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Interactive comment on "Soil surface roughness: comparing old and new measuring methods and application in a soil erosion model" *by* L. M. Thomsen et al.

Anonymous Referee #1

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First of all I really like the comparison of different methods to derive the surface roughness. I think it is very important to implement a measured roughness value to models. And this means not only to soil erosion models. The paper is well written and points out very interesting aspects regarding the computation of surface roughness. Especially the comparison of "older" methods and "very new" methods is very good.

As this is a methodological paper, I have a few questions and comments regarding the used methods:

-It is hard to estimate how the used methods fit to the single conditions on the measured

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plots, as you dont have Figures (pictures) for all of them (or a representative sample for every kind of testplot).

-I think the computation of the surface roughness using a best fitting plane (only one for every plot, right?) can lead to a misinterpretation of the roughness. This could especially the case for the very dense point clouds from the TLS and Stereophotogrammetry! I'm not sure, but in one part of your paper you talk about detecting single soil aggregates. Using only one best fitting plane (and deriving the distances to this plane) will give you the roughness (e.g. test plot in Figure 2) of the macro topography of the plot, not the roughness triggered by the single stones or soil aggregates! It could be good to make clear which kind of roughness you mean.

-The measured point densities by using photogrammetry and TLS are very high. I think you describe a massive oversampling of your plots. As an example: Your TLS has a footprint of 4 mm, which means, that normally you will completly cover your testplot (1 sqm) by 62500 -> to many points in your TLS data set!

-How did you scan the plots (scan angle to the test plot). A very acute angle can lead to problems as you have an increasing footprint in your measure x-axis.

-As you say the comparison of the single methods is very challenging. I absolutely agree with you, but I won't agree with your assumption, that TLS is the most accurate measurement device in outdoor environments! This strongly depends on the scale. I am not sure if it is the fact for your study and your derived roughness value!

-I think for the comparison of the methods (Photogrammetry, XtionPro and TLS) it would have been better to create similar point densities by thinning (e.g. using the open source software cloud compare).

-Why didn' you compare the point clouds or DEMs of the three methods (TLS, Xiton and photogrammetry) by doing a cut and fill analysis? Doing so you can estimate the differences between these DEMs and where exactly the single methods have

disadvantages to measure a correct surface (which is the base for the computation of the roughness).

Please also note the supplement to this comment:
http://www.soil-discuss.net/1/C452/2015/soild-1-C452-2015-supplement.pdf

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Interactive comment on SOIL Discuss., 1, 981, 2014.

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