



ADVANCES IN FOREST FIRE RESEARCH 2018

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A project to measure and model pyrolysis to improve prediction of prescribed fire behavior

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Abstract

Laboratory and field experiments focused on pyrolysis and ignition coupled with sufficient description of fuel characteristics and physics-based modeling are being used to improve our understanding of combustion processes in mixed (heterogeneous) fuel beds managed with prescribed fire in the southern United States. Previous pyrolysis work has typically used ground-up samples, thus eliminating any effects caused by moisture content, fuel particle shape, or heating mode. We are measuring pyrolysis at bench, laboratory and field-scale using intact fuels from living plants. Pyrolysis products being measured include light gases and tars using off-line and real-time spectroscopic instruments. 3-D fuel description, heat transfer to the fuels, and air flow around the fuels are being determined using a variety of intrusive and nonintrusive methods. The ability of high fidelity physics-based FDS, WFDS, and GPYRO3D to reproduce experimental results and to study conditions outside the range of the experimental data is being examined. This presentation will present an overview of the project and the questions being addressed. Preliminary results from initial attempts to measure pyrolysis at field-scale and results from early modeling of pyrolysis of live leaves using coupled GPYRO3D and FDS models are presented.

Keywords: FTIR spectroscopy, gas sampling, pyrolysis, convection, gas chromatography, flaming, smoldering, wildland fuels