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Soil carbon and soil physical properties under land use change in a protected area of Sicily

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This work investigated the role of land cover and land use change as a soil's ability to store carbon and reduce carbon dioxide emission in a Mediterranean area. Using both historic records and land cover crop maps we estimated the effect of land cover change on the carbon stock from 1972 to 2008 in a natural reserve (Grotta di S. Ninfa) in the West of Sicily. Five paired sites in different soil types were selected and five land use classes (arable land, vineyard, olive grove, gariggue, eucalyptus afforestation, relict woods of Quercus pubescens and Quercus ilex and high maquis of Laurus nobilis) were analyzed. We studied the effect of land use on soil organic carbon (SOC) content in bulk soil and 1000-2000 μm, 500-1000 μm, 250-500 μm, 63-250 μm, 25-63 μm and <25 μm size fractions. Furthermore, laboratory incubation of the soil samples was conducted to measure carbon dioxide evolution in bulk soil and a smaller size fraction from each five land use classes. In this way we evaluated mass distribution of different SOC pools influenced by land use and their relationships with carbon mineralization and different soil proprieties. Finally our results indicated that land use conversion, vegetation type and management practices, which control biogeochemical and physical soil properties, could help to reduce carbon dioxide emissions and sequester SOC.

Key Words: Carbon Dioxide Emission,Land Use change,Soil Organic Carbon.