The Authors did a good job in addressing my review comments one by one and in adapting the manuscript. Of my original comments, there are two remaining where I require a clarification and an adjustment of the manuscript. These are given below. Other issues are solved from my point of view.

Comment 3: I think the method in the manuscript, which neglects other factors of importance, could be partially responsible for their own relatively low accuracy. Factors such as vegetation, lithology and soil transmissivity (also mentioned by the authors for classical approaches, line 68) are what come to mind. I think deliberately neglecting these factors bends the aim of the manuscript from an overall debris flow hazard indicator to introducing a specific source-sink process-based method. This is still innovative and interesting, but I think the authors should mention their choices in this regard more explicitly at the end of the introduction and in the methods.

Response 3: Our fundamental approach is to constrain the design of the machine learning scheme using the basic principles of watershed erosion and transport. During the research framework design process, we did not overlook the role of vegetation. The reason for not deliberately incorporating vegetation data is that current DEM data products are generally based on InSAR satellite observation technology, which does not filter out the elevation affected by vegetation. The calculation process of the geomorphological connectivity index (IC value) is based on this type of DEM, and thus the resulting IC values naturally include spatial variations in surface connectivity caused by vegetation. We also did not consider using geological maps to describe lithology, as descriptions based on geological maps are typically qualitative, which is not conducive to a quantitative assessment process. In fact, regardless of lithology, loose surface soils and weathered layers are the key contributors to debris flow formation. Therefore, we introduced the erodibility factor, K, from the Universal Soil Loss Equation. This indicator reflects the degree to which the surface is prone to erosion and is only related to the properties of the soil or weathered layer itself. It is a quantitative metric with clear physical meaning, which facilitates a more rigorous quantitative assessment. To aid in reader understanding, we have added relevant explanations (the modified text can be found in lines 8-10 of "3.1 Data and Preprocessing").

Subsequent Response reviewer 3: Correct me if I'm misinterpreting here, but it reads as if you treat canopy height as an addition to the DEM. This is not how I think vegetation should be included. Vegetation has a complex interaction with soil hydrology and geotechnics. It is not 'additional elevation'. My advice would be to somehow reflect vegetation presence in your model as independent variable or incorporate it in the erodibility/connectivity. Another option would be to ignore it of course, as it might not be a focus of the study. I think you should also mention that the DEM you use is in fact a Digital Surface Model.

Comment 26: Figure 11. How is the relative importance calculated?

Response 26: In machine learning, if a change in the value of a particular factor leads to a more significant change in the dependent variable, then the relative importance of that factor is higher. This can be understood through a simpler example. For instance, 9 in multiple linear regression, each independent variable in the results corresponds to a significance level p-value. The smaller the p-value, the more significant the factor, and thus, the importance of the factors can be ranked based on the significance of the p- value.

Response reviewer: Mention this method explicitly, or with a reference.