Modelling long-term storm erosivity time-series: : a case study in the Western Swiss plateau

Book Item (Buchkapitel, Lexikonartikel, jur. Kommentierung, Beiträge in Sammelbänden)

ID 2364273
Author(s) Diodato, N.; Bellocchi, G.; Meusburger, Katrin; Buttafuoco, G.
Author(s) at UniBasel Di Bella, Katrin ;
Year 2014
Title Modelling long-term storm erosivity time-series: : a case study in the Western Swiss plateau
Editor(s) Diodato, N; Bellocchi, G
Book title Storminess and environmental change
Publisher Springer
Place of publication Dordrecht
Pages 149-165

Climate and weather variability induces considerable switch in storm-erosivity, which is the power of rainfall involved in many damaging hydro-meteorological events worldwide. The present paper proposes advances in our understanding of the hydroclimatological processes and their associated modelling requirements that can be useful in both climate simulation and extremes reconstruction. The novel model CREM (Complexity-reduced Storm Erosivity Model) was developed to test a parsimonious approach in order to perform historical reconstructions of annual rainfall-runoff erosivity when high-resolution precipitation records (e. g., hourly or sub-hourly) are missing. The test-area is located in the Western Swiss Plateau (around Bern), where erosive rainstorm can occur with different modes as seasonal meteorological patterns evolve. The CREM incorporates monthly precipitation and the daily maximum rainfall in a year for estimating storm erosivity compatible with the climatic factor of the RUSLE. Despite its simplicity, the CREM has estimated the storm erosivity with sufficient accuracy, explaining about 90 % of the interannual variability for the validation period (1989-2010). This model calibration offered the possibility of using the model to reconstruct the annual erosivity for the study-area since 1864. Analysis of the reconstructed time series identified two breakpoints (end of nineteenth century, 1970s) that could be related to distinct climate periods. It also indicated a moderate temporal dependence structure. In general, the CREM model produced reliable results and is thus proposed as a useful tool for climatic reconstructions.

Digital Object Identifier DOI 10.1007/978-94-007-7948-8_10
ISI-number WOS:000338289700011