

## **The Impact of Climate Change on Fire Weather as Predicted by a Regional Climate Model**

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Abstract:

This study utilizes the output from regional climate model (RCM) simulations to assess the potential impact of global climate change on future fire regimes in regions of Midwest and the Eastern United States. The climate model simulations are performed at the Eastern Area Modeling Consortium (EAMC) - a part of the Fire Consortia for Advanced Modeling of Meteorology and Smoke (FCAMMS) established under the U.S. National Fire Plan. A MM5-based regional climate model is used to perform several decade-long simulations for the current climate and the future climate of the mid-century over the contiguous United States. These RCM simulations are driven by the global climate model output from the NCAR Community Climate System Model version 3.0 (CCSM3).

The potential fire risk under global warming scenario is assessed by examining the changes in atmospheric properties and processes that can affect the severity of fires, especially those properties and processes that determine the atmospheric boundary layer where small-scale fire-atmosphere interactions are of critical importance. A particular emphasis is given to potential changes in the intensity of the atmospheric turbulence in the low atmosphere. The intensity of boundary layer turbulence, which can be characterized by a quantity called turbulence kinetic energy (TKE), has been shown to be a good indicator of erratic fire behavior. The potential changes in TKE and its production and destruction, are evaluated, together with other boundary layer variables such as stability, dryness, and wind shear using the regional climate model simulation results.