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Modelling post-fire runoff and erosion processes for emergency assessment of post-fire flood hazards

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Land use change, as well as changes in the soil physical and chemical properties impact the runoff and erosion generation processes, and overall transport mechanism. Therefore, research and development of a watershed's physics-based distributed runoff and erosion processes is needed to better predict discharge and erosion under different environments. This is important for not only local floods and droughts and, geomorphological and landform changes point of view but also for a better understanding of the hydrology, erosion and land surface processes and its impact on ecosystem, transport system, environment and socio-economy and safety. One of the natural and/or manmade causes that brings about changes in land use and soil property is wildfires. In an effort to represent the physics of the watershed under post-fire conditions, this study presents a detailed analysis of runoff and erosion generation processes, by including soil hydrophobicity and burn severity related soil hydraulic properties changes, and transport responses, under sediment laden fluid flow conditions, in watersheds under burn conditions. This study also conducted distributed hydro-geomorphological parameter value identification process for enabling engineers and hydrologists to provide critical post-fire flooding assessments for stakeholders and decision makers in relatively short period.