



Modelling the impact of climate change and land use on soil erosion in a Mediterranean catchment

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The Mediterranean area is a sensible ecosystem expected to be deeply impacted by global change. New challenges concerning both land use and climate changes will affect hydrology and soil loss. In this context, under the MASCC project (Mediterranean Agricultural Soils Conservation under global Change), we modelled soil erosion using LandSoil model considering different scenarios and integrating local soil conservation practices to mitigate the effects.

The catchment (91ha, 43°30'N, 3°19'E) is a somewhat hilly area located in the Occitania region (Southern France), with an average elevation of 102 m a.s.l.; 62% of it is covered by vineyards, and it has a mean rainfall of about 650mm.y⁻¹. We tested the climatic impact using rainfall down-scaled from a RCM model, ALADIN53, on RCP4.5 emission configuration. The climatic datasets were 1) a 20-year historical series (1985–2005) and 2) a future climatic scenario (2040–2060). Land use changes were modelled realizing four different scenarios from socio-economic trends, respecting the catchment peculiarity. We integrated local anti-erosive practices, such as grass strips or conservative cropping. The four scenarios were 1) business-as-usual, following the last decade's land use trends; 2) productivist, focusing on high agricultural production; 3) environmental protection; and 4) sustainable, valorising the quality of the local productions.

As main result we found that land use change was the main controlling factor, while climate change (2050 horizon) had a second-order influence. On land uses, the more protective scenario reduced soil erosion by up to 65% whereas climate change impacted up to 56%. We also observed that the most soil loss is produced by extreme events. Comparisons among the different scenarios revealed that, the more the environment is degraded (i.e. fewer conservation practices are enacted), the more soil erosion concentrates on extreme events.