Geophysical Research Abstracts
Vol. 15, EGU2013-6336-1, 2013
EGU General Assembly 2013

Fire occurrence prediction in the Mediterranean: Application to Southern France

Panagiota Papakosta, Jan Öster, Anke Scherb, and Daniel Straub
TUM Technische Universität München, Engineering Risk Analysis Group, Munich, Germany (panagiota.papakosta@tum.de)

The areas that extend in the Mediterranean basin have a long fire history. The climatic conditions of wet winters and long hot drying summers support seasonal fire events, mainly ignited by humans. Extended land fragmentation hinders fire spread, but seasonal winds (e.g. Mistral in South France or Meltemia in Greece) can drive fire events to become uncontrollable fires with severe impacts to humans and the environment [1].

Prediction models in these areas should incorporate both natural and anthropogenic factors. Several indices have been developed worldwide to express fire weather conditions. The Canadian Fire Weather Index (FWI) is currently adapted by many countries in Europe due to the easily observable input weather parameters (temperature, wind speed, relative humidity, precipitation) and the easy-to-implement algorithms of the Canadian formulation describing fuel moisture relations [2],[3]. Human influence can be expressed directly by human presence (e.g. population density) or indirectly by proxy indicators (e.g. street density [4], land cover type). The random nature of fire occurrences and the uncertainties associated with the influencing factors motivate probabilistic prediction models.

The aim of this study is to develop a prediction model of fire occurrence probability under natural and anthropogenic influence in Southern France and to compare it with earlier developed predictions in other Mediterranean areas [5]. Fire occurrence is modeled as a Poisson process. Two interpolation methods (Kriging and Inverse Distance Weighting) are used to interpolate daily weather observations from weather stations to a 1 km^2 spatial grid and their results are compared. Poisson regression estimates the parameters of the model and the resulting daily predictions are provided in terms of maps displaying fire occurrence rates.

The model is applied to the regions Provence-Alpes-Côtes D'Azur und Languedoc-Roussillon in the South of France. Weather data are obtained from the German and French Weather Services (Deutscher Wetterdienst and Météo-France). Historical fire events are taken from Prométhée database. Time series 2000-2010 are used as learning data and data from 2011 is used as the validation data. The resulting model can support real-time fire risk estimation for improved allocation of firefighting resources and planning of other mitigation actions.

[1] Keeley, J.E.; Bond, W.J.; Bradstock, R.A.; Pausas, J.G.; Rundel, P.W. (2012): Fire in Mediterranean ecosystems: ecology, evolution and management. Cambridge University Press, New York, USA, pp.515
[2] Lawson, B.D.; Armitage, O.B. (2008): Weather Guide for the Canadian Forest Fire Danger Rating System. Natural Resources Canada, Canadian Forest Service, Northern Forestry Centre, Edmonton, Alberta, Canada.
[3] Van Wagner, C.E.; Pickett, T.L. (1985): Equations and FORTRAN Program for the Canadian Forest Fire Weather Index System. Forestry Technical Report 33. Canadian Forestry Service, Government of Canada, Ottawa, Ontario, Canada
[4] Syphard, A.D.; Radeloff, V.C.; Keuler, N.S.; Taylor, R.S.; Hawbaker, T.J.; Stewart, S.I.; Clayton, M.K. (2008): Predicting spatial patterns of fire on a southern California landscape. International Journal of Wildland Fire, 17, pp.602-613
[5] Papakosta, P.; Klein, F.; König, S.; Straub, D. (2012): Linking spatio-temporal data to the Fire Weather Index to estimate the probability of wildfire in the Mediterranean. Geophysical Research Abstracts, Vol.14, EGU2012-12737, EGU General Assembly 2012