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Investigating the definition of flood maps using a 2D hydraulic routing model forced by a DEM-based fully continuous rainfall-runoff algorithm

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Ongoing efforts of remote sensing technologies to provide more accurate digital elevation models (DEMs) at the global scale are supporting the use of terrain analysis and hydrologic and hydraulic modelling algorithms for flood mapping in ungauged basins. In this work we implement a fully continuous hydrologic-hydraulic model feeded by a rainfall synthetic time series for providing river hydrographs that are routed along the channel using a bidimensional hydraulic model for the detailed physically-based characterization of the inundation process. In this way the whole physical process is represented, from the net rainfall to the flow time series, avoiding any conceptual sub-method (design hyetograph and hydrograph) commonly needed to apply standard flood modelling and mapping procedures. Nevertheless, the floodplain information is no longer deterministic as the result of the evaluation of the impact on the river valley of a single design hydrologic scenario (event-based approach,EBA), but the final result is composed of a combination of data derived by the application of a fully-continuous approach (FCA). Indeed FCA provides a flow depth time series for each single cell of the inundated domain. The final flood map should be, thus, the result of a proper analysis of this dataset in statistical, qualitative and quantitative terms. Otherwise this would lead to an undefined flooding scenario that could be useless for flood risk management and decision making in urban plans.