

EGU2020-20784

<https://doi.org/10.5194/egusphere-egu2020-20784>

EGU General Assembly 2020

© Author(s) 2022. This work is distributed under the Creative Commons Attribution 4.0 License.



Low watershed hydrological and erosion response after fire can be explained by connectivity

Jinfeng Wu, Jantiene E.M. Baartman, and João P. Nunes

College of Resources and Environmental Sciences, China Agricultural University, Beijing, China (jinfeng.wu@wur.nl)

Mediterranean regions have always been affected by wildfires. However, no studies investigating post-fire hydrological responses and erosion at the watershed scale ($\sim 10 \text{ km}^2$) were conducted in Mediterranean. In this study, the discharge and sediment measurements at the outlet of a Mediterranean watershed were observed to test changes in hydrological responses and sediment loads before and after the fire. Besides, aid by the PCA analysis and analysis of connectivity patterns and changes using the index of connectivity (IC), we analyze the hydrological responses and erosion to a wildfire at the watershed scale. Although most of vegetation was removed after the wildfire, it did not, overall, lead to a significant increase in hydrological responses and sediment loads at the watershed scale. Our results can be explained by three major factors. Firstly, much lower rainfall the first two hydrological years after the fire occurred in our watershed. Secondly, as a result of the scale dependency of hydrological and erosion processes, fire-enhanced overland flow and sediment transport occurred locally on hillslope with high burn severity but did not (yet) reach the outlet. Finally, and arguably, most importantly, connectivity in our study area is relatively low and, although it increases after the fire, it remains generally low. Even though post-wildfire connectivity in our watershed increased by 20%, this increase in connectivity was mainly located in the upstream-most part of this catchment, with much less increased connectivity in the downstream areas, which are closer to the catchment outlet. We concluded that the fire consumed vegetation and altered hydrology and erosion processes but didn't significantly influence downstream water quantity and quality. Connectivity linked to burn severity was suitable for evaluating the effect of wildfire on hydrological responses and erosion. Moreover, this method also appears to be reasonable in assessing and mitigating post-fire water contamination risk.