

Large rural wildfires in Continental Portugal: The influence of climatic extremes.

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Portugal is located in the transition zone between subtropical and medium latitude types of climate, strongly affected by droughts and heat waves, which are expected to increase in duration, frequency and intensity in the different future scenarios of climate change. These extreme climatic events can have great impacts on human and natural systems, including: hydrological losses affecting human consumption and activities, agroforestry and energy production; the increase in mortality, human morbidity and, fire risk.

Rural wildfires can be seen as natural agents, ecologically desirable and essential agents in many ecosystems as well as natural hazards and critical components of terrestrial ecosystem and the climate system. In the last three decades, Portugal was the European country with the highest number of rural wildfires and the third highest value of burnt area. These events are closely associated with the type of climate, occurrence of extreme summer weather events, type of vegetation, and human activities, which are the main fire ignition cause. The main objectives of this study are: (i) identification and characterization of droughts and heat waves for recent past climate conditions; (ii) identification of the relationship between large rural wildfires (burnt area above 5 000 ha), droughts and heat waves.

The study benefits from the use of two detailed datasets, namely: (a) ERA-Interim dataset, which provide meteorological data with high spatial resolution for the 1981 – 2017 period, namely the daily precipitation, daily air temperature and maximum air temperature; and, (b) a wildfire dataset, which comprises detailed spatial-temporal information about the selected wildfire events. The methodology adopted is based on the heat wave definition of Fischer and Schär (2010), the Standardized Precipitation Index (SPI) and the Standardized Precipitation Evapotranspiration Index (SPEI). Geographic information systems techniques and statistical analyses were used to assess the relationship between large rural wildfires, droughts and heat waves. The results include: (i) the characterization of heat waves and droughts for recent past climate conditions, in terms of frequency, duration, seasonality and intensity; and, (ii) the characterization of the spatial-temporal relationship between large rural wildfires, droughts and heat waves. The results allows us to conclude that: heat waves is a summer problem; Central Portugal was the region most affected in terms of heat wave number and intensity; the spatial and temporal patterns of large rural wildfires are in good agreement with the spatial and temporal distribution of the climatic extremes; and, the probability of having a wildfire during an heat wave or a drought is 89% and 94%, respectively. The authors strongly believe these results are a valuable contribution towards a better forest and fire risk management, especially in the regions affected by droughts and heat waves.