Application of 3D photo-reconstruction in soil erosion studies

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3D photo-reconstruction (3D-PR) has been applied successfully to obtain elevation models using uncalibrated and nonmetric cameras for a range of geoscience applications (e.g. James and Robson, 2012), including gully erosion assessment (Castillo et al., 2012). However, its application in soil erosion studies is currently at the outset. The aim of this work is to compare 3D-PR with conventional techniques that have been employed traditionally for different purposes in soil erosion studies. In this preliminary work, we tested three applications that involve volume calculations: estimation of soil bulk density (BD), quantification of soil erosion at road banks (RB) and sedimentation rates behind check dams (CD). For each analysis, a PR field survey was carried out simultaneously with a conventional method (volume of water was used for BD, and total station surveys for RB and CD). For the 3D-PR technique, the accuracy as a function of the number of pictures taken was evaluated.

In this study we explore the difference in the volume estimates between 3D-PR and conventional techniques as well as the time requirements for each method in order to compare their performance and optimal field of application.