Geophysical Research Abstracts
Vol. 19, EGU2017-8466, 2017
EGU General Assembly 2017

Seasonal variation and climate change impact in Rainfall Erosivity across Europe

Panos Panagos (1), Pasquale Borrelli (2), Katrin Meusburger (2), Christine Alewell (2), and Cristiano Ballabio (1)

(1) European Commission, Joint Research Centre, Ispra (VA), Italy (panos.panagos@jrc.ec.europa.eu), (2) University of Basel, Environmental Geosciences, Basel, Switzerland

Rainfall erosivity quantifies the climatic effect on water erosion and is of high importance for soil scientists, land use planners, agronomists, hydrologists and environmental scientists in general. The rainfall erosivity combines the influence of rainfall duration, magnitude, frequency and intensity. Rainfall erosivity is calculated from a series of single storm events by multiplying the total storm kinetic energy with the measured maximum 30-minute rainfall intensity. This estimation requests high temporal resolution (e.g. 30 minutes) rainfall data for sufficiently long time periods (i.e. 20 years). The European Commission's Joint Research Centr(JRC) in collaboration with national/regional meteorological services and Environmental Institutions made an extensive data collection of high resolution rainfall data in the 28 Member States of the European Union plus Switzerland to estimate rainfall erosivity in Europe. This resulted in the **Rainfall Erosivity Database on the European Scale (REDES)** which included 1,675 stations. The interpolation of those point erosivity values with a Gaussian Process Regression (GPR) model has resulted in the first Rainfall Erosivity map of Europe (*Science of the Total Environment*, **511**: 801-815).

In 2016, REDES extended with a monthly component, which allowed developing monthly and seasonal erosivity maps and assessing rainfall erosivity both spatially and temporally for European Union and Switzerland. The monthly erosivity maps have been used to develop composite indicators that map both intra-annual variability and concentration of erosive events (*Science of the Total Environment,* **579***: 1298-1315*). Consequently, spatio-temporal mapping of rainfall erosivity permits to identify the months and the areas with highest risk of soil loss where conservation measures should be applied in different seasons of the year. Finally, the identification of the most erosive month allows recommending certain agricultural management practices (crop residues, reduced tillage) in regions with high erosivity. Besides soil erosion mapping, the intra-annual analysis of rainfall erosivity is an important step towards flood prevention, hazard mitigation, ecosystem services, land use change and agricultural production.

The application of REDES in combination with moderate climate change scenarios scenario (HadGEM RCP 4.5) resulted in predictions of erosivity in 2050. The overall increase of rainfall erosivity in Europe by 18% until 2050 are in line with projected increases of 17% for the U.S.A. The predicted mean rise of erosivity is also expected to increase the threat of soil erosion in Europe. The most noticeable increase of erosivity is projected for North-Central Europe, the English Channel, The Netherlands and Northern France. On the contrary, the Mediterranean basin show mixed trends.

The success story with the compilation of REDES and first rainfall erosivity map of Europe was a driver to implement a Global Rainfall Erosivity Database (GloREDa). During the last 3 years, JRC was leading an effort to collect high temporal resolution rainfall data worldwide. In collaboration with 50 scientists worldwide and 100+ Meteorological and environmental Organisations, we have developed a Global Erosivity Database. In this database, we managed to include calculated erosivity values for 3,625 stations covering 63 countries worldwide.