



An operational system of fire danger rating over Mediterranean Europe

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A methodology is presented to assess fire danger based on the probability of exceedance of prescribed thresholds of daily released energy. The procedure is developed and tested over Mediterranean Europe, defined by latitude circles of 35 and 45°N and meridians of 10°W and 27.5°E, for the period 2010-2016.

The procedure involves estimating the so-called static and daily probabilities of exceedance. For a given point, the static probability is estimated by the ratio of the number of daily fire occurrences releasing energy above a given threshold to the total number of occurrences inside a cell centred at the point. The daily probability of exceedance which takes into account meteorological factors by means of the Canadian Fire Weather Index (FWI) is in turn estimated based on a Generalized Pareto distribution with static probability and FWI as covariates of the scale parameter. The rationale of the procedure is that small fires, assessed by the static probability, have a weak dependence on weather, whereas the larger fires strongly depend on concurrent meteorological conditions.

It is shown that observed frequencies of exceedance over the study area for the period 2010-2016 match with the estimated values of probability based on the developed models for static and daily probabilities of exceedance. Some (small) variability is however found between different years suggesting that refinements can be made in future works by using a larger sample to further increase the robustness of the method.

The developed methodology presents the advantage of evaluating fire danger with the same criteria for all the study area, making it a good parameter to harmonize fire danger forecasts and forest management studies.

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