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Effects of soil erosion on soil organic carbon on a terraced vineyard in a mountainous Mediterranean environment

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Soil erosion by water and subsequent sediment transport and deposition may lead to changes in soil organic carbon (SOC), especially in sloping agricultural land. This might be significant for the SOC cycle in the mountainous areas of the Mediterranean basin, due to lack of maintenance of terraced agricultural landscapes and resulting changes in soil erosion rates. The objective of this study is to assess the effects of soil erosion on SOC content on a typical terraced vineyard with degraded dry-stone walls. The study was conducted on a 1,400-m2 mountain slope in the Troodos Mountains of Cyprus, at an elevation of 1,300 m above sea level. Long-term average annual precipitation is 750 mm. The average distance from slope-top to slope-base is around 50 m with ten dry-stone terraces. The mid-slope terrace wall was equipped with seven, 1-m wide sediment traps, three on standing sections of the wall and four on degraded sections. Sediment was collected from the traps after rainfall events, from December 2015 to November 2017, for quantifying soil erosion. Composite soil samples were collected from a regular grid, using a cluster sampling method at depths of 0-15 cm and 15-30 cm and analysed for SOC. The composite sample included one sample from the center of the grid and three samples at 1-m distance from the center with an angle of 120° between the axis. Loss-on-Ignition was used for SOC analyses. A soil erosion rate of 2.5 t ha-1 y-1 was calculated for the monitored 520-m2 upslope section, based on the trap measurements. Results of the SOC analysis showed higher SOC percentages at the slope-base than at the slope-top. The observed SOC and erosion rates will be compared with simulations performed with the Pan-European Soil Erosion Risk Assessment model (PESERA).