# Impacts of a large wildfire on hydrologic behaviour and water resources quality in the Pisano Mount area (northwestern Tuscany): preliminary results

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**Abstract**

Wildfires are recognized as one of the most effecting ecological agents, altering geomorphological processes, hydrologic cycles, and water quality (Shakesby, 2011; Smith et al., 2011; Moody et al., 2013). On average from 50,000 to 65,000 fires occur in Europe every year, burning approximately 500,000 ha of forested areas (Turco et al., 2014).

Between September 2018 and February 2019 two large wildfires burned about 1,400 ha of forest and farmlands in the Pisano Mount area, mainly in the municipalities of Calci and Vicopisano (northwestern Tuscany) (Salbitano et al., 2020). The area is mainly formed of a hilly landscape, with extensive forest cover and peculiar geomorphological features. The main outcropping rocks are composed of quartzite, arenite, phyllite and quartz metaconglomerate. The burned area is of primary importance in the hydrologic recharge processes of the groundwater resources hosted in the alluvial fan of the Zambra stream and in the multi-layer aquifer of the Pisa plain (Del Tredici, 2019).

The presented study is concerned with a characterization of the hydrological cycle and water resources quality in the burned area of the Pisano Mount.

The recent wildfire impact on hydrological behaviour and water quality and quantity is being evaluated by the comparison between burned and unburned areas, selecting two major catchments in the former and two sub-catchments in the latter. The catchments were selected as similar as possible by evaluating morphometry, geology and pre-fire vegetation features.

A network of meteorological stations was already present and was implemented.

Five hydraulic sections of the main streams draining the area are currently monitored for hydraulic level and physico-chemical parameters. All the sections are equipped for monitoring water level, electrical conductivity, and temperature, whereas two probes register also pH, turbidity and oxidation-reduction potential.

Monthly samples are collected for stream water and groundwater. In addition, four plate lysimeters will be installed to sample water infiltrated through the soils to evaluate the chemical exchanges between soil and rainwater. Samples are analysed for major anions and cations, total suspended solids, trace elements, water isotopes and organic compounds, to search chemical perturbation potentially arising by the wildfire.

Finally, a survey of measurement of the hydraulic properties, permeability and sorptivity, is also scheduled, aiming to address changes of these properties induced by wildfires.

The main knowledge about wildfire perturbation and the experimental design will be illustrated including the preliminary results of the work.

**Keywords**: wildfire, small catchment, groundwater, monitoring, hydrologic cycle.