Geophysical Research Abstracts
Vol. 14, EGU2012-12813, 2012
EGU General Assembly 2012

Piloted Ignition Regimes of Wildland Fuel Beds

J.C. Thomas (1), A. Simeoni (1), F. Colella (2), and J.L. Torero (3)

(1) Department of Fire Protection Engineering, Worcester Polytechnic Institute, Worcester, United States , (2) Dipartimento di Energetica, Politecnico di Torino, Torino, Italy, (3) BRE Centre for Fire Safety Engineering, University of Edinburgh, Edinburgh, United Kingdom

Abstract

Pine needle litters, a key fuel in North American and Mediterranean forest systems, are highly porous fuel beds. They provide a source of continuous fuel medium that can be easily ignited and will sustain flame spread in forest fires. This study is a continuation of previous piloted ignition experimentation [1]. Here, focus was drawn to the influence of airflow in a porous fuel bed for three species: Pinus halepensis, Pinus strobus, and Pinus resinosa. Each needle species is characterized by surface-to-volume ratio and density. The tests samples are characterized by the bulk density, porosity and absorptivity. The needles are subjected to an external radiant heat flux using the FM Global Fire Propagation Apparatus. Ignition delay times and surface temperatures were recorded under a range of different test conditions (basket open area, flow conditions and different level of the radiant heat flux). A comparison of the results indicates that the flow condition must be considered for the modeling of such fuel beds. For conditions where the air flow through the sample is blocked a solid like behavior can be observed. The results show that this cannot be granted for open sample baskets. The goal of this study is to understand the effects, cooling and mixing, of airflow through the porous medium on the time to ignition of the sample and aid in the development of new models for characterizing the ignition behavior.

References

[1] A. Simeoni, F. Colella, E. Martinot, P. Bartoli, J.L. Torero. Flaming ignition of pine needle beds. VI International Conference on Forest Fire Research, Coimbra, Portugal, 15-18 November 2010.