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Climate change influence on catchment sediment yield

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The effects of a change in climate are expected to be recognizable in many environmental aspects even at small spatial scales: atmospheric carbon dioxide concentration, air temperature, precipitation pattern (days of snowfall translate in days of rainfall), rainfall intensity and erosivity. As a consequence, strong modifications may affect the rate of evapo-transpiration, infiltration and plant biomass production, but also of the soil erosion.
To which extent climate change may affect runoff production, soil erosion and sediment transport in upland catchments is investigated here by combining data of long term precipitation, sediment yield and future climate change provided by Global Circulation Models (GCMs) with a spatially distributed modeling approach to flow generation and surface erosion. The model accounts for changes in the structure and properties of soil and vegetation cover by combining the tube-flux approach to the topographic watershed partitioning through a parsimonious parametrization of the main hydrological processes. This model is used to predict hydrological and sediment fluxes for three small catchments in Saint Gabriel mountains of Southern California under control and climate change conditions. Simulation runs using a 45 years long record of hourly precipitation, both observed and referred to a future scenario, show that climate change may induce a significant modification in the catchment response to storms, with major effects on erosion and flood flows.