Reviewer one

General Comments:

This study conducted a sensitivity analysis of major parameters of the GLOF numerical simulation using the open-source software r.avaflow model to determine which parameters significantly affect outputs closely related to GLOF hazard and risk assessment, such as peak discharge, total discharge, flow arrival time, and reach distance. The manuscript is well-organized, and the references are appropriate, demonstrating the research's significance and originality. All figures are of good quality, and the information is clearly presented.

I have commented on some points requiring minor revision. Please refer to the specific comments below for detailed suggestions for revision.

Many thanks for the positive review of our manuscript and valuable feedback. we sincerely appreciate the time you have taken to review it. Below, we provide a point-by-point response to the reviewer's comments, with our response highlighted in blue font for clarity.

Specific Comments:

#1   l.86-89: Since the previous sentence already states that r.avaflow is open source, it would be better to delete "is open source and" from this sentence and instead write, "r.avaflow allows modification of all input parameters, ...".

Corrected as suggested.

#2   l.159: The text refers to "Figure 1B and 1E," but the subfigure labels are written in lowercase. Please make the labelling consistent throughout the manuscript. The same correction applies to the following text, figures, and supplement.

Corrected as suggested. All the signposting to the figures now is done in lowercase consistent with the figure labelling in the revised manuscript.

#3   l.165: If you use scientific notation, it might be more appropriate to write 300×106 m3 as 3×108 m3.

Amended as suggested.

#4   l.171: Insert "shows" or another appropriate verb after "The map (a)."

Amended as suggested.

#5   l.254, Figure 2: There is no legend for CFF in the figure.

The legend for the CFF is added as suggested.

#6   l.287: It would be better to write this as 106-107 m3.

Amended as suggested for this one and in all appearances.

#7   l.310: It says, "3.2.1 Digital elevation (1) and mesh size (2)," but some of the subsection titles from 3.2.1 to 3.2.6 include numbering, while others do not, which causes confusion. It might be better to remove the numbering from the subsection titles altogether.

Initially, the numbering was done to make it convenient for the reader to refer to section 3.2, where parameters are introduced. In the revised manuscript, we have removed all the numberings after the subheadings as suggested by the reviewer.

#8   l.325: The unit should be written as kg m-3. Similar unit errors are seen from this point onwards.

The unit is corrected as suggested, as are all subsequent appearances.

#9   l.329: It would be better to write this as 2.94×108 m3.

Corrected as suggested.

#10   l.428-430: Table 3 does not show the results described here.

The signposting to Table 3 is deleted. Thanks for pointing out this typo. We have added the supplementary figure (Fig S3) for the arrival time along the river profile line and signposting here and subsequent appearances are amended accordingly.

#11   l.431: It would be better to insert the unit (min) after the number 4.37.

The unit is added as recommended.

#12   l.434-437, Figure 3: The figure title indicates that the left and right panels respectively show maximum flow heights and hydrographs, but this is the opposite. Additionally, the left panel of each subfigure (a)-(d) does not have a horizontal axis label. Also, it is not clear what the dashed lines in the right panel indicate.

Thanks for the careful spot. The figure panel labelling is amended as suggested. We have also added the x-axis label for the left panels. The solid line represents the flow height of the liquid, and the dashed line represents the solid part of the flow. These captions are now updated in the revised manuscript.

#13   l.440-441: Although this description refers to Fig. 3, it is difficult to interpret the flow velocity characteristics from Fig. 3.

After revisiting the figures and analysis we have now amended lines 440-441 to 'resulting in a significant increase in flow characteristics like flow depth' which is consistent with data indicated by Figure 3.

#14   l.456, Table 3: What does the "SL no." in the leftmost column stand for?

We meant to say, 'serial number.' But we have amended it from 'SL no.' to 'No.' to avoid any confusion in the revised manuscript.

#15   l.470-471: Is it not possible to determine from Fig. 4 how the solid volumetric portion exhibit fluctuates?

Thank you for pointing out this. We have now signposted to supplementary figure 3, where we added the flow height of debris and fluid resulting from the GLOF initiated by a mass movement entering from different directions.

#16   l.486, Figure 5: What does the light-colored shaded area in each subfigure represent (e.g., 95% confidence interval)? It would be better to clarify this in the legend or caption. Additionally, the regression equation and the coefficient of determination seem to mismatch in some subfigures. Please verify to ensure there are no errors. These comments also apply to Figs. 6 and 7.

Thanks for pointing this out. Yes, the light colour-shaded region shows a 95% confidence interval. We have now mentioned this in the caption. Coefficient and regression equations are corrected in the revised manuscript.

#17   l.493, Figure 6: The label on the vertical axis should be replaced with "total discharge."

The y-axis label is amended to 'Total discharge' as recommended.

#18   l.533: From this point onwards, the CV value is written in units of %, but isn't it common to treat CV as a dimensionless value if it is derived by dividing the standard deviation by the mean? If the coefficient of variation is expressed as a percentage, it would be better to clearly state this in the text.

Thanks for pointing out this. We agree that CV is a dimensionless value. Here we multiplied the CV value by 100 to present the CV in percentage form. However, as recommended, we have now clarified this in line 410 as 'We multiplied each CV value by 100 to express it in percentage form'. And amended line 530 from 'calculated the coefficient of variation to 'percentage coefficient of variation'.

#19   l.538-: The following descriptions of the regression analysis results show some differences between the coefficients of determination shown in Figs. 5-7. Please check and correct as necessary.

Thank you for pointing out this. We have noticed a typo in the figures in the earlier version. The values for R^2 are corrected in the revised manuscript.

#20   l.548: Insert "(Fig. 6)" after "total discharge."

Amended as suggested.

#21   l.558: It states that the volume range is 4×106 m3 to 10×106 m3, but the figure shows normalized parameter values, making it difficult to correlate with the actual volumes. It would be better to include the normalized values here. The same comment applies to the description of CE in l.560-562.

Thanks for pointing out this. To avoid confusion here and in all appearances, we have changed the x-axis scale of Figures 5 and 6 to the original value of the parameter we used in modelling in the revised manuscript.

#22   l.585-586: The description "ranging from HMA-DEM (8 m) to SRTM GL3 (90 m)" would be better described as "with resolutions ranging from 8 m (HMA-DEM) to 90 m (SRTM GL3)."

Amended as suggested.

#23   l.686: This is the first time mention of δ in the discussion section, so it would be better to use the notation "basal friction (δ)" as with the other parameters.

#24   l.700: This is likely a mistake; it should read, "This is because CFF controls the mobility of the fluid part." Also, it would be better to write the "FF" in CFF as a subscript throughout the text.

#25   l.833: "helpin" should be replaced with "helping."