



## **Soil organic carbon replacement and deposition in a highly eroding Mediterranean catchment**

Elisabet Nadeu (1), Asmeret A. Berhe (2), Joris de Vente (3), and Carolina Boix-Fayos (1)

(1) Soil and Water Conservation Department, CEBAS-CSIC, Murcia, Spain, (2) School of Natural Sciences, University of California, Merced, Merced, United States, (3) School of Geosciences, University of Aberdeen, United Kingdom

Soil erosion can lead to net terrestrial carbon sequestration as long as i) eroded soil organic carbon (SOC) is replaced, at least partially, in the eroded landform positions and/or ii) deposited SOC is protected from decomposition in depositional positions. In response to the need to provide more quantitative field data for a better understanding of SOC dynamics in eroding watersheds, a study was conducted in La Rogativa catchment, southeastern Spain. La Rogativa catchment experiences high rates of water erosion. To address the problem of high erosion rates, the government has been promoting a series of hydrological correction works during the last four decades that include a combination of reforestation and the construction of check-dams. Two subcatchments (17 ha and 48 ha in size, respectively) were selected for this study, each of them with a check-dam at the outlet constructed in the 1970s allowing the assessment of retained sediment and SOC. Radiocarbon analyses were conducted on soil and sediment samples to obtain information on SOC replacement on the slopes and SOC preservation on depositional sites. In the 17 ha subcatchment, observed  $\Delta^{14}\text{C}$  values in soils decreased in depth from  $-64\text{\textperthousand}$  to  $-193\text{\textperthousand}$  and fluctuated between  $-7\text{\textperthousand}$  and  $-105\text{\textperthousand}$  in sediments, while in the 48 ha subcatchment soil  $\Delta^{14}\text{C}$  values decreased from  $78\text{\textperthousand}$  to  $-433\text{\textperthousand}$  but the  $\Delta^{14}\text{C}$  in sediment increased in depth from  $-400\text{\textperthousand}$  to  $-170\text{\textperthousand}$ . SOC replacement on the slopes using radiocarbon values was found to be low (0.04% and 0.1%, for the 17 ha and 48 ha respectively). Differences between SOC and  $\Delta^{14}\text{C}$  values in eroding and depositional positions in each subcatchment, as well as between subcatchments, seem to be related to a possible evolution in dominant erosion processes together with changing land use. A better understanding of the relationship between erosion dynamics and SOC accumulation and protection on the depositional sites was obtained by combining radiocarbon data from sediments deposited behind the check-dams with information obtained from a morphological mapping of the stream bed and slope-bed connections.