Forest Fire Risk Index specific for Galicia (NW of Spain): an essential device for fire prevention

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Abstract

In Galicia (NW of Spain), that supports about the 45% of the forest fires occurred in Spain, it is of paramount importance to develop predictive models, which can help in the adoption of prevention measures. Given the scope of the economical and ecological problem, a Forest Fire Risk Index Specific for Galicia was developed, which daily predicts the zones with low, medium, high and extreme risk of fires, four days in advance, for each of the 360 cells of 10 km x 10 km that cover the total Galicia surface, with about 85% of reliability and less than 15% of overestimation. This Index, which considers four levels of risk, is visualised, by means of a GIS, on a Galicia map, where the cells appear in the colour corresponding to the risk level: green (low risk), yellow (medium risk), brown (high risk) and red (extreme risk). This model permits to keep watch on these areas and to reinforce the resources for fire fighting. For the elaboration of the Fire Risk Index an algorithm was developed by a statistical procedure, using the Galicia historic meteorological (1968-2005) and forest fire (1980-2005) databases. This algorithm combines meteorological factors: temperature, precipitation, relative humidity and wind intensity, taking also into account the fire history. The Index was then modulated with the structural risk, evaluating for each cell the influence of the following characteristics: vegetation type, accessibility, economical activity, population distribution and history of previous fires in the cell. This algorithm permits the diary calculation of the Fire Risk Index for each of the 360 cells of 10x10 km in which the UTM system divides Galicia, four days in advance or more if reliable meteorological predictions exist. For the prediction of the fire risk the system also uses the meteorological data in real time, which enters in the system automatically every day by means of an informatic programme, which takes them directly from the automatic meteorological stations, and the meteorological predictions, which also enter automatically in the system. Today the System is predicting the Index for four days, according to the reliability of the meteorological prediction data and modifies the Index automatically every day if the meteorological forecast is modified by the meteorological service. The main advantages of this Index are the following: i) it estimates an specific value for the fire risk; ii) it counteracts the uncertainty which produces the human factor; iii) it operates under any meteorological conditions; and iv) it can be applied to any other region or country, previous adaptation of the algorithm for the specific Forest Fire Risk Index to the new databases, because the scientific bases and the structure have been perfectly established.

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