of section 2.4.

Although we agree with the reviewer that the main focus of the paper is to assess the influence of the anthropic factor on slope stability, we additionally include the implication of those factors in rainfall thresholds to emphasize the impacts on landslide early warning systems, which is the focus of the special issue.

We agree with the reviewer that improvements about the state of the art of physical based modeling are necessary. Therefore, the introduction section has been updated to include recent literature.

b) The description of state of the art models in section 2.4 is not up-to-date. The references are old. Please have a look to this reference for more recent literature: Rossi, G., Catani, F., Leoni, L., Segoni, S., and Tofani, V.: HIRESSS: a physically based slope stability simulator for HPC applications, Nat. Hazards Earth Syst. Sci., 13, 151-166.

We will include current bibliographical references on stability and flow analysis models.

c) Please clarify better in the text that SHALSTAB, TRIGERS and so on, are distributed models while the Geostudio Package (SEEP/W and SLOPE/W) makes an analysis at slope scale.

We will clarify the difference among the models in the introduction section.

d) Which type of method do you use in your stability analysis?

For stability analysis, we used the Morgenstern & Price method. In order to simulate the transient conditions during the rainfall event of 2000, it was used the module Seep/W. Such cases area analysis by the software GeoSlope an integrated, fully coupled solution. This point has been clarified in the new version of the manuscript in the last paragraph of the introduction section.

e) Concerning the stability analysis you should add a figure with the location of the cuts and loads along your profiles. This is a very important point to be better addressed since it makes your work weak. You know that the loading and unloading of a slope can have different effect on the slope stability depending on the location of the works (J. N. Hutchinson An influence line approach to the stabilization of slopes by cuts and fills Canadian Geotechnical Journal, 1984, Vol. 21, No. 2: pp. 363-370).

A new figure has been added in the current version of the manuscript showing the location of cut and fills. It should be emphasized that the results of the present study corroborated the studies of Hutchinson (1984) regarding the effect slope cuts and the location of the loads in the stability factor FS.

Another important issue relates to the shape of landslide surface in the SLOPE/W analysis. Have you drawn your sliding surfaces (the ones in figure 2)? Or have let the software to identify the most critical sliding surfaces? In both cases a figure with the sliding surfaces and their location along the slopes should be added. If possible also a description of the landslides; planar or rotational shape?

Regarding the sliding surface, simulations were designed to allow Geoslope to identify automatically the most critical rupture surface. To clarify this point, we have added the following paragraph to section 2.4:

> ***All the simulations allowed the slope stability module SLOPE/W to identify the most critical rupture surface. Therefore, the values of the Slope Safety Factor – FS, were the lowest of all conditions analyzed.***

In addition, a new Figure includes the rupture surface and the type of processes added showing the location of the type of landslide processes involved (planar or rotational rupture)

f) In Table 2 both the effective cohesion and effective friction angles are very high. Please comment on this.

To address this comment, the following paragraph has been added in the result section 3.1

> ***The high values of the resistance parameters shown in Table 2 are associated with the high heterogeneity of the residual gneiss soil, such as the presence quartz particles and other minerals of considerable size in the specimens tested, which confer them high resistance.***

g) In Table 3 matric suction must have positive values otherwise you should call it pore water pressure.

We adopted the term pore-water pressure in Table 3.

<u>Other minor comments</u>:

a) You should explain what is CEMADEN the first time you mention it (Page 2, line 45)
An explanation of the acroname CEMADEN has been added in the introduction section.

b) The sentence at page 5, lines 132-133 is already been written above, please delete it.

The whole paragraph has been improved and merged with the previous sentence. The original sentence was:

> ***Soil moisture was monitored in the study area at regular intervals of 1 h to a depth 3.0 meters during 2016 using two EnviroScanTM (Campbell Scientific, 2016) probes installed next of the borehole SD-03 (Figure 2). Every EnviroScanTM 133 probes included six capacitance sensors that allowed the determination of soil moisture every 0.5 meter, thus is, at the depths of 0.5, 1.0, until 3.0 m deep. This distribution of depths allowed to monitoring moisture variations for those soil layers which are relevant to this study: landfill, residual soil and saprolite. Sensor calibration was based on the relationship provided by the manufactured (Campbell Scientific, 2016) based on dry and wet readings of each sensor.***

And now is:

> ***Soil moisture was monitored during 2016 at hourly intervals and to a depth of 3 m using two EnviroScanTM (Campbell Scientific, 2016) probes installed next of the borehole SD-03 (Figure 2). Each probe included six capacitance sensors that measured soil moisture every 0.5 m, thus is, at the depths of 0.5, 1.0, until 3.0 m deep, which allowed to monitor moisture variations of the landfill, residual and saprolite layers. Before the EnviroScanTM capacitance probes were installed in the soil, maximum and minimum values were normalized by matching the raw readings from each sensor at both 0% (held in air) and 100% water levels (submerged in water).***

c) Labels in Figure 1 are not readable, please modify the figure.

Figure 1 has been improved as requested.

d) In caption of Figure 3 you mention deposits of landslide events (blue cross-hatched areas) but they are not visible in the figure. Please modify the figure.

The sentence "and deposits of landslides events (blue cross-hatched areas)" was removed in Figure 3.