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Statistical evaluation of site-specific wildfire risk index calculation for Adriatic regions

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Abstract

Wildfires are great threat to nature and humans. Predicting fire occurrence, early fire detection and intervention can significantly diminish hazardous consequences. Therefore, fire risk index is used to quantify probability of fire occurrence at certain time and place, in order to help fire managers to organize fire protection in a better way. In this paper we have performed statistical analysis of past fires detected by satellites in respect to various parameters. We have taken into account meteorological, topological and anthropological parameters and study their influence on fire occurrence. Based on this study we proposed an improved method for calculating a site-specific fire risk index (SWRI), especially tuned for the Adriatic region.

Keywords: wildfires, wildfire risk index, Adriatic region, statistical evaluation

1. Introduction

Wildfires are important class of natural hazards especially in areas with mild and hot climate such as Mediterranean region. Fire management deals with predicting, preventing and detecting wildfires, as well as fire suppression after it ignites. For all these activities, fire risk index can be useful indicator. Fire risk index represents a numerical description probability of fire ignition and spread on a certain place and time. Wildfire risk index determination is of great importance for both wildfire prevention and protection. Even before the actual wildfire, identifying the fire danger is of great importance as it can be useful for planning firefighting activities. By using wildfire risk index, it is possible to achieve a more successful surveillance of the surrounding terrain by raising the level of alertness of automatic fire detection system or human observers on areas where current risk index is high. Beside that, wildfire risk index could help improve fire alertness for all the citizens who may be affected by wildfires.

Most countries exposed to wildfires have either developed or use one of the existing methods for wildfire risk index calculation. However, most of these indexes are not adequate for the use in the Adriatic region. Even more, not many existing wildfire risk indexes were site-specific developed with a focus on a micro-location, and therefore they have a rather low spatial resolution.

In this paper we propose a calculation method for Site-specific Wildfire Risk Index (SWRI) with quite satisfactory spatial resolution. The proposed wildfire risk index is not based solely on the meteorological parameters, like most existing wildfire risk indexes. It also takes into account other parameters for which we have, after carrying out a detailed statistical analysis, proven that they have a significant influence on the risk of wildfires in the Adriatic region, particularly on the central part of the Adriatic. More specifically, the proposed wildfire risk index is based on the following parameters: climatological and meteorological parameters, vegetation, terrain configuration and anthropogenic parameters. An example of the developed site-specific wildfire risk index for Split and Dalmatia County in Croatia, during a relatively high-risk index is shown in Figure 1.