Topic 1

Recent trends in forest fires in Mediterranean areas and associated changes in fire regimes

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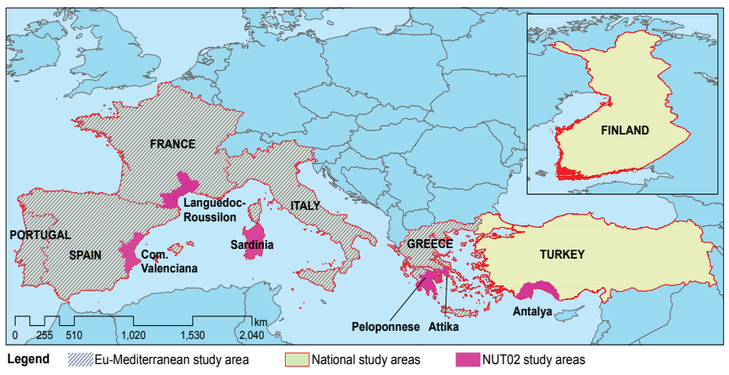
Understanding fire regimes is very important to assess the ecological effects of forest fires and project them under future scenarios. FUME project characterised fire regimes at different spatial scales and analysed trends and shifts in fire occurrence during the recent history. Overall, the results highlighted an inter-annual variability of fire activity, a general slight decreasing trend in burned area (with the exception of Portugal), and a shift in number of fires in several countries. Such trends are likely due to a combined effect of extreme fire weather events, changes in policies and management practices, law enforcements and reporting systems.

Implications for policy and management

- *Need to further strengthen efforts towards harmonized definitions, formats and methodologies in fire data acquisition and assemblage across countries.*
- *Need for additional fire characteristics to be measured and recorded in the fire databases to accomplish a more comprehensive picture of fire regimes in Europe.*
- *The collection and recording of a consistent and comprehensive European fire database is a paramount knowledge base instrument to support fire management and related policies.*

The problem: Fire regimes are commonly described from the main characteristics of fires occurring in a region (i.e., fire intensities, seasonality, frequency, type and pattern), and are mainly driven by climate, vegetation and human factors. The thorough knowledge of these characteristics and their trends is essential for (1) understanding the effects of fire on ecosystems and the interactions between fires and their driving factors, (2) anticipating and limiting the potential negative impacts of fires (especially in areas experiencing rapid changes or newly exposed to fire), (3) supporting fire management (prevention and fighting) and land planning, and (4) projecting future fire potential under changing environmental and social conditions.

Fig. 1.1: Fire Statistic study area, composed of 7 countries (Portugal, Spain, France, Italy, Greece, Turkey, and Finland) and 6 NUT02 regions (Comunidad Valenciana, Languedoc-Roussillon, Sardinia, Peloponnese, Attica, Antalya).



The approach: Contemporary (1985-2005) fire regimes, in terms of frequency, seasonality, and inter-annual variability, were characterized in the Euro-Mediterranean area at different spatial scales (from EUMed to National level down to NUTS2[1] scale, Fig. 1.1) using fire statistics (monthly fire number and burned area) derived from different sources. The existence of significant trends and shifts in fire occurrence was also investigated. Because during the last decades their number was considered significantly affected by the variation in data recording and reporting systems, fires smaller than 0.01 ha were deleted from the analysis (Fig. 1.2).

Achievements:

Fire regime characterization: Throughout the analysed period (1985-2005), the majority (about 85%) of fires burned less than 10 hectares, although, as a whole, they accounted for a small portion (about 11%) of the total burned area (Fig. 1.2). At EUMed level, fire incidence (i.e., the burned area over the land area) was higher in Portugal, followed by Spain and Italy (Table 1.1). Summer (JJAS) was the main burning period, although several countries presented a secondary peak in early spring. Fires tended to start earlier in South-Western regions, while in the South-Eastern regions a number of ignitions were recorded in October. Countries were characterized by a certain degree of inter-annual variability; higher variability was found in NUTS2 with medium-low fire activity (Table 1.1).

Recent trends and changes: The whole study area exhibited a general increase in the number of fires. Portugal (1989 and 1994) and Greece (2000) show an upward trend, while Italy (1994) exhibits a

[1] Nomenclature of territorial units for statistics (NUTS): is a geographical nomenclature subdividing the EU territory into regions at three different levels. It is based on the administrative divisions applied in the EU Member States. NUTS level 2 in most EU countries corresponds to the administrative level of Regions.

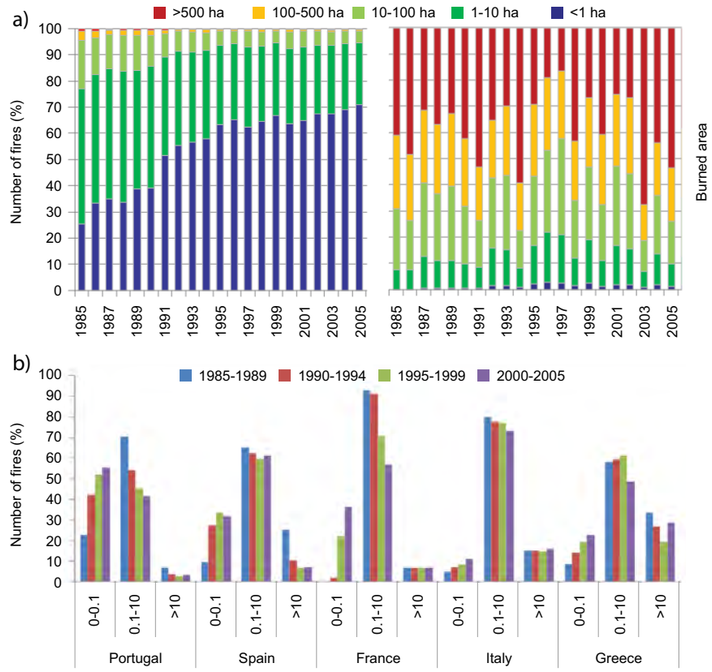


Fig. 1.2a: Temporal evolution of annual number of fires and burned area in EUMed by share (in %) of fire size categories (data elaborated from the European Fire Database of EFFIS, San Miguel-Ayanz et al., 2012). Note the increasing trend in the number of small fires, likely due to the variation of recording and reporting systems throughout the period considered.

Fig. 1.2b: Evolution of number of fires in FUME EUMed study areas by share (in %) of fire size categories and by time steps (1985-1989, 1990-1994, 1995-1999, 2000-2005). Note the increasing trend in the number of small fires, likely due to the variation of recording and reporting systems throughout the period considered.

downward trend (Fig. 1.3). The burned area had an opposite trend, with a generalized slight decrease throughout the period considered, significantly in Italy, Greece, and Turkey. At NUTS2 level, a significant increase in the number of fires was observed only in Attica and Peloponnese, while burned area followed a general decrease in all the study areas.

Lessons learned and implications: One of the main limitations for the analysis of fire regimes is the lack of long-term comparable and harmonized historical records. Differences in datasets across countries and throughout the years need to be considered when comparing past and recent years or when analysing trends and shifts. In this respect the European Fire Database of EFFIS (San Miguel-Ayanz et al., 2012) is an important tool that needs to be maintained and further enhanced.

Law enforcements in State and European legislation, as well as the improvement of fire management services and monitoring systems have certainly contributed to contain fire activity and incidence (e.g. Salis et al., 2013). However, apparently they have not been sufficient to balance the increased severity of extreme events under severe weather conditions observed in recent years.

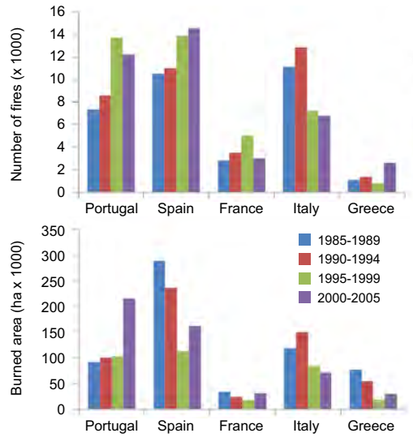


Fig. 1.3: Evolution of average fire number and area burned by time steps (1985-1989, 1990-1994, 1995-1999, 2000-2005) in FUME EUMed study areas.

Table 1.1: Number of fire (FN) and burned area (BA) statistics at EUMed, national, and NUTS2 scales, for the period 1985-2005. The table is based on monthly values from FUME partners.

	Total FN (x 1000)	Total BA (ha x 1000)	Total FN/country land area	Total BA/country land area (%)	Average fire size (ha)	Coefficient of variation FN	Coefficient of variation BA
EUMed	1076.67	10509.65	0.69	6.73	9.76	0.91	0.98
Portugal	429.42	2772.82	4.69	30.30	6.46	0.47	0.72
Spain	366.67	4170.85	0.73	8.36	11.37	0.30	0.62
France	28.60	454.59	0.05	0.83	15.89	0.31	0.87
Italy	213.04	2184.01	0.72	7.43	10.25	0.36	0.50
Greece	38.94	927.38	0.30	7.19	23.82	0.67	0.97
Turkey[a]	31.82	185.66	0.04	0.24	5.84	0.26	0.78
Finland	19.16	10.28	0.06	0.03	0.54	0.62	0.58
Com. Valenciana	4.82	213.40	0.21	0.92	44.31	0.34	1.97
Languedoc[b]	9.51	3.95	0.35	0.01	0.42	0.39	3.30
Sardinia	65.27	619.61	2.71	25.72	9.49	0.38	0.69
Peloponnese	7.22	170.71	0.34	7.98	32.36	0.62	1.77
Attica	1.57	50.87	0.41	13.36	23.64	0.65	1.05
Antalya[b]	3.71	26.93	0.18	1.30	7.27	0.33	0.81

[a] Data from 1990-2005

[b] Only data related to fire in forests and shrublands were available.

Forest fires

under climate, social and economic changes in Europe, the Mediterranean and other fire-affected areas of the world

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