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Earth Surface Dynamics Discussions

Interactive comment on "A comparison of Structure from Motion Photogrammetry and the Traversing Micro Erosion Meter for measuring erosion on rock shore platforms" *by* Niamh D. Cullen et al.

Anonymous Referee #2

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The article "A comparison of Structure from Motion Photogrammetry and the Traversing Micro Erosion Meter for measuring erosion on rock shore platforms" compare a methodological implementation of SfM-MVS photogrammetry to evaluate sub-millimetre erosion processes of shore platform, with classical direct measurements from TMEM system. The structure of this paper is composed of: 1) an introductory part resuming the methodologies used to measure gentle topographic changes over rock shore surface with focus on TMEM and SfM-MVS photogrammetry; 2) a detailed methodological section; 3) the results, segmented between a quality assessment of

DEMs, a comparison of the level of geomorphological changes detection regarding the rugosity of surface, and a comparison between SfM-MVS photogrammetry tools and TMEM; 4) a discussion and conclusion.

My opinion about this article is that it proposes a very interesting approach to quantify and map small scale erosion processes over shore platform at low cost and with accuracy. The SFM-MVS photogrammetry protocol and results are very detailed, especially regarding vertical error assessment. The results show that the method is able to reach small and medium scales detection of erosion over low rugosity surface but are clearly limited to detect loss of rock fragment over more complex topography. The SfM-MVS photogrammetry results show typical errors of geometry reconstruction associated to the technique such as shadow effect. I really appreciated the discussion part because the authors detailed the issues of the implementation of SfM-MVS and TMEM techniques in field. The article structure is clear and readable. I think that this paper will be very useful for the coastal scientists working on the evolution of shore platforms which are common objects over many shores in the world. Moreover, protocol enhancements can be also possible such as accurate error mapping from James et al. (2017) to increase the level of detection of changes.

However, I suggest to detail more the photographs recording protocol. Indeed, do you take random oblique pictures or sub-vertical ones? This information will be very useful for non-specialist readers if they want to reproduce your protocol for their own research. Then, on field, depends on the type of rock and the degree of brightness, you can have specular reflection which lead to bad quality photograph. I suggest using diffuser to reduce and homogenise brightness over the object. This can be a suggestion into the discussion. Then, I also appreciate to have topographic profiles from DEMs and DoD graphs crossing erosion features, between stage 0 and 3 for example. This will strengthen the demonstration and the advantages of SFM-MVS photogrammetry for sub millimetre measurements. Finally, I also suggest adding the size of simulated erosion features practiced over the block experiments. I also think that there is a lack

of direct measurements of block geometry, using TMEM for example, with SfM-MVS photogrammetry results.

Globally, I have notified minor revisions, described below, for this paper.

- General forms remark: Homogenise figure calling into the text,

Line 99 - "...utilising widely available software (e.g. ArcMap, CloudCompare) for geomorphic change detection to quantify... " I suggest to replace " ArcMap " by " GIS software such as ESRI ArcGIS desktop or QGIS ".

line 102 - " ...Westoby et al. (2012), Verma and Bourke (for more ... " close the parenthesis and indicate "in review" may be

line 153 - "...to capture different scales of erosion fromgranular scale abrasion ..." forgot a blank space

line 178 - "We used a Nikon D5500 with a variable zoom lens set up at 24 mm focal length." The focal length set at 24mm from variable zoom lens is noted into EXIF file of picture, or Photoscan estimate it?

Lines 187 – 191 – I suggest to provide the magnitude (globally) of simulated erosion processes in mm, such as deep of shallow scratch or abrasion, the size of rock block removed, etc. . .

Lines 204 – 206 – Do you enhance image rendering and texture using some treatments (increase contrast for example) or you just convert RAW in TIFF format?

Lines 207 – 208 - "Baseline DEMs..." Regarding non-specialist readers, I suggest to also indicate that DEMs raster grids need to be generated with common pixel coordinate origin in addition to common resolution.

Lines 290 – 306 & 315-334 & 335-352 – Results: I suggest adding, if possible, direct measurements of surface topography and simulated erosion features to compare with reconstructed scene geometry. This will be useful especially for scratch because the

magnitude of topographic changes due to this type of features can be always within the LoD.

Figures:

General remarks: I suggest using the same caption notation between figure graphic and legend

Figure 1: I suggest adding scale bar on the elements; moreover, I think that a caption showing the picture location over the surface or picture overlap map, such as some view from Photoscan, can illustrate photographs recording strategy.

Figure 2: I suggest to expand the scale of colour bar in order to observe the spatial variability of DoD between compared DEMs of control blocks.

Figure 3, 4, 5 – I suggest to eventually used the same regular interval scale in mm for DoD and after LoD in order to increase readability of legend and colours. I also suggest to plot graphs presenting DEMs between stage 0 and 3 and DoD, crossing erosion features, in order to appreciate the quality of reconstruction with SfM-MVS.

Figure 5 – The DoD after application of LoD captions in this figure display strange colour bars where the LoD limits not appear clearly.

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