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A DEM-based Method for Flood Risk Mapping at Large Scale

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In recent years, the acquisition of data from multiple sources, together with improvements in computational capabilities, has allowed to improve our understanding on natural hazard through new approaches based on machine learning and Big Data analytics. This has given new potential to flood risk mapping, allowing the automatic extraction of flood prone areas using geomorphic approaches based on Digital Elevation Models (DEMs). Our group has carried out several years of research on this topic, investigating the dominant topographic control for flood exposure using techniques of pattern classification based on morphologic features. Recent analyses highlighted the potential of a hydrogeomorphic descriptor, called Geomorphic Flood Index (GFI) (Samela et al., 2017), adopted to develop a linear binary classification procedure able to identify flood susceptible areas. Considering the relevance of inundation depth for flood risk assessment, the GFI method has been further exploited to obtain an approximate, but immediate, estimate of the water surface elevation in a river and surrounding areas. The new procedure is applied on a case study located in southern Italy, obtaining satisfactory performances (Manfreda & Samela, 2019). In particular, the inundation depths are very similar to the ones obtained by hydraulic simulations in the domain where 2D dynamics prevail. The reduced computational effort and the general availability of the required data make the method suitable for applications over large and data-sparse areas, opening new horizons for damage estimation and flood risk assessment at national/continental/global scale. Our findings may help to define new strategies for flood risk providing information that, although approximate, may be of practical utility for preliminary assessment of expected flood damage, flood management and mitigation.

Keywords
Flooding; geomorphic analyses; geomorphic flood index (GFI); linear binary classification; Digital elevation models (DEMs); inundation depth.

References
Manfreda, S. & Samela, C. (2019). A DEM-based method for a rapid estimation of flood inundation depth. J. Flood Risk Manag. (in press).
Samela, C., Troy, T. J., & Manfreda, S. (2017). Geomorphic classifiers for flood-prone areas delineation for data-scarce environments. Adv. Water Resour., 102, 13-28