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Rainfall erosivity in Piedmont Region (North-West Italy) and vineyards implications

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Soil erosion by water is the ongoing geomorphic process of soil degradation studied most in the Mediterranean region. The potential ability for rainfall to cause soil loss is expressed as rainfall erosivity (EI30), it is widely used in soil erosion model for predicting soil loss. Studies conducted along the Italian Peninsula indicate that most, if not all, agricultural cropland areas experience some degree of soil erosion by water. However, measurements of the rainfall erosivity are spatially limited to a few locations, preventing researchers from effectively assessing the geography and magnitude of soil loss across the country. The objective of this work was to investigate the magnitude, frequency and trends of rainfall erosivity in Piedmont Region (northwestern Italy) in order to investigate the detailed spatio-temporal distribution of rainfall erosivity, to develop a grid-based map of rainfall erosivity and to evaluate the effects of the soil erosion on the main piedmonts vineyards. Rainfall erosivity for ground stations, belonging to the Agro-Meteorological network of Piedmont Region (RAM), has been observed. They are well distributed over the whole region and are firstly computed based on mostly 30-min time-resolution rainfall data using a continuous 17-year series of daily rainfall events. The rainfall erosivity applying the RUSLE R equation and then according to Wischmeier and Smith (1978), the rainfall erosivity index (EI30) of each erosive storm have been calculated. The relationships between real EI30 and modelled EI30 have been validated by applying the Nash and Sutcliffe (1970) model-efficiency. After validation, these rainfall erosivity models were then applied to the long term daily rainfall series of the selected stations yielding time series of annual and seasonal rainfall erosivity. The Mann–Kendall non-parametric test statistic was used to detect time trends in the rainfall erosivity time series. The regression-kriging approach was also used to interpolate the rainfall erosivity values of the meteorological stations to a regional rainfall erosivity map. The outcomes of this study provide innovative knowledge that can enable more effective assessments of soil loss (multi-scale and multi-temporal). In particular, this project would support the importance of monitoring soil water erosion to better understand and mitigate the effects of erosion in the main Piedmont vineyards witch is one of the principal cause of economic damage to viticulture.