

***Interactive comment on “The application of terrestrial laser scanner and photogrammetry in measuring erosion and deposition processes in humid badlands in the Central Spanish Pyrenees” by E. Nadal-Romero et al.***

**Anonymous Referee #3**

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General Comments: This paper presents the results of slope-scale surveys carried out in badland areas over timescales of a few years. The work uses terrestrial laser scanning (TLS) and a photo-based technique for topographic measurement, comparing the results and presenting the surface changes over time. The authors seem to have some interesting data but don't appear to exploit them to their full potential. Overall, I suggest that the manuscript would benefit from clearer specific objectives, an increase in focus and some more detailed analysis of the results.

C153

Specific Comments: The paper seems to have the aim of both comparing techniques and presenting some new erosion data. Both areas could be significantly strengthened. The abstract states that 'TLS data sets and photogrammetry techniques provide new opportunities in geomorphological erosion studies' – what are these new opportunities (over and above those exploited in previous publications)? Are these really best described as 'new' techniques (Section 1.3)? This seems a little incongruous with Fig 2 and associated discussion which shows publications of 'non-invasive' technologies going back to 1996. Text could focus more on exploiting the previously published advantages of the different techniques for this specific application than discussing the approaches as 'new', particularly given the number of previous works that have carried out much more detailed TLS/'photogrammetry' comparisons. A wider discussion of how these techniques have been shown to perform in different environments and at different scales would be useful. What are the characteristics of badland topography that are similar or different to environments that have been more broadly investigated using these techniques, and what implications does that have for method selection? The abstract could be more focussed on delivering key points and enticing the reader into the main text; it currently feels rather generalised.

Within the paper, the 'photogrammetry' technique is referred to as both 'photogrammetry' and 'close range photogrammetry'; however, the software used is one of the more recent offerings based on a 'structure from motion' approach rather than 'traditional' photogrammetry. I think the terminology throughout could be clarified – the use of 'photogrammetry' would imply a somewhat different approach to many workers. 'Traditional' photogrammetry has been used for geomorphology applications for a good length of time, this should be recognised and the more recent photo-based approaches put in context with a more thorough trawl through the literature. A key technical area to clarify is P345 L6 – measuring distance is fundamental in photogrammetry and the current phrasing is misleading. If the authors don't see a difference in resolution with distance, this needs to be explained more carefully.

C154

The paper purports to make comparisons between techniques, but does not deliver any particularly new information from the comparison. Although various statistics are given for differences, most results are presented in terms of one technique or another. Why not show DEMs of difference in order to really explore similarities/differences as done for change between surveys in Fig. 5-8? Figures 5-8 These figures should be significantly improved for interpretation; panels are not labelled and the colour scale has no useful axis. The use of a perspective view only really hinders detailed comparisons. Would these figures not be better drafted as DEMs of difference? This would provide scales and a certainty that the changes illustrated were in the vertical – in the current point cloud comparisons are we looking at vertical component of change or change orthogonal to the local surface?

Finally, the paper presents results on change but does not go much into the analysis or develop a process understanding. Probably, the data are too temporally sparse for the latter, but some more on what could be possible may be useful to strengthen the scientific aspects of the discussion.

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Interactive comment on SOIL Discuss., 2, 337, 2015.