Assessing riverbank erosion in Bangladesh using time series of Sentinel-1 radar imagery in the Google Earth Engine

Authors' response to Referee 2

Referee comment	**Authors' response**
Title: an observation– highlighting "google earth engine" in the title is not necessary; but the author can think to highlight their important study finding …. "We found that with Sentinel-1 data, erosion locations can be determined already one month after the end of the monsoon, and hence potentially earlier than using optical satellite images" for example.	Thank you for this suggestion. We believe that the main contribution of our paper is the development, implementation, and verification of a method to assess riverbank erosion along Jamuna River using satellite radar imagery. Since the Google Earth Engine is a crucial element – not so much regarding the methodology itself, but surely regarding an open and straight-forward accessibility of (1) the implementation (incl. source code) of the method, (2) handling of the large amount of Sentinel-1 SAR data (which is typically hard to handle for non-expert users), and (3) regarding reproducibility/ transferability of the approach, all readily available within the Google Earth Engine – we prefer to keep it in the title.
Introduction: The orientation of the Case study Bangladesh can come a bit later, so far this paper does not have any dedicated section for theoretical discussion or literature review, it this is thinkable to address here. It will help to understand the state of the art and detect the research gap and that even can relate to the motivation of the case study section and the formulation of the objective.	Our paper assesses riverbank erosion for a particular case study. As such, we believe it is appropriate to introduce the case study at the beginning of the introduction. Concerning theory and literature review: We agree that we have not included a dedicated, in-depth theoretical section on radar scattering. To our understanding, the journal NHESS has an interdisciplinary readership for which we chose to focus on the most important aspects necessary to understand the paper (e.g. that a key advantage of using radar imagery for this particular application is its independence of daylight and weather conditions). Having said that, we will rework the introduction to even better highlight the research gap with respect to the state of the art.
Section 2 "Method and data": some of the sub-section headings are identical to section 3 "Results" e.g. 2.3 same as 3.1, 2.4 same as 3.2. This is completely confusing and contributes to poor readability. It is recommended to revise the sub-section headings in the "Results" section. They should be more declarative rather than general about the particular highlights or findings of the section.	Thank you. We will adapt the headings and make them more descriptive.

Some terminology can be more clarified – e.g. “land” - does it refer to open space / agricultural land/ forest?	“Land” refers to agricultural land. We will clarify this in the paper.
The URL link for code and tool needs to be presented in a standard format and with Meta-description (repository like platform Zenodo with DOI may be an option) and push the access link URL, DOI in them in the annexe of the paper only refer them in the original text.	Thank you for this remark. We will proceed as suggested.
After opening the given link - in the current state – it makes to rethink the author’s statement “the code and tool developed in this study might be of interest to both policymakers and practitioners working in the fields of disaster risk management and communication” (SECTION 430)	Thank you for this feedback. We agree that the source code of the tool might not be of interest to policymakers and practitioners. We will therefore remove “the code” from the statement you highlighted. Concerning the usability of the tool, we believe that the tutorial which we have recorded and published on YouTube will allow policy-makers and practitioners to use the tool and to replicate the results of our analysis at low effort.
The paper focused only on the physical aspect by quantification changes and intensity of erosion; however, it will be necessary to shed light on some discussion and policy implications – how these results can be fed to the other research direction for example socio-economic dimensions.	Thank you. Indeed, the results of the study are directly used in a larger social science research project studying the adaptation of the population living along Jamuna River to the riverbank erosion: https://p3.snf.ch/Project-185210.
So far, the data processing task allows for to production of indicators in time series and spatial scale; the reader may also expect - what is the scope to do some predictive analytics in the future research scope.	We agree that prediction of erosion would obviously be very useful. However, we think that a meaningful erosion prediction involves a whole set of additional (previously unknown) parameters (prediction of precipitation, river discharge, numerical modelling of fluvial processes etc) and predictive methods, which are simply out of the scope of the research presented in our manuscript. We rather see the erosion classification obtained in our work as a useful and readily available INPUT to predictive approaches. Examples of such approaches include a probabilistic prediction of riverbank erosion based on past events. Please note that e.g. Dhaka-based CEGIS provides a probabilistic prediction of riverbank erosion for the Jamuna River each year. Then, if long enough time series are available, machine learning might help to predict erosion (but also this approach would be merely classification-data-driven and would not include the strongly variable unknown future weather / discharge etc parameters).