Geophysical Research Abstracts,
Vol. 10, EGU2008-A-07969, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-07969
EGU General Assembly 2008

Spatial modelling of the influence of human activity on wildfire ignition risk in a Mediterranean landscape

R. Romero-Calcerrada (1), F. Barrio-Parra (2), J.D.A. Millington (3) C.J. Novillo (4)

(1) School of Experimental Science and Technology. Rey Juan Carlos University. Avda. Tulipán s/n, 28933 Móstoles, Madrid, Spain (raul.romero.calcerrada@urjc.es/ Fax: ++34 91 4887068), (2) School of Experimental Science and Technology. Rey Juan Carlos University. Avda. Tulipán s/n, 28933 Móstoles, Madrid, Spain, (3) Center for Systems Integration and Sustainability, Michigan State University, 115 Manly Miles Building, 1405 S. Harrison Rd., East Lansing, MI 48823, USA. (4) School of Experimental Science and Technology. Rey Juan Carlos University. Avda. Tulipán s/n, 28933 Móstoles, Madrid, Spain

Approximately 95% of wildfires in Spain are caused directly or indirectly by human activity. Consequently, ignition risk estimation in this region must consider anthropic influences. However, the importance of human factors has been given scant regard compared with biophysical factors in quantitative analyses of risk. The reasons for this are diverse, but one of the most important is the difficulty in spatially evaluating and modelling the human component of fire ignitions.

In our study we used 11 independent variables, comprised of five socio-economic variables and six spatial variables or spatial attributes of socio-economic variables (e.g. distance to urban areas), for a multi-use landscape in the south west of the Autonomous Community of Madrid, Spain. The spatial variables were defined to represent human access across the study area and the spatial pattern of human land use. National and regional statistics were examined to find the main socio-economic aspects that might be used to characterize ignition risk. All variables were selected because of their influence on wildfire ignition risk.

From these groups of variables we derived four datasets of independent variables using different techniques: socio-economic variables alone (sev) and socio-economic

variables using dasymetric methods (sev-dm); and spatial variables using equal interval classes (sv-ei) and spatial variables using cost analysis (sv-ca) (friction maps or cost of human movements). The dependent variable was an ignition point dataset for the years 2000-2003. These data were grouped into four- (Model 1) and two- month (Model 2) fire seasons. Ignition points for 2004 and 2005 were used for model testing.

We used weights-of-evidence based GIS modelling to examine the relative influence of socio-economic variables on the spatial distribution of wildfire ignition risk. Eight predictive maps of wildfire risk were produced: 1) four for the two-month fire season combining the four datasets of independents variables (sev and sv-ei; sev and sv-ca; sev-dm and sv-ei; sev-dm and sv-ca) and 2) another four for the four-month fire season using the same dataset combinations.

The results show that spatial patterns of wildfire ignition are strongly associated with human access to the natural landscape; proximity to urban areas and roads are found to be the most important causal factors. Our findings highlight the importance of considering socioeconomic variables when modelling and predicting the spatial distribution of wildfire ignition risk in Spain. The models produced using the independent variable groups of sev / sv-ei and sev / sv-ca are better than the models using sev-dm / sv-ei and sev-dm / sv-ca. The first group of models is more accurate and uses fewer numbers of variables. We suggest the methods and results presented here will be useful to optimize time and human resources in areas where the urban-forest interface is increasing and where human activity is an important cause of wildfire ignition.