Geophysical Research Abstracts
Vol. 19, EGU2017-17219, 2017
EGU General Assembly 2017

Approximation to SOC stocks variations over time affected by land use changes in a Mediterranean mountain agricultural catchment

Ivan Lizaga (1), Laura Quijano (1), Leticia Gaspar (2), and Ana Navas (1)

(1) Spanish National Research Council, Soil and Water, Spain (ilizaga@eead.csic.es), (2) Spanish National Research Council, Museo Nacional de Ciencias Naturales, Spain

Land use conversion from cropland to natural vegetation can be an effective mechanism to reduce soil C losses and promote soil C recovery affecting the storage of C in soils. Understanding how anthropogenic land use changes lead to implications for soil C storage and how it affects the distribution of total carbon provide information that will support the application of best management practices to restore or maintain soil C.
Agricultural abandonment is one of the most important land use changes in recent decades in Mediterranean catchments. This land use change can play a key role on ecosystems functions that, can be particularly relevant in Mediterranean mountain landscapes where soils are fragile and prone to erosion.
This research aims to evaluate the effects of land use changes on SOC stocks at catchment scale. To this purpose, a total of 98 soil samples were collected on a 500 m grid in the Barués catchment (23 km2) with elevation ranges between 535 and 964 m.a.s.l and mean slope of 16º. The study area is a Mediterranean mountain ephemeral stream catchment located in the central part of the Ebro Basin in northeast Spain (4699000N 647300E) where in recent decades the abandonment of cultivated areas was the main land use change. The sampling points are distributed proportionally in function of the percentage area occupied by the different land uses to be statistically comparable. The SOC content was measured by dry combustion method with LECO equipment. A soil type map of the catchment and two land use maps were created based on two different scenarios using aerial photography for 1957 and 2010 in order to compare how land use has affected carbon storage in the catchment. Six main soil types were identified named Calcisols, Cambisols, Fluvisols, Leptosols and Regosols.
The results show an important decrease (71%) of the cultivated land that in 1957 extended over 13.4 km2 whereas today only occupies 3.8 km2 while forested areas increased from 9.2 km2 in 1957 to 15.8 km2 at present.
SOC stocks were calculated by considering the soil types, soil depth, density of the fine fraction and estimated carbon content. Apart from the Fluvisols located in the downstream part of the catchment an increase in the SOC stocks since 1957 was documented for all soil types. These results are probably influenced by the gradual reduction of the agriculture lands and the transition to naturally revegetated or reforested areas. On the contrary SOC stocks have decreased in the Fluvisols that remain cultivated and are prone to erosion due to both the land use and their location in the proximity to streams with high connectivity.
This study contributes to evaluate the impact of land use changes on SOC stocks to provide information that will help land managers to take more informed decisions as land use strategies can have a critical effect on the soil capacity to store carbon.