

# THE ROLE OF FUTURE CLIMATE ON IBERIAN WILDFIRE REGIMES

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## 1. OBJECTIVES

- Distinguish independent clusters of Burnt Area (BA) regimes (pyro-regions) inside the Iberian Peninsula (IP);
- Construct simple statistical models to reproduce BA series based on meteorological predictors;
- Develop Iberia BA projections for the 21st century using different approaches for RCM data handling.

## 3. STATISTICAL MODELS FOR BURNT AREA

- Forward stepwise regression models were constructed using the ERA-Interim meteorological dataset;
- The best monthly models (Fig.2) are obtained by combining short-term and long-term meteorological information as predictors:

- (1) Short-term predictors - monthly frequencies of extremely warm and dry days;
- (2) long-term predictors – monthly values of *background* anomalous meteorological conditions.

## 2. DATA

Fire data: From Portuguese and Spanish fire authorities.

Meteorological fields:

- Daily temperature, precipitation and geopotential height at the 500hPa level series from the ERA-Interim reanalysis, on a horizontal resolution of 0.75x0.75°.
- RCM projections from 4 models from the ENSEMBLES project;

## 4. FUTURE PROJECTIONS

RCM outputs from the 4 models from the ENSEMBLES project were used (Hadley Center, KNMI, MPI, ICTP) to project BA series until 2075 in the IP, employing the statistical models previously developed and calibrated with the ERA-Interim dataset during the control period (1981-2005).

We have used two approaches to correct the RCM biases in several predictors including the novel Delta Change method. Results from both correction methods were compared, in order to understand the limitations and impacts of RCM short-term inherent variability.

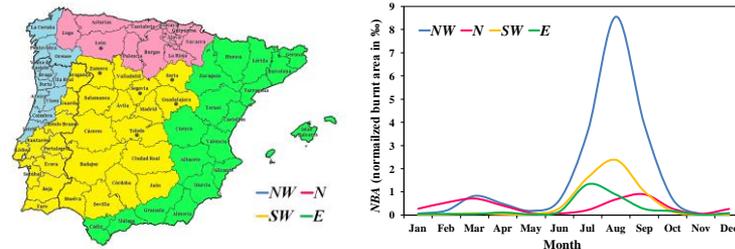


Fig.1 - The 4 clusters considered for the Iberia fire regime analysis, and their respective mean intra-annual variability: blue – NW; yellow – SW; green – E; magenta – N.

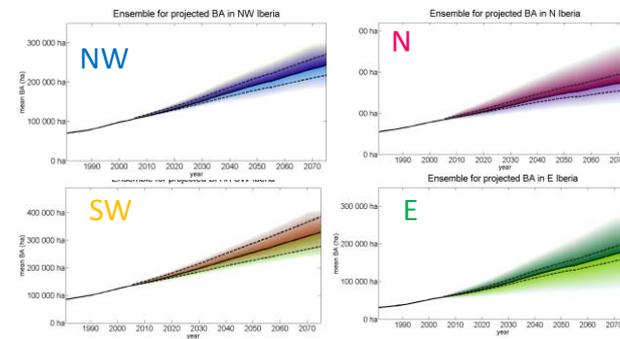


Fig.3 - Ensembles of projected mean BA for the period 1981-2075 in Iberia. Solid line: mean of all 16 members of the simulations; Upper dashed line: mean of the simulations using a fixed reference climatology; Lower dashed line: mean of the simulations using a moving reference climatology. Darker and lighter shades represent ensemble uncertainties of these simulations and where obtained using inter-quartiles. A 25-year moving average was applied to all series.

## CONCLUSIONS

- Meteorology explains most of the fire occurrence variability in Iberia, with a smaller fraction being attributed to human factors, such as land-use, fire suppression, etc..
- Specific long-term meteorological backgrounds (such as droughts) may enhance vegetation vulnerability during the fire season in certain sectors;
- Very simple statistical models can reproduce the largest part of the BA inter-annual variability, enabling the construction of future BA scenarios, which estimate the potential 2 to 3 times more BA in Iberia by the late 21st century;
- There is great uncertainty on these future projections, namely as the human factor cannot be considered. This fact clearly shows the imperative need to consider climate change mitigation measures, when regarding fire management in the upcoming decades.

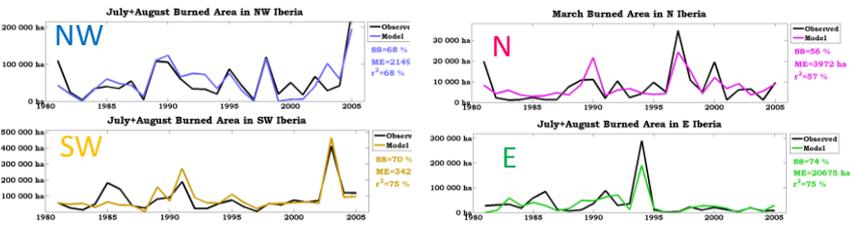


Fig.2 - Observed (black lines) and modeled (colored lines) series for the July plus August (March in the N cluster) Burnt Area in each of the considered clusters of the Iberian Peninsula. Modeled series result from a forward stepwise regression which uses as predictors meteorological variables from the ERA-Interim reanalysis dataset (temperature, precipitation and geopotential series).