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Interactive comment on "3-D models and structural analysis of analogue rock avalanche deposits: a kinematic analysis of the propagation mechanism" *by* C. Longchamp et al.

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Dear Reviewer, each of your comments are answered in details below: Referee #1 Comment 1: Equifinality of structural features is a problem. The occurrence of the same structural features in both, friction-controlled laboratory-scale granular flows and highly mobile, dynamically fragmenting rock avalanches simply implies some fundamental and intrinsic behaviour of all granular masses in motion. It does not, however, elucidate the long-runout characteristic of large rock avalanches, and thus limits the extrapolation of dynamic processes from the lab to the field significantly. I would therefore suggest that the authors emphasize that deformations not dynamics are investigated

through their methods. Answer: we thank you the referee for this useful comment. We will then stretch out that the main objective of this research is to propose tools and work-flow to rapidly map the features present at the surface of deposits. These features provide important information on the mobility of the rock avalanche. The method was first tested within our laboratory results of dry granular flow where we highlighted deformation process then we applied it to real case event, the Frank Slide for this study. Changes in manuscript: The manuscript will be changed in order to clarify the fact that we attempt to propose a simple methodology to describe the features at the surface, not to improve our understanding for the process generating the long runout of rock avalanches. Moreover, we will be more precise in the fact that we emphasize the deformations and not the dynamic. The title of the paper will also be changed to be clearer. Comment 2: No scaling calculations were applied, which is a prerequisite if dynamics are to be compared to phenomena of different scales. This could have furthermore, a priori, solved the problem of grain sizes being too large to capture the deformation features (the scale of which is known from previous experiments of this kind, which should be cited more comprehensively). Answer: The authors are aware that no scaling calculations were applied as we do not attempted to propose a real dynamic interpretation but we based our value for the laboratory on previous work to be in the interval of the scaling. As the referee suggest, we will underline better the purpose of this study, as stated in the previous comment to avoid misunderstanding. Changes in manuscript: Some scaling values obtained by previous authors will be reported in the manuscript. Consideration about grainsize ration will also be added to the text. Comment 3: How do the authors explain that mixing between stratigraphic units is observed in the laboratory but not in the field? Answer: In laboratory, loose material is use involving a partial mixing of the grains. The fragmentation of the layers is not taken into account whereas it plays a role in the field. Changes in manuscript: A sentence will be added about the mixing in order to clarify this difference with real cases. Comment 4: The authors should clearly state how (if) their analogue models differ from the many done before and how (if) their analysis technique adds new merit

or better insights or easier/cheaper/faster application or more detailed results. a. How does their technique differ from other analyses tools of surface roughness etc.? b. Is the code freely available? c. Who has done such experiments before (in addition to the few papers cited) and how do their results compare? Answer: according to the referee we will enlarge our bibliography and underline the difference between our works and the works of other authors. The analysis technique based on the filters is easy and fast (around 2h for the experiments + point clouds reconstruction + filtering). It is also cheap as you only need a camera to take pictures. In our study we used the softwares Agisoft Photoscan and Polyworks to construct the 3D point cloud and Matlab for the filtering. Some softwares are freely available, as Cloud Compare and Visual SFM for the point clouds and Octave instead of Matlab. By using these softwares, our method becomes even cheaper. a) References about the surface roughness will be added to the text. b) I will discuss with the coauthors about the free access to the code. c) Here again, references will be added Changes in manuscript: according to the suggestion of the referee we will improve our manuscript adding in the description of the method some statements regarding the fact that it is fast and easy to use as well as cheap. Some other references will also be added to the text for the roughness and experiments in order to compare the results. Specific Comments: we thank the referee for the useful comments which will certainly integrate in the text and which will improve the quality of the paper and put in evidence the importance of the present work.

Interactive comment on Earth Surf. Dynam. Discuss., 3, 1255, 2015.