Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Effect of turbulence on wildfire propagation[1] STEFANO LEONARDI, MARTAND MAYUKH GARIMELLA, UMBERTO CIRI, The University of Texas at Dallas — Wildfires are natural hazards which pose existential threat to humanity and nature. To ensure minimal damage, predictive monitoring systems have been established and are being improved by research. In recent times, numerical fire prediction models have been developed by coupling numerical weather prediction (NWP) models with fire propagation models. However, to minimize computational time, the NWPs are run at a coarser resolution relative to the resolution of the fire models. This gap in resolution is counterproductive as details of small scale interactions, which can lead to extreme events such as crown fires, are neglected. To investigate this effect, large eddy simulations (LES) are performed to propagate a two dimensional fire front using the level-set method which is advanced in time by a third-order Runge-Kutta algorithm. The heat flux generated from the fire is fed back to LES as boundary condition and the effect of buoyancy on wind propagation is included to model a realistic fire weather interaction. From the simulation data, the effects of small scale turbulence structures and change in local atmospheric conditions on fire spread are analyzed. The LES simulation results are compared with the weather research and forecast (WRF) model simulation for wildland fire.

[1]This work was supported by National Science Foundation, grant number 1836505

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Date submitted: 31 Jul 2019 Electronic form version 1.4