



Forest fires and lightning activity during the outstanding 2003 and 2005 fire seasons

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Wildfires in southern Europe cause frequent extensive economical and ecological losses and, even human casualties. Comparatively to other Mediterranean countries, Portugal is the country with more burnt area and fires per unit area in the last decade, mainly during the summer season (Pereira et al., 2011). According to the fire records available, between 1980 and 2009, wildfires have affected over 3 million hectares in Portugal (JRC, 2011), which corresponds to approximately a third of the Portuguese Continental territory.

The main factors that influence fire ignition and propagation are: (1) the presence of fuel (i.e. vegetation); (2) climate and weather; (3) socioeconomic conditions that affect land use/land cover patterns, fire-prevention and fire-fighting capacity and (4) topography. Specifically, weather (e.g. wind, temperature, precipitation, humidity, and lightning occurrence) plays an important role in fire behavior, affecting both ignition and spread of wildfires.

Some countries have a relatively large fraction of fires caused by lightning, e.g. northwestern USA, Canada, Russia (O. In contrast, Portugal has only a small percentage of fire records caused by lightning. Although significant doubts remain for the majority of fires in the catalog since they were cataloged without a likely cause.

The recent years of 2003 and 2005 were particularly outstanding for fire activity in Portugal, registering, respectively, total burned areas of 425 726 ha and 338 262 ha. However, while the 2003 was triggered by an exceptional heatwave that struck the entire western Europe, the 2005 fire season registered was coincident with one of the most severe droughts of the 20th century.

In this work we have used mainly two different databases: 1) the Portuguese Rural Fire Database (PRFD) which is representative of rural fires that have occurred in Continental Portugal, 2001–2011, with the original data provided by the Autoridade Florestal Nacional (AFN, 2011); 2) lightning discharges location which were extracted from the Portuguese Lightning Location System that has been in service since June of 2002 and is operated by the national weather service - Instituto de Meteorologia (IM).

The main objective of this work is to analyze for possible relations between the PRFD and the Portuguese lightning database for the 2003 and 2005 extreme fire seasons. In particular we were able to verify the forest fires labeled as “ignited by lightning” by comparing its location to the lightning discharges location database. Furthermore we have also investigated possible fire ignition by lightning discharges that have not yet been labeled in the PRFD by comparing daily data from both datasets.