

Forests under threat: assessing fire risk and climate-driven uncertainty in a large-scale forest model

Miguel Rivière
(AgroParisTech, CIRED)

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Campus du Jardin tropical - à 5 minutes du RER A de Nogent-sur-Marne

www.centre-cired.fr - @cired8568 - **Contacts** : A. Méjean & A. Missemer

Résumé/Abstract :

Natural disturbances such as wildfires routinely affect forest resources, with cascading impacts on the forest sector and its climate mitigation potential. At the sectoral scale, bio-economic models used for prospective analysis are usually deterministic and overlook local disturbance processes. Our objectives are to investigate the implications of changing wildfire regimes for the forest sector and to assess the propagation of different sources of climate-induced uncertainties from the climate system to the forest sector. To retain some degree of genericity while considering the local context, we focus on the regional scale through the example of Southern France, where a strong increase in fire activity is expected. We couple a probabilistic fire model to a spatialized model of the forest sector for which we develop a fire impact module, and we perform multiple simulations until 2100 for different levels of radiative forcing and data from several Global Circulation Models. Fires affect a limited, albeit increasing, share of forest resources every year in a cumulative manner, and their impacts are mostly witnessed in the latter half of the century. Inter-annual fluctuations in fire activity only marginally propagate to the forest sector, and uncertainty in projections is dominated by the choice of forcing levels and climate models in the long-term. Uncertainty due to stochasticity in the fire process, although never predominant, accounts for a sizeable and stable proportion of total uncertainty. Our results highlight the need to consider multiple climate outlooks but also the inherent variability in disturbance processes for long-term prospective analysis with bio-economic forest models.