Poster Cluster 31: Climate extremes & risk: Impacts, cascades, feedbacks with biosphere and society

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Climate dryness as a driver for wildfire occurrence in Southwest France

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Abstract

Summer 2022 was exceptionally hot and dry in France (second hottest summer after 2003 since 1900, one of the 10 driest summers since 1959). In the Southwest of France, "megafires" burnt 28,000 hectares of the Landes Forest, constituting an exceptional disastrous event since 1949 for the regional natural ecosystem, and posing challenges for civilian societies. The specificity of the Landes Forest is its soil texture with lignite below the surface. Soil being very dry in summer 2022, fire was able to propagate underground and resurface further away, making firemen's work extremely difficult. Such underground-propagating fires even discreetly persisted beyond summer 2022.

These wildfires raised many questions on land-use management. One of them is whether reducing ditch drainage (created to evacuate excess water in this region which can be very wet in winter) could make the forest less vulnerable to soil droughts and thus reduce the risk of wildfires.

To address the issue, droughts frequency, intensity and duration in the last decades are firstly analysed in the region with data from different sources. Meteorological and soil drought indices such as SPI, SPEI and soil moisture index are computed from ERA5, SAFRAN reanalysis and E-Obs dataset. Climate conditions are then compared to wildfire characteristics deduced from MODIS satellite data. Although anthropogenic factors have a high impact on fire ignition, the probability of high wildfire activity still depends on climate conditions. Some relevant physical explanations, beyond the statistical conclusion, are formulated for the occurrence of droughts and their relation to fire occurrences. Hot and dry compound extreme conditions are furthermore assessed in CMIP6 climate simulations to foresee the future risk of wildfires. An investigation on the detection and attribution issue of fire-favourable conditions is also performed with dedicated DAMIP simulations.

In parallel with the diagnostic works, a ditch drainage conceptual model is also built to investigate whether modifying drainage can reduce the vulnerability of the forest to increasing dryness in climate conditions. In a broader perspective, the objective of this work is to develop a methodology replicable in other regions of the world to analyse the impacts of climate change at a local scale and explore how climate science can provide quantitative information to help decision making.

Keywords

drought, wildfire, land-use, hydrology, climate-extremes, vulnerability