

***Interactive comment on “Shadow analysis of soil surface roughness compared to the chain set method and direct measurement of micro-relief”***  
**by R. García Moreno et al.**

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We appreciate the submitted comments from Dr Oleschko, however we must clarify some ideas. As it has been pointed out by the others referees the manuscript tried to validate a new method to measure soil surface roughness, called shadow analysis. The validation tried to be carried out comparing results from different field and laboratory trials to other two well developed methods used abroad for soil erosion studies, the pin meter and the chain set method. The indexes used in these last methods to evaluate the results are CV and SD, for the first method, based on the definition of soil surface roughness (Allmaras et al., 1966), while the second it is based on the index

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developed by Saleh (1993), and later developed by Merrill et al. (2001) named Chain Roughness, or CR. Since the first developments of the shadow analysis was already published in Geoderma in 2008: García Moreno, R., Saa Requejo, A., Tarquis, A.M., Barrington, S., and Díaz Álvarez, M.C., 2008a. A shadow analysis method to measure soil surface roughness. Geoderma 146 (2008) 201–208. And the editor and the referees introduced some new interesting ideas to go further through the original project, we continue the research these last two years. I must mention that this manuscript was designed as an excellent paper in new instrumental techniques, in the discussion of best paper of 2008 in the publication of ΠΙΤΔΪMETRON Flyer April 2009, International Union of Soil Science,. Since the method it is already well explained in this article, we did not want to go exhaustively explaining again the mechanisms. However, we highlighted the idea in the methods of the revised manuscript that: “The measurements for shadow analysis were obtained by taking images during three days with an incident angle of light of 45°. The exact hour was calculated according to the location and the day of the year, assuring a constant angle for the incident light. This angle was measured before taking the images.” That means basically that we want to be sure in every picture taken that the shadows exactly equal the heights, to be able to compare soil surface roughness from all the experimental trials from soil-tillage tool combinations. I think it is basically the same idea you are pointing out with your examples. To assure the angle we have used classical astronomic formulas which calculate the incident angle of the sun based on the hour of the day and the latitude and longitude of the measurement sites, and actually during all the experiments we verified the results in field measuring sun’s angle. We used the equation developed by Spencer (1971), and it is the same basis that you can see in practical website as the one from NOAA, <http://www.srrb.noaa.gov/highlights/sunrise/azel.html>, to calculate the solar position. In this sense, we can assure that all the shadows compared in the method have been taken in the same conditions, in this case 45 ° angles. You mentioned that SD and CV can not been expression for the shadows analysis. Actually, as you can see in our document they are used to express results from the pin meter method, they are

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not used for shadow analysis, to compare the indexes to the results from the percentage of shadows. Since the relationship for both indexes is broadly explained in the manuscript referred before from the same authors published in *Geoderma*, and actually occupies half of the results we think it is better to refer to this article to best evaluate their differences in field and in laboratory trials. Finally, we will introduce some of the scientific terms that you have proposed, but for some of them we will communicate the specific comments to improve the “English writing”, and more specifically the scientific language to Elsevier Language Editing Services, since they were the editing company to review the manuscript before we send the document to Biogeosciences. Normally, we work with them to finally polish our manuscripts to assure that the documents reach the highest scientific language standard before it is sent to editor.

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