SOIL Discuss., 2, C109–C111, 2015
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SOIL Discussions Open Access



# *Interactive comment on* "Gully geometry: what are we measuring?" *by* J. Casalí et al.

**Anonymous Referee #1**

Received and published: 4 May 2015

This paper aims to propose a measurement protocol of the geometry of (ephemeral) gullies (width and depth) with the goal of pooling criteria in future works. The uncertainty of these measurements, especially in the case of complex cross section shapes, is a real problem felt by the researchers involved in studies on this kind of erosion, especially considering the general lack of information in the literature. Therefore, the subject is both interesting and challenging. The authors define "an equivalent prismatic gully (EPG)" obtained subtracting the "detailed digital elevation model (DEM) of a gully whose geometry we wish to determine" from the DEM of the same area before the gully in question would have been formed. Some points, however, need to be addressed before this paper can be considered for publication. My major concerns are:

1.The technique suggested is not new among users of the GIS, but it is necessary to find the answers to some questions before it can be proposed as a standardized



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method for future research. The main questions are: -what does it mean "detailed" DEM (P. 327, l. 20)? I suppose the authors refer to the detail of the field survey to build the DEM. But, what is the level of details required to reduce the error with respect to the simplified techniques? Do we have to survey a mesh of 1 mm, 10 mm, 100 mm, . . .. . .? Clearly, the answer depends also on the size of the channel to detect and involves the choice of suitable instruments for the survey; -what is the error reduction with respect to the usual? -what is the error reduction respect to the usual technique improved measuring more than one width and depth for each section? -what is the difference in terms of economic engagement and hours of labor invested? -what is the advantage of minimizing the type of error described, compared to that due to other uncertainties, e.g. the choice of the distance between the cross sections to be surveyed? (P. 328, L. 8 ". . ..a multitude of other points xi along the channel. . .").

2. The use of an equivalent prismatic gully defined by a single value of width (We) and depth (De) involves the loss of valuable information (e.g. the maximum depth of the different segments of the channel, etc.). This may be acceptable or not depending on the purpose of the measurements.

3. The authors affirm that the problem of reducing the type of error discussed is not even usually recognized by the researcher. I think it should be obvious that the researcher analyzes the shape of the section and choose what measures to take, in order to reduce errors in the estimation of the surface area of the cross section. These operations are not usually described in literature just because they are obvious for a researcher. In my opinion, the real explanation is, rather, that until recently the researchers who dealt with (ephemeral) gullies aimed to reduce errors, but only in order to compare measurements made by the same research team. Of course, the transition to a phase of comparison between the experimental results obtained by various research teams imposes a shared definition of standardized measurement protocols and techniques, as proposed by the authors in the manuscript.

In conclusion, in order to define a standardized measurement protocol of the



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(ephemeral) gully geometry, the authors should: - compare different measurement techniques for different sizes of the channel and, for the reconstruction of the DEM, for different survey meshes; - evaluate the related errors; - suggest the type of equipment necessary for create a detailed DEM.

Other specific comments for the authors: P. 328, l. 9. and P. 329, l. 9. The authors define the width (We) and the depth (De) of the equivalent prismatic gully (EPG) as “effective”. I think it should be better to use a different term, e.g. “mean equivalent” .

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Interactive comment on SOIL Discuss., 2, 323, 2015.