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Evaluation of soil profiles to understand resilience in natural and anthropogenic environments after different number of wildfires

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Abstract

Understanding the connection between wildfires and soils is crucial for the successful assessment of the past, present, and future status of natural and human ecosystems. Soils are spatially heterogeneous depending on the environmental conditions but also on land management by humans. Similar to the other soil types, burned soils are needed to be assessed in order to assess their sensitivity to the wildfire effects and evaluate their recovery capacity. As a result, promoting landscape resilience throughout the different post-fire stages are peremptory as well as the so-called non-productive functions such as soil water retention capacity but also trace or deleterious elements, avoiding erosion, compaction, etc. The main aim of this research is to apply differently mapping techniques, and soil characterization to understand the soil profile status, changes, and evolution after a different number of wildfires (0, 1 and 2 times) occurred in the last 20 years in contrasting environments (abandoned agricultural terraces and natural hillslopes). The study was conducted in a representative catchment located on the island of Mallorca (Spain) through (i) an exhaustive fieldwork campaign describing 24 soil profiles; (ii) sampling and analyzing the main soil properties in each soil horizon; and, (iii) mapping the land-use changes and main geomorphological processes. The current status characterization of soil profiles allowed us to understand if the recovery or degradation due to human impacts in the past, wildfires, or both. This study pretends to fill the gap existing in the literature due to the large datasets that are usually required and specific conditions needed in the same catchment to address the wildfires-soils links.

Keywords: Soil profiles; soil geography; wildfire; resilience;

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