



Analysis of the annual trends of fire density in Southern Europe

Sandra Oliveira, Friderike Oehler, Jesus San-Miguel Ayanz, Andrea Camia, and Tracy Durrant

Joint Research Centre of the European Commission, Institute for Environment and Sustainability, Ispra, Italy
(sandra.santos-de-oliveira@jrc.ec.europa.eu)

Wildland fires are a major hazard in Europe, particularly in the Mediterranean area. The assessment of fire risk constitutes an important tool for forest fire management. Long-term or structural fire risk, even though it is a key component for the support of fire prevention activities, has not been investigated systematically at the European level. A research initiative is currently ongoing at the Joint Research Centre with the aim to develop a long-term fire risk model for Europe, to be integrated in the European Forest Fire Information System (EFFIS). For this purpose, fire risk is considered as a combination of fire occurrence and fire outcome. Fire occurrence is assessed based on the probability of ignition and estimated fire behaviour, while fire outcome is based on vulnerability.

This study analysed the spatial and temporal trends of fire occurrence (ignition) in the Euro-Mediterranean region, from 1985 until 2007, in order to understand the subjacent factors of the fire distribution patterns, a topic even more relevant in a context of climatic and environmental change.

Fire ignition data was obtained from the European Forest Fire Database of EFFIS, which currently includes data gathered from 21 countries and about 1.87 million individual fire records, of which 1.22 million are from the Euro-Mediterranean region. Due to the geo-location uncertainty associated with the database, fire density (number of fires/km²) was used as a surrogate of fire ignition. The total number of fire events per year was spatially distributed within the wildland area of the correspondent NUTS3 region (administrative districts used as geographical units to report fire events in the database). Corine Land Cover (CLC) 1990 was used to define the wildland areas for the period between 1985 and 1994 and CLC 2000 for the period between 1995 and 2007. Kernel density estimation methods (e.g. Amatulli et al., 2007) were applied to obtain the dependent variable in a continuous format, necessary to integrate with other data available at the European level.

Fire incidence changes by year and along each year. Between 1985 and 2007, 69% of the total number of fires occurred in the main fire season, considered as the period between 1st of June and 30th of September. The fire seasons of 1998, 2000, 1996 and 2003 recorded the highest number of fires in the whole of the Euro-Mediterranean countries. The countries with the highest fire density for the whole period were Portugal (over 4000 fires/km²), Spain (463/km²) and Italy (444/km²). There are clear differences in the annual trends of fire density between countries; 2007 was the year with higher fire density in Greece, 1998 in Portugal and 2000 in Spain. The variables that explain these differences in fire density are being explored, among which road network, population density, human settlements, land cover, agricultural production, topography and climate. Potential variations on the influence of each variable by year are also considered.