Climate change impact on wildfire danger indices: where do the greatest uncertainties lie?

Hélène Fargeon[*1], Nicolas Martin St Paul[1], François Pimont[1], Miquel De Cáceres[2], Julien Ruffault[3], and Jean-Luc Dupuy[1]

[1]Unité de Recherches Forestières Méditerranéennes (URFM) – Institut National de la Recherche Agronomique : UR0629 – France
[2]Forest Sciences Centre of Catalonia (CEMFOR-CTFC) – Solsona 25280, Espagne
[3]RECOVER – Institut national de recherche en sciences et technologies pour l'environnement et l'agriculture - IRSTEA (FRANCE) – 13100 Aix-en-Provence, France

Résumé

Climate change is often expected to lead to an increase in wildfire danger. The Forest Fire Weather Index (FWI) and its subcomponents, like the Drought Code (DC), are widely used to forecast and project climatic fire danger. However, applications of such wildfire danger indices are subjected to different uncertainties. A first one is related to the ability of these indices to accurately predict empirical data of observed wildfires ("empirical uncertainty"); whereas a second lies in the projection of these indices, which is inherently affected by the spread among climatic input data available from different general and regional circulation models ("projection uncertainty"). It is crucial to take this aspect into account as uncertainties pile up in the modelling chains, what has seldom been done in the context of wildfires. Our study aims at exploring both types of uncertainties, and comparing their respective contributions to the global prediction. First, we analyse uncertainties related to the predictions of an empirical record of past fire observations (number of fire) over French Mediterranean area (Prométhée) using the FWI computed at an 8km resolution (using SAFRAN climatic input) for the historical period 1995-2015. We then investigate the uncertainty linked to climatic projections by projecting FWI and fire occurrence (based on the empirical relation calibrated under historical conditions) under two IPCC scenarios and using two GCM/RCM model combinations for the period 2005-2100.
Predictions of fire occurrence under historical conditions reveal important bias both spatially and temporally, highlighting potential uncertainties in the global use of FWI to predict wildfire. FWI and fire occurrence projected under different RCP scenario also reveal an important spread. Ongoing work includes computation with additional models and the assessment of the relative weight of different uncertainty sources in the projection of wildfire risk.

---

[*]Intervenant