Testing An Automatic Approach For Rill Network Extraction To Measure Rill Erosion By Terrestrial Photogrammetry

F.G. Carolloa, C. Di Stefanoa, A. Nicosiaa, V. Palmeria, V. Pampalonea\*, V. Ferroa

Università di Palermo, Dipartimento di Scienze Agrarie Alimentari e Forestali, viale delle Scienze, Edificio 4, 90128 Palermo, Italia

\*phone number: +3909123897073; vincenzo.pampalone@unipa.it

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**Abstract.** In a recent investigation, the applicability of close-range photogrammetry to measure rill erosion was positively tested on two plots with a length of 22 m and steepness of 22% and 26% at the Sparacia experimental area (Sicily, Southern Italy). An objective method, based on the convergence index, was applied to delineate the rill network from the Digital Elevation Models (DEMs) and measure the eroded channel volume, accordingly.

For the erosion event of September 2017, rills also formed on the 14.9% slope of the experimental area and were surveyed on two 44 m-long plots with a series of photographs taken from the ground to cover each plot. Rills were characterized by apparent differences in the cross-section geometry as compared to those previously detected on the more sloped plots, inasmuch they were wider and shallower.

The present investigation aimed to test the applicability of the method based on the convergence index for this different morphologic condition. In other words, the aim was to check the effects of the rill cross-section morphology on the proposed procedure to measure rill erosion.

The three-dimensional (3D) Digital Terrain Models and DEMs were obtained by an image-processing software using the Structure from Motion technique. The rill channels detected by the convergence index were separated into contributing and non-contributing to the total soil loss measured in the tanks downstream of the plots. The rill density and frequency, and the soil loss due to contributing rills were obtained. Finally, the sediment weight measured by the contributing rills was compared with the weight of the sediment stored in the tanks that was assumed as reference value.