Geophysical Research Abstracts
Vol. 21, EGU2019-4937, 2019
EGU General Assembly 2019

An evaluation of the effects of rainfall seasonality, drought, and wildfire on the hydrological ecosystem services of a Mediterranean region at different spatial scales.

Nunzio Romano (1,2), Carolina Allocca (1), and Paolo Nasta (1)

(1) Department of Agricultural Sciences - Division of Agricultural, Forest and Biosystems Engineering, University of Naples Federico II, Portici (Napoli), Italy (nunzio.romano@unina.it), (2) Interdepartmental Research Center for Environment (C.I.R.AM.), University of Naples Federico II, Napoli, Italy.

Agricultural and forest ecosystems in Europe, especially those distributed across the Mediterranean Belt, are experiencing rapid changes in climate seasonality and land use that might compromise the provision of key ecosystem services related to the hydrologic cycle. According to the last report released by IPCC in 2018 more frequent droughts might severely stress water supply in most catchments. Rural abandonment has induced a significant increase in forest cover, which is scarcely maintained and prone to wildfire risks under prolonged dry conditions. Moreover, while on the one hand annual-average rainfall seems to keep steady through time, on the other hand rainfall events at sub-daily temporal resolution are getting more intense by exacerbating floods, landslides, and soil erosion. It is therefore necessary to use advanced techniques and hydrological models to serve reliable scenarios-based projections to select cost-effective solutions to contrast negative effects to assure the provision of key ecosystem services. Reliable scenarios will certainly support the best adaptation options with respect to drought and wildfire occurrence as well as to prevent the risk of water stress and soil erosion.
This study evaluates the effects exerted by changes in rainfall seasonality on the hydrological ecosystem services such as water yield and soil erosion. These attributes are evaluated at different spatial scales: at the large scale of the entire Campania Region and at catchment scale of the Upper Alento River in southern Italy. The first part of this investigation refers to the analysis of daily rainfall time series, from 1950 to 2018 recorded in 249 weather stations distributed across the region. Rainfall seasonality was characterized using the SI (Seasonality Index), whereas 3- and 6-month SPI (Standardized Precipitation Index) values are used to evaluate drought severity. Rainfall erosivity based on hourly measurements show a typical seasonality, with maximum values occurring mainly on fall season, and was also estimated by using simplified relationships based on daily rainfall values. The second part of this study focuses on the impact exerted by dry and wet seasons, but also by wildfires, on surface runoff and sediment yield in a pilot catchment of the Campania Region (the Upper Alento River Catchment). This catchment serves as a hydrological observatory where variables and fluxes are monitored with advanced devices (e.g. cosmic-ray probes, wireless sensor networks), whereas water and sediment budgets are simulated using the Soil Water Assessment Tool (SWAT) model.