

Utilizing Automated Fire Growth Models To Support Private Industry

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Most wildfire growth modeling is focused on supporting fire operations and suppression. However, many commercial entities ranging from public utilities, transportation, banks and insurance companies all depend on accurate fire predictions to make essential business decisions. Several publicly developed models are available for fire-spread simulations (FARSITE, FlamMap, FSIM), but are too complicated and computationally intensive for rapid simulations of existing wildfires. We describe here a first-principles, 2-D fire spread model based on the Rothermel 1-D fire model. Using fuel and topographic data from LANDFIRE (US Department of Agriculture and US Department of Interior), as well as weather forecasts from The National Digital Forecast Database, we predict the rate of fire spread around the perimeter of an existing fire. We predict future perimeters by iteratively advancing the existing perimeter with a level-set method that is functionally similar to a finite-difference advection algorithm. This model predicts physically reasonable fire behavior (in response to fuel, slope, temperature, wind, and humidity) with computation times (on a PC) that are practical for response-phase decision support. By integrating this model with a streamlined input database, as well as an intuitive, lightweight user interface, this model will provide real-time wildfire forecasts that can be used to drive real-time operational decision making for private industry and others impacted by severe wildfire events.