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A model to predict the risk of forest fires caused by human action

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Researchers from the University of Lleida, the University of Alcalá and Spanish National Research Council (CSIC) have developed a model that can make long-term predictions of a higher risk of fires caused by human action in a specific area. Data concerning fires occurred between 1998 and 2000 in 6,006 towns in Spain have been collected, with the exception of Navarra and the Canary Islands, where enough data were not available. Up to 29 risk variables have been analysed and grouped according to seven factors: socioeconomic transformations in rural areas; socioeconomic transformations in urban areas; persistence or transformation of traditional activities involving fire in rural areas; accidents or negligence derived from electrical infrastructures, transport and others; structure of landscape and population; forest policies; and factors related to intentional fire.

PHOTO: Bombers de la Generalitat

This pioneer model is the first to be designed in Spain. It identifies Galicia, the Cantabric coastline and the Catalan and Valencian coast as the areas with the highest long-term risk, together with other areas from inland Spain

The model created is the first of its kind in Spain and takes into account the 13 most significant variables affecting the whole of Spain. It identifies Galicia, the Cantabric coastline, and the Catalan and Valencian coast as the areas with a higher risk, together with other areas from inland Spain. This index does not intend to be an estimation of short-term risk (daily or weekly), which is usually carried out by means of weather parameters, but analyses the long-term risk. The authors of this study, Cristina Vega (UdL), Jesús Martínez (CSIC) and Emilio Chuvieco (University of Alcalá) explained that more than 90% of the forest fires in Spain are directly or indirectly caused by human action, although this factor is almost never taken into account in analyses and risk indexes used.

The model was adjusted to the data corresponding to 60% of the 6,006 towns and was validated with the remaining 40%. It showed a reliability of 85%, a very high result in this type of measurements. The risk variables were elaborated from digital cartographic sources, analyses coming from systems of geographical information and several census data.

The most significant variables in the model are the density of agricultural machinery, the density of livestock in traditional extensive farming and the fragmentation of the agricultural landscape. The first two can be considered as indicators of the agricultural and farming activity, in which the use of fire continues to be generalised. These factors are aggravated by social conflicts such as agricultural abandonment (measured as the change of agricultural land into forest), which contribute to creating situations of danger. The results also confirm the importance of the proximity of forests to roads or to potentially risky infrastructures like dumps and mines.

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A total of 29 risk variables have been identified and grouped in seven major factors: socioeconomic transformations of rural areas; socioeconomic transformations of urban areas; persistence or transformation of traditional activities involving fire in rural areas; accidents or negligence derived from electrical infrastructures, transport and others; structure of landscape and population; forest policies; and factors related to intentional fires.