Abstract Submitted
for the OSS19 Meeting of
The American Physical Society

Discrete Tree Based Fire Simulation JOSEPH THEISS, NIKLAS MANZ, College of Wooster — Using a cell-based model with a quasi-physical simulation, we simulated the mechanics of heat transfer and buoyancy to observe a fire's geometry and calibrate it to measured values for further testing. We then simulated the results of a fire spread through 4 to 6 trees of constant separation placed on varying slopes to observe the effects of slope on fire propagation. We find that simple fire spread can be characterized by three factors: tree height, tree separation, and slope. Tree height was measured over 5 variations, tree separation was measured over 9, and slope was measured over the range of 90 to 90 degrees in 5 degree increments. Tree separation and tree height both showed to be dependent on regular functions: exponential and linear respectfully. Slope was determined to be a multi-part piecewise function. Further, fire front velocity was highly dependent on the ability and rate of fire to propagate downward on trees, up until a critical angle based on flame geometry.

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Date submitted: 10 Mar 2019 Electronic form version 1.4