



Spatio-temporal relative humidity patterns and extreme wildfires in the Mediterranean

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Extremely hot temperature, strong winds and the actions of arsonists are usually referred as major causes of the thousands wildfires which spread every year through the Mediterranean countries. Of all these wildfires, only few rare events can be considered as a major threat to the population and a civil protection emergency. Since, in case of severe weather conditions, the causes of fire ignition are often related with negligence, it is extremely important to be able to predict and discriminate extreme danger conditions, in order to avoid fire ignitions by means of preventive actions.

Many peculiarities make Mediterranean wildfires different from other natural risk: the most relevant is that fire ignitions are human caused in more than 90% of fire events. Fire spread is related with vegetation cover, orography, and fuel moisture content and wind conditions. The ability of fire fighters to cope with the fire front is also a major factor in determining the area potentially covered by a wildfire and the damages caused by the event. In literature all these aspects are considered, in order to define tools able to predict and manage wildfire risk.

Finding precursors for extreme wildfires throughout Mediterranean regions is the focus of this work. As Mediterranean storms are usually related with extreme precipitation and consequent floods, in this paper we propose to consider extreme wildfires in the Mediterranean as a specular aspect of "traditional" Mediterranean storms. While floods are related with soil moisture conditions, vegetation cover, topography and their main trigger are extreme precipitation events, wildfires are usually considered as the complex results of several heterogeneous aspect, and strong winds and high temperature are often considered as the main drivers in extreme wildfire risk conditions.

In this work, we considered the extreme events occurred during the 2007 summer season, highlighting the extremely low relative humidity of the air at the soil level associated with the occurrence of extreme wildfires. The summer of 2009 is also taken into account, because the same meteorological scenario characterized the extreme wildfires that spread across Sardinia (Italy).

We propose to consider space-time relative humidity patterns in the closest layer to the soil as the main driver of extreme Mediterranean wildfires. Hourly data, gathered so far from 1st January 2007 by the hygrometers available by the Network of Civil Protection Functional Centers have been analyzed. Minimum values of 48h moving average and their coefficient of variation have been analyzed in connection with the most severe events occurred in Italy. Despite the day-night cycle has a very strong influence on relative humidity at the ground level, minima around 30% are revealed to occur often in the very proximity of the burnt areas less than 24 hours before the fire breakout.

Results show that extreme Mediterranean wildfires can be related with anomalies in space-time distribution of atmospheric relative humidity (extremely dry conditions).