Dear Editor in Chief

We are pleased to submit a revised manuscript entitled *Efficacy of using Radar Induced Factors in Landslide Susceptibility Analysis: case study of Koslanda, Sri Lanka* for publication in the Journal of Natural Hazards and Earth System Sciences. A revised copy of the manuscript is provided with changes to the manuscript requested by the reviewers indicated in the attached document, together with detailed responses to the reviewers' comments.

Yours Sincerely

AKRN Ranasinghe

Responses to reviewer comments on the paper " Efficacy of using Radar Induced Factors in Landslide Susceptibility Analysis: case study of Koslanda, Sri Lanka"

We wish to thank all reviewers for their constructive comments. All reviewers felt that the paper has to be well organized and the introduction part should be reduced by moving some parts to the methodology. Specifically, all reviewers felt that the description of the study area should make as little larger with comprising additional information about the geology and the typology of the landslides. Further they have commented on the rewriting of the abstract and the conclusions according to the conducted research work. All reviewers stated on the inclusion of colour figures as they are more appeal. Consequently, the paper is rearranged with the rewritten abstract, reduced introduction, properly arranged methodology, and study area. Results and Discussion were separated and Conclusions changed accordingly. All the figures were inserted with the colour by preserving the colour blindness using colour scales. The details of these changes are provided below, along with responses to the other more minor comments.

In the following, the comments of the reviewers are shown in italics and our responses indented in normal text. References to the edited lines are according to those found in the revised manuscript, unless specifically referred to in the original manuscript.

Response to Anonymous Referee #1.

Dear authors, the manuscript titled "Efficiency of using Radar Induced Factors in landslide susceptibility analysis: case study of Koslanda, Sri Lanka" deals with the application of 4 methods for assessing the landslide susceptibility map: Bivariate InfoVal, Bivariate InfoVal with RIF, Multivariate MCDA based on AHP, Multivariate MCDA based on AHP with RIF. The work generally fits the aim of the journal, but needs several modifications and some lacks needs to be filled. The required improvements interest several parts of the work, mainly the data and methodology.

*   *Why all the images are black and white? Please provide the coloured images.*

All the figures were inserted in to the manuscript with the colour by preserving the colour blindness using colour scales. (Figure 1, 2, & 4)

*   *The Abstract has to be rewritten because it cannot stay alone to explain the conducted work.*

The abstract has been rewritten. (page 1, lines 9 – 20)

*   *The Introduction, besides it is quite long, partially misses in state-of-the-art about the landslide susceptibility methods and, mainly, in the use of remote sensing data for susceptibility map purposes and for extracting the parameters then utilized.*

The introduction part made improved by reducing the extra information where unnecessary. Deleted the Lines, page 2 lines 3-5, lines 10-12, line 22, and lines 28-29.

Further, as commented, part of the statistical methods for landslide susceptibility analysis moved to the methodology part. (page 3 lines 17-33 and page 4 lines 1-2 to page 9 lines 22-30, page 10 lines 14-24).

Remote sensing for susceptibility map purposes and for extracting the parameters are already explained in page 2 lines 14-20.

*   *The study area is not well presented. It is not well localized (also because the images are B/W) and described. Furthermore, no geological and geomorphological information of the area were inserted. These information have to be added.*

The colour image with topographical information with previous landslide signatures are inserted as Figure 1. The geomorphological information is already included in the manuscript in page 4 lines 26 – 31, but additionally the geological information is inserted in to the page 4 line 31 and page 5 lines 1 – 3.

*   *Data and methodology section has to be deeply improved. Add more info and images of the used data, while Table 1 can be removed because it is useless and it no add information*

with respect to the text. The used methodologies are no described, as well as no images of the described and used factors are present.

Table 1 is removed from the manuscript (page 5 line 18), while inserting the types of predisposing factors in to the text (page 5 lines 22-25).

The information and the images used to extract all landslide predisposing factors are already within the manuscript under all predisposing factors. However, some information is added as in (page 6 lines 3-4)

Available information is, for example, topographical factors –"Sentinel-1 radar image on 12th March 2015" (page 6 line 16), Soil factors – "Landsat-8 image of 3rd July 2015" (page 7 line 20) and "dry reference image on 12th March 2015 and the wet image on 24th November 2014" (page 8 lines 14-15).

Data and Methodology section is separated, while improving the methodology part. (page 9 line 20 – page 11 line 3). When considering the guide lines of the manuscript preparation, even though the individual figures from fifteen predisposing factors are really significant, it is difficult to add them to the manuscript. Hence, all the fifteen predisposing factors in colour figures were added as supplementary materials (Sup 1-3).

* How did you extract factors by Sentinel-2 and Landsat images? The resolution of the images was enough? Please clarify.

Sentinel – 2 images with 10 m resolution is used to extract Land use (page 8 lines 13 – 15) and Lineament predisposing factors. Landsat-8 with 30 m resolution (NIR & R bands) and 100m resolution Thermal band is used to extract surface soil moisture from Universal Triangle relationship between Soil Moisture, Normalized Difference Vegetation Index (NDVI), and Land Surface Temperature (LST). The study area is approximately 19 km^2 and since this study is basically focused on the applicability of remote sensing (radar and optical) for landslide susceptibility analysis on smaller scale, the freely available Sentinel–2 and Landsat–8 image with Thermal band was sufficiently enough for this research study.

*	*Insert the landslide inventory map derived by the multi-temporal analysis.*

Landslide inventory map with training and validation samples for Landslide susceptibility analysis is inserted in to the manuscript as Figure 2. (page 9 line 28 and page 10 line 2)

*	*Table 1 can be maintained if the relative weights are included, with a short explanation about how they were calculated and the addition of the "questionnaire survey form" in the text or as supplementary material.*

As proposed in above Table 1 is removed from the manuscript but relative weights with all the predisposing factors are inserted in to the text. (page 10 line 28 and page 11 line 1-2)

The details of the relative weight calculation in bivariate, information value method (page 10 lines 4-12) and multivariate, MCDA based on AHP is inserted in to the manuscript (page 10 lines 14 – 24).

Questionnaire survey form is attached as a supplementary material (Sup 4)

*	*Results and discussion also need improvements. I suggest to separate the results and discussions. In the results session the four resulting landslide susceptible maps calculated (please with colours) have to be inserted and described.*

Splitted the Discussion part from the Results. (page 11 line 18)

In the results section, four colour landslide susceptibility maps were inserted in to the manuscript by preserving the colour blindness. (Figure 4)

Resultant susceptibility regions as high, moderate, low and very low regions are numerically compared with the spatial formation in the study area. (page 11 line 24 - page 12 line 4) and (page 12 lines 24-32)

*	*To make readable and comparable all the percentage of the four maps and relative classes, please summarize them in a table. Then the comparison between then can be insert in the discussions session.*

Percentages of susceptibility classes in four landslide prediction maps are already summarized in the Table 1. All the comparison between them are inserted in the Discussion part. (page 13 lines 3-11).

*	*Consequently, to all the required modifications and suggestions the conclusion has to be reviewed accordingly.*

Conclusion is arranged according to the revisions made in the previous sections. (page 14 lines 9 - page 15 line 19)

Minor issues

*	*Add some more recent references about the "landslide-specific information for emergency and disaster management activities in the world". See for example Solari et al., 2018*

Four recent references are added in to the reference list and cited in the text (page 1 line 23, page 2 line 17, page 9 line 18)

*	*Add references of already published methods, e.g. IDW, NDVI and LST*

For NDVI and LST, references are already added in the manuscript (page 7 lines 13-14 and lines 22).

IDW is a standard interpolation method and is used to interpolate the rainfall data through out the study area for better computations.

*	*Pay attention to the tenses. You write some parts using the present form and other the past.*

Corrected present tenses in to the past in the manuscript. (page 2 line 27)

*	*Please check – Line 24 page 2 - remove "could"*

Deleted. (page 2 line 24)

*	*Substitute "from the Mean Sea Level" with a.s.l. (above sea level) – Line 26 page 4*

Corrected. (page 4 line 17)

*	*Line 3 page 5 remove "for these data"*

Corrected. (page 5 line 11)

*   *Line 7 page 5 - Substitute "an inventory map of landslide" with "landslide inventory map"*

Corrected. (page 5 lines 15-16)