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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Application of UAV-SfM photogrammetry and aerial LiDAR to a disastrous flood: multitemporal topographic measurement of a newly formed crevasse splay of the Kinu River, central Japan" *by* Atsuto Izumida et al.

Anonymous Referee #1

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GENERAL COMMENTS

This study gives a nice insight in the topographic changes that occurred during a levee breach / crevasse splay and its aftermath. Taking the analysis of this data set slightly further, notably through determining volume changes, would improve the paper significantly and give more insight in the events.

SPECIFIC COMMENTS

Title - You mention 'disastrous flood' and 'disaster' in the paper. It would be good to give some indication of the magnitude of this event in terms of return time, wounded /

casualties and costs.

2-2/3 Unclear what you mean here: 'land use' and 'human-built structures'. Do you want to indicate that breaches differ when there is agriculture/roads as opposed to natural floodplain vegetation? Or do you want to indicate that lobes of sediment accumulate behind human objects such as buildings? Or otherwise?

2-23 I think you should make the nuance here that the topography before a flood may be available but not of sufficient detail to investigate the topographic change.

3-27/28 Can you also indicate peak (and average) discharge and flood return time?

In general the text concerning the STUDY AREA and THE 2015 FLOOD OF THE KINU RIVER can be shortened and more to the point. On the other hand, relevant information on settlements, land-use and the flood impact (wounded/casualties and costs) should be mentioned here.

5-13 Indicate the locations / distribution of GCPs in a figure.

5-12 What were the results for the automatic camera calibration, did it return the known values?

5-24 If you mention this, give an indication for how many locations and how they are distributed. Did you also include houses on the top-right (figures 2a-c)?

6-2/4 How are these points distributed, with respect to each other and the GCPs. Include these in a figure.

6-9/19 You can calculate a limit of detection using these numbers and apply this in the figures.

6-13/14 Why didn't you use the lower of the two resolutions? Using the higher resolution can lead to local scale effects.

For the applied systematic error correction you assume that the error is both linear and

in the Z direction. Therefore it is important to: 1) show the distribution of the GCPs and control points (see earlier comments) and 2) show that there is no doming in the SfM DEM - this is a known problem see e.g. James and Robson (2014). James, M. R. and Robson, S. (2014), Mitigating systematic error in topographic models derived from UAV and ground-based image networks. Earth Surf. Process. Landforms, 39: 1413–1420. doi:10.1002/esp.3609

7-1 I think you should exclude inundated areas in the DEM of difference (either filter these areas out indicate them using a different color) - you could include them in a separate figure to indicate the water depth.

7-18 See earlier remark on limit of detection.

8-8/9 Please support these comments with volume calculations.

8-21/23 Unclear what you mean with 'important environmental component of the floodplain' and the relation with human changes. Do you mean that without human impact there would have been more vegetation in the floodplain and the crevasse splay topography might have been different (but how)?

8-31 Is the wind velocity sufficient to pick up the (fine) sediment?

9-7/9 What do you exactly mean with 'simpler topography'? Would it have been possible if the topography was more 'complex' at the later time?

9-21/22 Note that it may also be valuable to research historical events using archival photogrammetry, e.g. Bakker and Lane (2016). Bakker, M., and Lane, S. N. (2016), Archival photogrammetric analysis of river–floodplain systems using Structure from Motion (SfM) methods. Earth Surf. Process. Landforms, doi: 10.1002/esp.4085. 9-31/34 This is a very important point and I think you have a good data set to include these calculations!

Most important remark concerning the RESULTS AND DISCUSSION is that a volumetric analysis would be very valuable (for the area as a whole and / or for certain

regions), indicating the net amount of sediment that came from the river channel, the amount of erosion / sedimentation on the levee/floodplain, the amount of sediment that was redistributed / imported during post-flood works.

TECHNICAL CORRECTIONS

Title - You mention 'multitemporal', but in this case (3 measurements) 'repeated' is perhaps more appropriate.

1-14 'by subtraction' can be removed.

1-16 'carried out by people' can be removed.

1-17 'with different resolutions and acquisition periods': I would say different spatial and temporal resolutions. (Acquisition period can be interpreted as the duration of acquisition, e.g. the flight time of the UAV).

1-18 'sudden' can be removed.

2-4 It is questionable if you should include a reference to this unpublished paper. Both here and further in the manuscript this reference is not required / of added value. I would advise not to include it.

2-4 'Thus' can be removed (there is no direct link with the previous sentence).

3-3 Refer to the figure here.

4-22 Brackets can be removed here and later on when mentioning points/m2.

4-28 Include that this was converted to raster (similar to the pre-flood lidar data).

5-8/10 Only mention the usable photos.

6-17/27 This is a (specific) description of the study area - not results.

7-1 This part of the method.

Table 1: This table can be removed (little information and no additional information than

in the text).

Table 3: What is the (estimated) velocity required to transport sediment? Mean velocity is probably not a suitable measure, perhaps the 90th percentile(?).

Figure 1: Include 'Japan' in the left top figure.

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