

***Interactive comment on “A
photogrammetry-based approach for soil bulk
density measurements with an emphasis on
applications to cosmogenic nuclide analysis” by
Joel Mohren et al.***

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Does the paper address relevant scientific questions within the scope of ESurf? YES
Does the paper present novel concepts, ideas, tools, or data? YES
Are substantial conclusions reached? YES
Are the scientific methods and assumptions valid and clearly outlined? YES
Are the results sufficient to support the interpretations and conclusions? YES
Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)? YES, if using Microsoft Windows[®], which is not freeware. Do the authors give proper credit

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to related work and clearly indicate their own new/original contribution? YES Does the title clearly reflect the contents of the paper? YES Does the abstract provide a concise and complete summary? YES Is the overall presentation well structured and clear? YES Is the language fluent and precise? YES Are mathematical formulae, symbols, abbreviations, and units correctly defined and used? Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated? YES Are the number and quality of references appropriate? YES Is the amount and quality of supplementary material appropriate? N/A (it seems that all figs. and tables will be included in the main file)

Comments: The authors present and characterise a relatively fast and field-based technique for bulk soil density determinations, something that is critical for the application of TCN depth-profile dating. The authors tested this technique in artificial and natural scenarios with soils covering a wide range of bulk densities. The soil bulk density determination requires an accurate measurement of both a) the weight of a piece of soil and b) its volume. The first can be easily achieved using any portable balance, but the measurement of the volume is usually imprecise. Other commonly used field techniques for assessing the bulk soil density are usually not accurate enough to allow the determination of precise maximum ages from TCN profiles in unconsolidated materials (see some examples in Rodríguez-Rodríguez et al.,2020, appendix A, table I; doi:10.1016/j.gloplacha.2020.103271). Therefore, I think that this manuscript implies a relevant advance for TCN profile dating, and probably for other applications too.

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