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Modelling land use on medium-term soil erosion: Application of a landscape evolution model in a Mediterranean catchment

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Soil resources are being irreversibly lost and degraded (EEA, 2000). Pressure has been generated by the concentration of population and activities in restricted spaces as well as changes in climate and land use. Relevant human-induced changes include those implemented by farmers as well as those imposed by policy in a range of spatial scales. Climate-induced changes are those related to changes in the seasonal distribution of climate factors and in the frequency of extreme events predicted by projections of future climate change (IPCC, 2007).
The aim of this research is to evaluate the influence of land use on medium-term soil erosion delivery in a Mediterranean context, focusing on a small catchment (91 ha) located in the south of France and characterized by extensive vineyard land use. We used LandSoil (Ciampalini et al., 2012) – a landscape evolution model operating at the field/small catchment scale – to analyse different land use for the 21st century. Land use changes have been designed considering the actual scenario as stationary reference and introducing variations of soil use and landscape structure from the most conservative to the most degraded condition according to realistic hypothesis.
Results indicate that land use and landscape structure play a main role in sediment delivery: i) soil loss variations in favourable and unfavourable land-use scenarii range from -3.7% to more than ten times compared to the stationary scenario, ii) landscape structure variation represents a minor factor in soil loss variations ranging from -54% to +110%. Future strategies should consider adaptation to climate change and land use – landscape structure reorganisation.