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STSM title: Assessing soil organic carbon pool and related soil quality indices following erosional/depositional processes in active and abandoned croplands

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Five Keywords: conservation agriculture; ecosystem services; erosion control; surface processes; sustainable farming systems

Topic summary: The major objective of this study was to examine the impact of surface processes on the soil organic carbon pools. Practically, the aim was to investigate the effect of erosional and depositional processes on the quantity and quality of soil organic carbon. A secondary objective was to assess differences in these processes between active and abandoned croplands.

Methods summary: We compared the soil organic carbon pools and related soil quality indices among different erosional phases, as well as between active and abandoned croplands. This was implemented by soil sampling to 0-5 and 5-10 cm depths. Also, ground-based proximal sensing methods was utilized in order to map the spatial variability of the key properties of soil, including volumetric moisture content, texture, and total organic carbon. The proximal sensing methods based on: (i) electromagnetic induction by EM38-Mk2, which measures apparent electrical conductivity (ECa) at two depths (0-75 cm and 0-150 cm); (ii) galvanometric method by Veris2000-xa, which measures ECa at about 0-50 cm; and (iii) gamma-ray spectroscopy by "The Mole" spectroradiometer, which measures the gamma-ray counts emitted naturally from the shallowest 30-40 cm layer of the soil.

Results and implications for restoration: This study highlights the importance of SOC as a means in soil conservation. Also, the results of this study show the potential of temporary land abandonment for allowing self-restoration processes of degraded agro-ecosystems. Particularly, this study shows that the application of organic amendments to soil, either directly (through manuring or composting) or indirectly (through on-site retention of crop residues), could improve the physical quality soil, and assist in soil erosion control. Innovative technologies for identification of soil quality related-processes, and particularly of soil organic carbon dynamics, have to be perceived as important components in future restoration activities of degraded, eroded, and abandoned cropping systems around the world, and especially in drylands. This is due to the cost-effective nature of the relevant technologies and procedures, enabling the high efficiency of restoration activities.

COST ES1104 Desert Restoration Hub



Fig. 1. Characteristic view of the Contrada Campolato region, Puglia, Italy.

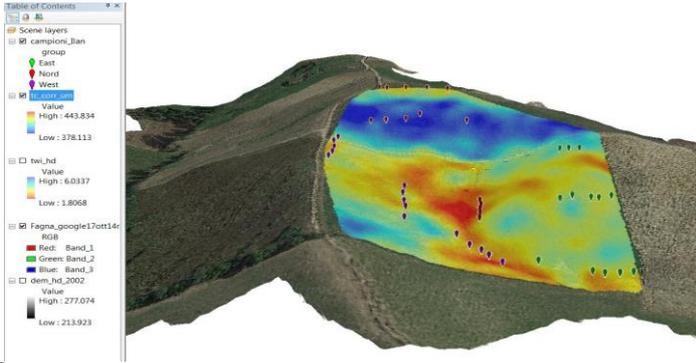


Fig. 2. Small-scale watershed in Fagna Farm, Toscana, Italy. Colours show the magnitude of soil reflectance of gamma-rays