

FLAME TEMPERATURE AND WIND SPEED MEASUREMENTS DURING EXPERIMENTAL CROWN FIRES

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ABSTRACT

Wind speed and direction measurements took place around the perimeter of each of the main experimental fires of the International Crown Fire Modelling Experiment, Northwest Territories. Wind was measured at 2-m, 5-m, and 10-m heights at distances of 20 to 30 m from the ignition side and fire exit side and at a control location. Comparisons are made between control tower winds and those at the ignition end of each plot measured during the duration of the burn. Pre-burn and post-burn in-stand winds were also measured in several stands and are compared. Flame temperature was measured from the forest floor up into the canopy in three locations within each of the experimental fires. Measurements were made by fine-gauge thermocouples capable of measuring the duration of flaming at a single point. Vertical variation in flame temperature and flame duration is shown.

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AIR TEMPERATURES AND THERMAL RADIATION MEASUREMENTS IN FULL-SCALE WIND-DRIVEN CROWN FIRES

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ABSTRACT

Spatial and temporal measurements of thermal energy transport from flames spreading through a boreal conifer forest are presented. Peak air temperatures exceeded 1200 °C and flame radiative emissive power reached 250 kW/m². Measurements indicate that thermal radiation is the dominant mode of energy transfer ahead of the flaming front, while convective energy transfer dominates after the onset of flaming combustion. Flaming combustion duration was less than 25 seconds. These measurements were collected from four fire experiments in Canada's Northwest Territories. These data are pertinent to current and future fire modeling efforts and clearly indicate the magnitude of temperatures, energy fluxes that can be expected in such vegetation types.

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