INITIATIVE ON
Extreme Weather and Climate
COLUMBIA UNIVERSITY

The challenges of modeling fire: climate and CO2 effects can be simulated but human behavior and decisions are unpredictable. FireMIP will help give directions toward progress.

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Recent findings show that agricultural expansion and intensification in savannas are causing declining fire activity while heat waves and droughts have increased fire occurrence in forested areas and mediterranean ecosystems causing vegetation shifts. While research continues to improve climate projections and create scenarios of plausible changes in climate trends and variability, ecologists strive to better understand plant responses to increasing levels of atmospheric CO2 that cause changes in ecosystem carbon and water cycles. Much research is still needed to better understand soil processes and the role of the soil biota in plant adaptation to climate change. Fire modelers are also tackling the importance of human behavior and decisions to better represent a global view of fire effects. The level of uncertainty linked to human actions is much greater since humans are responsible for: fire ignitions in places and at times of year that ecosystems have not been subject to in the past; the introduction of invasive species that cause surface fuel continuity where patchiness prevented fire spread; fire suppression allowing the expansion of fire sensitive species and creating non resilient landscapes; the establishment of fire prone single-species single-aged tree plantations; the expansion of urban wildlife interface ignoring the legacy of fires and causing maladapted management. As climate stress increases and local conflicts force local populations to move, large-scale migrations have started to occur which exacerbates human impacts around the planet. The goal to simulate both natural responses to climate change as well as the role of humans on fire occurrence and effects becomes mostly unrealistic for long term forecast. Priorities need to be clearly delineated in order to both better understand ecosystem responses to changes in the disturbance cycle but also to deliver useful information and tools to land managers and decision makers preparing for the next fire season. The FireMIP group has taken the task to document global fire models and evaluate their reliability by doing extensive comparison with observations and remotely sensed data. The next step is to now identify specific weaknesses and lead the effort to progress toward better models. Their tremendous effort with little funding is commendable and will hopefully lead to a clearer path towards a defined set of directions in fire model improvement and ultimately the development of better tools for world leaders, funding agencies and nautral land managers.