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Is rainfall erosivity influenced by climate change?. A case study in a Mediterranean Climate area of North East Spain

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One of the main characteristics of the Mediterranean climate is the high intensity rainfall events usually recorded in autumn and spring. Those events usually concentrate a high percentage of annual rainfall. Different studies carried out in the Mediterranean countries suggest that notable changes in seasonal precipitation regimes have occurred during the second half of the 20th century. In addition, precipitation extremes seem to increase in association with global warming, which may favour erosion processes. Under this hypothesis one question arise: is the rainfall erosivity increasing influenced by climate change?
In this work rainfall erosivity and its variability in the last two decades was analysed in an area located NE Spain, where erosion processes of high magnitude are recorded. The main land use in that area is grape vines, which due to the scarce soil cover is usually associated with the highest erosion rates. The study area was located in the Penedès depression (North East Spain). Hourly data from four observatories Els Hostalets de Pierola (UTM X: 400664, Y: 4598608m, elv: 326m), La Granada (X:393758; Y:4580393), Sant Martí Sarroca (X: 385556; Y:4581486, elv: 257m) and Font_Rubi (X: 385118, Y:4587935. elev: 415 m) belonging to the period 1997-2013 were used in the analysis together with a tipping bucket rainfall series recorded at one minute intervals (10 years within the period 1996-2012). Rainfall erosivity was quantified by the index rainfall kinetic energy multiplied by the maximum intensity in 30minute periods (E*Imax30). The Imax30 was estimated from the relationship between hourly and 30 minute data obtained for the tipping bucket series using the Marquard algoritme. In order to analsye changes in rainfall erosivity, the annual and monthly number of erosive events were analysed for each observatory and in each year, the events were classified into intervals according to their erosivity. The intervals used were: 0-100; 100-200; 200-300; 300-400; 400-500 and > 500 MJ ha-1 mm h-1 . The high variability in total rainfall hided any trend in annual erosivity. However, in four years of the last 10-year period, annual rainfall erosivity was up to three times the average. In three of the four observatories, the number of erosive events presented a significant increasing trend in the number of annual erosive events. At Sant Martí Sarroca there was an increase in the number or events with erosivity values lesser than 500 MJha-1 mmh-1 but not in those of greater values. However, in Font Rubi there was in increase in the maximum annual event erosivity. A common fact among observatories was the change in distribution of the erosive events along the year: the number of erosive events increases in March, April and October and decreased in September. Soil losses estimated in vineyards of the area for those years with high erosivity were near twice the average recorded in a 12- year period.