EGU2020-5501
EGU General Assembly 2020

Post-wildfire flash flooding in small mountainous catchments: post-fire effects and characteristics of the November 2019 flash flood in Kineta, Greece

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During the period 24-25 November 2019 a low pressure system with organised convective storms has affected Greece as it crossed the country from west to east. The system, which was name Gyrionis, after a name used in the Greek mythology, has produced heavy rainfall, with increased lightning activity and local hailstorms. In the area of western Attica the maximum rainfall has been reported with 92 mm of on 24 November and additional 115 mm in 25 November, adding to a storm total of 206 mm, which caused flash floods in the town of Kineta. The storm caused overflowing of local torrents draining the south slopes of Geraneia Ori, inducing significant damages in property and infrastructure mainly within the town and across the coastal zone.

Field surveys showed that a wildfire that burned through almost the entire catchment of the main torrent (named Pikas) on 2018, played a crucial role in flooding and its impact on the town. At critical locations along the river, vegetation debris and eroded material of various grain sizes, including boulders, diminished dramatically the hydraulic capacity of the river, intensifying flooding in the downstream areas, which formed an alluvial fan.

Based on comparison of pre- and post-flood aerial photography of the burned area, a major source of this deposited material was identified as burned trees still standing after the fire, uprooted from the river banks of the main channel and carried away together with additional soil debris. The material was jammed at a crucial location near the apex of the alluvial fan causing floodwaters to overflow and inundate significant parts of the fan's apron, a geomorphological setting that increased the extent and impact of flooding further.

Overall, the case of Kineta, is a characteristic case of post-wildfire flash flooding, in which the fire effects are critical in the enhancement of subsequent flooding phenomena.