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Earth Surface Dynamics Discussions

# *Interactive comment on* "Optimising 4D Approaches to Surface Change Detection: Improving Understanding of Rockfall Magnitude-Frequency" *by* Jack G. Williams et al.

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The paper entitled "Optimising 4D approaches to Surface change detection: improving understanding of rockfall maginute-frecuency" by Williams et al. presents an interesting contribution about a near-continuous monitoring of a cliff using point clouds captured by means of a TLS. The paper addresses the well-known relationships between magnitude-frequency in geomorphological processes but using a very valuable dataset of scans acquired every hour for a period of several months. New technologies are now providing this kind of huge datasets and the key questions in the upcoming years would be relate to the best practices to manage large datasets. In this line, some ideas and



procedures are presented in the paper (e.g. filtering the cloud previous to change detection). I recommend the publication of the paper after some minor changes. In this line, I suggest improving some figures (please see comments below) although in general figures are of high-quality (e.g. figure 9 is great). I also recommend a clear statement of the objectives of the paper at the end of the first section. The methods section is clear but I think it could be improved using a workflow chart summarizing the different steps in one figure. I think this would be really helpful for readers. Finally, I would recommend a deeper discussion about the effect of using a spatially homogeneous LoD for change estimation in such a heterogeneous surface (including different layers-lithology with different slopes, small local faults, etc.). Detailed comments or suggestions:

INTRODUCTION: I miss here a clear statement of the objectives of the paper. I know that at the end of the section (i.e. lines 28-30) there is a description about what is done in this work however it sounds to me more introductory to a methodological section than presenting the main goals of the paper. I recommend to include a paragraph with a clear statement of the objectives. The classical reader will expect this at the end of an introduction. Fig.1: can be improved. England is floating in the same scale-map? Please use a box to delimitate England in a location box. The rest of the map needs a legend. Provide a legend indicating the meaning of symbols presented (green dots, red lines, etc.). The caption is huge and some information is not necessary, e.g. "powered by solar panels" Fig. 2b I recommend saying "hillshade of the cliff showing the area covered by the TLS" in the caption. Fig. 3 Caption: please use the superscript instead 10-4. Please indicate in the graph that colors in the figure 3b represent different search radius. Page 12, L20: the acronyms LoD and DoD show up before the complete term is presented (the term is presented in section 3.5, page 13 which later, please check the use of acronyms along the text) Section 3.5: do you assume a homogeneous LoD? This argument deserves a deep discussion. Section 4: the first sentences of the first paragraph sounds again like methods. The real results section starts in line 16.

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