Geophysical Research Abstracts
Vol. 12, EGU2010-7158-1, 2010
EGU General Assembly 2010

Links between fire activity and climate variability in NW Spain

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Northwestern Spain (Galicia and the provinces of León and Zamora) accounts for more than 50 % of the total forest fires and around 40% of the burned surface occurred in Spain since 1968. Socioeconomic (fire considered a cultural tool, abandonment of traditional management) and demographic factors (rural depopulation) explain such fire activity, which shows two seasonal peaks, in coincidence with atmospheric conditions favourable for burning: a principal one, during the summer and beginning of the autumn, and a secondary one at the end of winter and early spring.

In the present paper, we analyze the temporal evolution of the summer forest fires in that region and we link them to the occurrence of some atmospheric conditions favourable to their onset and spreading. Short term anomalous weather conditions were analyzed through the calculation of daily values of the FFWI index, and related to the atmospheric circulation through a synoptic pattern catalogue; besides, the prevalence of long term climate anomalies (drought) linked to regional and hemispheric patterns of circulation variability was highlighted through the calculation of indices.

A principal component analysis of the seasonal (summer) burned surface identified three different areas of coherent behaviour, the coastal Galicia, the northern Meseta and an intermediate. Due to the different climate conditions and limiting ecological factors, the atmospheric processes linked to extraordinary periods of burning vary on each region. In coastal Galicia, extreme fire seasons occur when conditions are much drier than normal, capable to enhance the fuel flammability of a usually humid environment; besides, the number of forest fires and their magnitude is usually linked also to atmospheric circulation patterns which trigger high-risk weather conditions (easterly flows promoting a severe warming and drying). Conversely, in the northern Meseta, usually drier, most of the forest fires, here affecting shrub vegetation, tend to occur after relatively wet (winter) years. Such conditions support the growth of fine fuels that quickly dry out during the summer season, not requiring extremely weather conditions to initiate large forest fires in this area.