# Influence of land use changes on soil carbon stock and soil carbon erosion in a Mediterranean catchment

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Land use changes exert an important control in the soil carbon stocks and in the acceleration or decrease of erosion processes. However among the scientific community there is nowadays an open discussion about whether soil erosion processes represent a net source or a net sink of atmospheric carbon. In this context we have explored the impact of land use changes on the soil carbon stock and on the eroded soil carbon by water in a Mediterranean subcatchment in subhumid conditions. The study catchment has suffered important land use changes in a period of 40 years, increasing the medium density forest cover 2.3 fold and decreasing the agricultural land by a 57 %. An estimation of the quantity and type of soil carbon accumulated during the studied period (1956-1997) was carried out. In addition the eroded soil carbon was quantified in sediments retained by check-dams in several subcatchments and related to the pattern of land use changes.

The change of land use pattern in the catchment between 1956 and 1997 led to an average accumulation rate of 10.29 g C m$^{-2}$ yr$^{-1}$ of . The accumulation of particulate soil carbon (POC) was dominant during the first period (1956-1981) and the accumulation of soil carbon associated to mineral particles (MOC) was dominant in the second period (1981-1997).

Eroded sediments presented an average OC enrichment ratio of 0.85 with respect to the

original soils of the catchment.. The average value of eroded carbon was $0.06\,\text{t ha}^{-1}\,\text{yr}^{-1}$, oscillating between $0.102\,\text{t ha}^{-1}\,\text{yr}^{-1}$ and $0.004\,\text{t ha}^{-1}\,\text{yr}^{-1}$ in different subcatchments. A significant negative relation between the rate of eroded carbon and average slope of the subcatchments indicates that an important source of sediments comes from the agricultural areas located in subcatchments with less slope. The eroded carbon is also negatively related with the change in medium density forest. This indicates that the areas with an increase of the medium density forest during the analyzed period of 40 years experienced less soil carbon losses by erosion.