DROUGHT- R&SPI – FOSTERING EUROPEAN DROUGHT RESEARCH AND SCIENCE-POLICY INTERFACING

Drought environmental impacts: analysis of correlations between wildfire risk, burned area, precipitation and temperature

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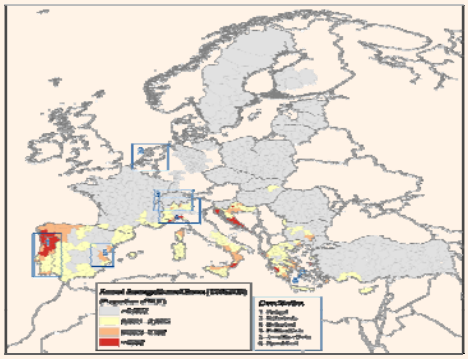
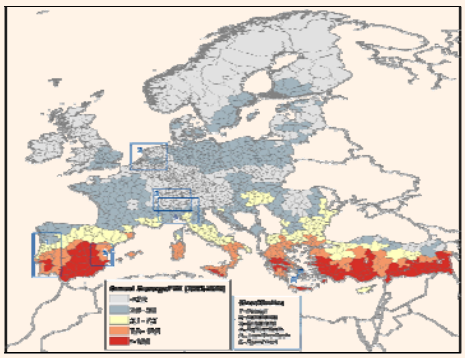
WILDFIRES AND DROUGHT LINKS

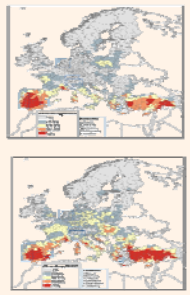
Characteristics of forest fires are very dependent on weather and climate (Flannigan and Harrington 1988), particularly in Mediterranean countries (Pausas 2004). Drought conditions are a good example of the climate-fire links, as the risk of fire increases with increasing drought duration and intensities. However, the relationship between drought and fire risk requires much more understanding (Wheaton 2001).

THE FIRE WEATHER INDEX (FWI)

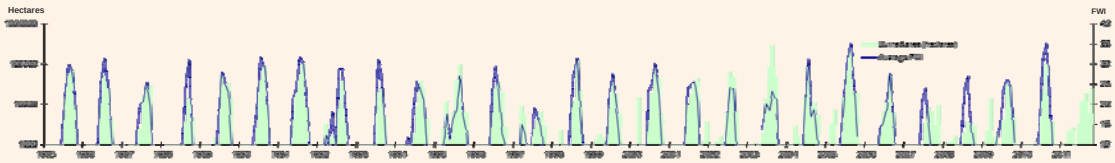
Since 2007 the Joint Research Centre (JRC) within the European Forest Fire Information System (EFFIS) network has adopted the Canadian Fire Weather Index (FWI) to assess the fire danger level in a harmonized way throughout Europe. The FWI is an integrated index computed daily from precipitation, temperature, relative humidity and wind variables. Therefore, the impact of weather variables in burned area can be analysed through its correlation with the average FWI.







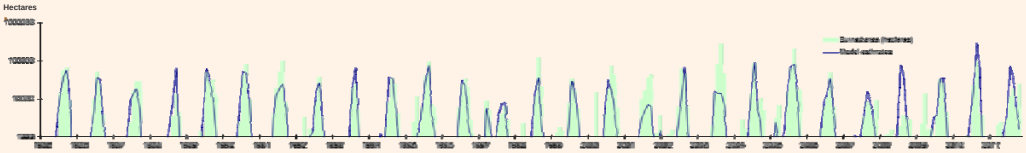
2003 and 2005 registered severe droughts in Europe. Both years were selected for analysis by case studies within DROUGHT-R&SPI



Correlations between average FWI values and total monthly burned area (hectares) in a logarithmic scale, for case study Portugal
ln (Area burned) = 3.93 + 0.248 FWI, R^2 = 0.650 n = 259

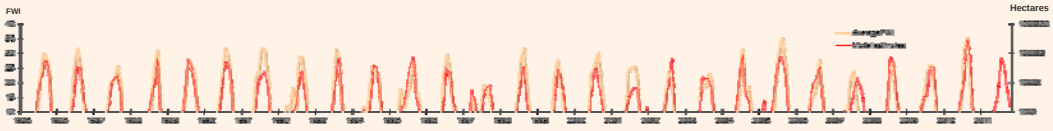
PRELIMINARY ANALYSIS: CASE STUDY PORTUGAL

Correlations could be established directly between burned area and monthly weather variables. Predictions based on monthly averages of precipitation and temperature are better than those including only precipitation (R^2=0.556, n=363) and even a little better than those provided by FWI



ln (Area burned) = 13.78 - 2.538 ln(P_2) + 0.061 T ln(P_2), R^2=0.658, n=363

P_2 = Precipitation of current and previous months T = Average monthly temperature



FWI values are very strongly correlated with model estimates (R^2=0.856, n=259)

CONCLUSIONS AND FURTHER ANALYSIS

It seems therefore that monthly values of weather variables are better estimates of burned area than FWI, as long as temperature is included in the model. Further analysis within DROUGHT - R&SPI will explore this type of approaches for other case studies (Work Package 2), as well as for Europe (Work Package 3). The final objective is to integrate 2-month precipitation anomalies (SPI2) in the model to predict areas burned by wildfires.

REFERENCES
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Pausas J.G. 2004. Changes in Fire and Climate in the Eastern Iberian Peninsula (Mediterranean Basin). Climatic Change 63:337–350
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