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Wildfire ash mobilization by splash under simulated rainfall in controlled laboratory conditions

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Recently burnt areas across the world have been documented to produce strong to extreme runoff and erosion responses. At the same time, they are well known to lose their typically blackish colour due to wildfire ashes (*sensu latu*, including char) relatively quickly during the early phases of the window-of-disturbance. The contribution of wildfire ash to post-fire erosion rates, however, remains poorly quantified. Arguably, this is first and foremost due to the difficulties of separating the ash and char fractions from the mineral soil fractions, at least at the routinely basis that is required for field erosion studies with high temporal resolution (say, less than 1 month) and an absolute minimum of three replicate plots per slope or treatment. To this end, the national ASHMOB project (CENTRO-01-0145-FEDER-029351) is trying to advance the knowledge of the mobilization of wildfire ash by wind and water erosion by studying it first under controlled laboratory conditions. The present study concerns the first phase of wildfire ash erosion by water, using Morgan cups to quantify the splash erosion of wildfire ash by high-intensity simulated rainfall in the Laboratory of Hydraulics, Water Resources and Environment of the University of Coimbra. More specifically, this study assessed the importance of the following factors in ash splash erosion: (1) extreme rainfall intensities, ranging from 150 to 450 mm/h; (2) source of the ash, from recently burnt woodlands dominated by maritime *Pinus pinaster*, *Eucalyptus globulus*, and *Arbutus unedo*; (3) ash depth or load. Preliminary analysis of the obtained results suggested that splash erosion of wildfire ash: (1) varied strongly with the applied rainfall intensity, increasing in a linear manner with increasing intensity; (2) differed markedly with the dominant tree cover, being clearly lower for the pine and eucalypt stands than for the strawberry tree stands, possibly due to the differences in soil burn severity as indicated by blackish and whitish ashes, respectively; (3) depended noticeably on ash depth, decreasing clearly with increasing ash depth and, arguably, with a greater damping capacity.