Number and title of the session you selected	SS08 Soil erosion assessment and effects of soil and water conservation measures
Presentation (Insert ✓ in your preferred option)	1. Oral [✓] 2. Poster [ ]

New quantitative geomorphometric approach to estimate soil volumes stored in agricultural terraces

Sara Cucchiaro[1,2*], Guido Paliaga[3], Daniel J. Fallu[4], Ben R. Pears[5], Kevin Walsh[6], Pengzhi Zhao[7], Kristof Van Oost[7], Lisa Snape[8], Andreas Lang[8], Antony G. Brown[4, 5], Paolo Tarolli[2]

[1] Department of Agricultural, Food, Environmental and Animal Sciences, University of Udine, Italy
[2] Department of Land, Environment, Agriculture and Forestry, University of Padova, Italy
[3] Research Institute for Geo-Hydrological Protection, National Research Council, Italy
[4] Natural Sciences, Tromso University Museum, Arctic University of Tromsø, Norway
[5] Department of Geography and Environmental Science, University of Southampton, UK
[6] Department of Archaeology, University of York, UK
[7] Georges Lemaître Centre for Earth and Climate Research, Earth and Life Institute, UCLouvain, Belgium
[8] Department of Geography and Geology, University of Salzburg, Austria

*Corresponding Author, e-mail: sara.cucchiaro@unipd.it

Abstract

Geomorphometric information can be exploited to study the future preservation of agricultural terrace landforms in a world increasingly affected by anthropogenic activities. High-resolution topographic techniques allow the mapping and characterization of geomorphological features with wide-ranging perspectives through high-resolution Digital Terrain Models (DTMs). By using riser bases as well as terrace edges (riser tops) and through the computation of geomorphometric parameters, it is possible to obtain environmentally useful information on these agricultural systems such as terrace soil thickness and volumes. This work aims to realize and test an innovative and rapid methodological workflow to estimate the minimum anthropogenic reworked and moved soil of terrace systems. We mapped and extracted geomorphological features, from which the original theoretical slope-surface of terrace systems were derived. Differences between actual and theoretical terraces from DTM and excavation evidence have been used to estimate the minimum soil volumes and masses used to remould slopes. Moreover, geomorphometric analysis through indices such as sediment connectivity permitted also to quantify the volume of sediment transported downstream, with the associated and mobilized C, after a collapsed terrace. The quantification of terrace volumes can provide extremely useful benchmarks for soil erosion models and offer a measure of the effect of these agricultural systems on soil organic carbon (SOC) sequestration.

Keyword: volume computation, agricultural terrace systems, high-resolution topography, geomorphological features