

Characterizing Fire Activity in Eastern Mediterranean Europe by Surface Temperature and Soil Moisture Variability

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Abstract

Being an agent of environmental hazard, wild fire is a major concern, especially in Mediterranean countries, where warm and dry summers may lead to high levels of vegetation stress. Vegetation fire, whether caused naturally or by humans, its widespread and occurrence depends on land cover (LC) type and state, climate and meteorological conditions, land use. The main concern of the study is quantification the physical processes related to vulnerability of biomass burning across the climatic gradient for Eastern Mediterranean Europe (Bulgaria) using satellite information, ground observations and model outputs for land surface state. Sixteen years (2004-2019) satellite data from LSASAF FRP-PIXEL product at MSG resolution were processed in order to determine the distribution of vegetation fires for the most risky period July-September. The work examines the relationships of wildfire statistics (number of fires and radiative energy released) to surface temperature (according LSASAF LST product), and soil moisture availability, SMA (according SVAT model) as energy-moisture related climate variables. Regression analyses for the main aggregated vegetation types (forest, shrubs, cultivated) reveal statistically significant dependences: - In short-term climatic aspect: a high correlation between monthly mean positive LST anomalies and fire activity as well as negative correlation between SMA anomalies and fire activity; - In long-term climatic aspect: the contribution of different LC types for fire activity is considered. Identified specific fire regime with location of spots with highest fire activity provides knowledge about fire-climate relations on a regional scale, which is important to define more risky regions as well as for projection the effects of global environmental change.



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