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Temperature peaks affect fire-induced soil water repellency, infiltration and erosion risk of Mediterranean shrublands. Implications for water and sediment connectivity

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We know that the impact of fire on soil water repellency varies largely with the availability of water and physical and chemical soil properties, as well as the intensity of pre-existing hydrophobicity. However, there are few studies that relate the intensity of post-fire soil hydrophobicity and its persistence to the intensity and duration of thermal peaks occurring during fire. Fundamentally, this is due to the difficulty of quantifying these factors in situ, so that experimental fires are an extremely useful tool.
The objective of this work was to study the impact of the intensity and duration of the thermal peaks observed during an experimental fire in the hydrophobicity of previously wet or slightly hydrophobic soils and the consequences of these changes on infiltration, runoff and soil loss (through rainfall simulation) in the immediate (30 days) and medium-term (1 year) post-fire period.
In general, soil water repellency increased in all cases, although high temperatures and residence times of moderate thermal peaks caused the greatest impact. Although infiltration rates determined by mini-disk infiltrometer with water generally declined, no significant changes were observed in the same measurement with ethanol (which negates the effect of hydrophobicity).