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Dynamic Influence of Climate and Vegetation on Fire Potential

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ABSTRACT

A forest fire, as a natural disturbance element, is an essential component to the functioning of many ecosystems. The last few decades, however, have brought a significant increase in wildfire activity in many areas of the world. Current climate change projections for the Iberian Peninsula, predict an increase in temperature mainly in summers, longer and more intense droughts, and slightly wetter winters. Thus, most studies and modelling efforts forecast a significant increase in the number and intensity of fires in most of the climatic change scenarios. Vulnerability to changes in fire regimes is expected to be different among ecosystems, for example Westerling and Bryant (2008) showed that climate change scenarios that favour hot and dry extremes may produce opposite results in moisture-limited vs. energy-limited fire regimes.

One suitable approach to quantify fire risk is by means of the fire potential index (FPI) (Burgan et al. 1998).This index integrates a suite of variables that encompasses the main factors involved in the initiation of forest fires, that are, weather conditions and fuel load. In this model the weather has a direct effect on dead fuel moisture; thus, when dead fuel moisture is high FPI is low. Fuel load is estimated from remote sensing data and represents the amount of vegetation susceptible to burning. High fuel load results in high values of FPI.

Statistical time series analysis (TSA) is a useful tool for identifying and modelling the dynamics (trends, cycles, periodicities) of variables observed sequentially over time. The analysis of dynamic relationships among variables is of particular interest in analyzing and modelling time series.

The aim of this work is to characterize intra-annual and inter-annual variability of the FPI in the period 2000–2009 and to assess the influence of weather conditions and fuel load in the fire risk as defined by the FPI.

Preliminary results show different forest fire risk patterns between the Mediterranean and the Temperate region. While in the Mediterranean region the weather component seems to explain most of the FPI variability, in the Temperate region also fuel component shows a significant effect. This result can have important implications in forest fire prediction and management.

REFERENCES

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