

Landscape estimates of heat release from prescribed fires: analysis and calibration of infrared imagery from aircraft

RESULTS FROM SMALL PLOT EXPERIMENTS



Overhead Video/IR/Gas sensing package



Ground sensors and fiducial markers

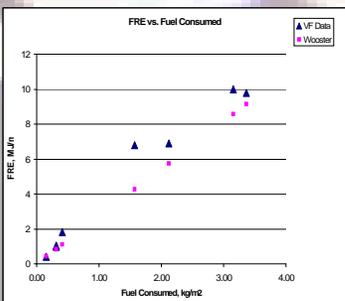


Gas detectors installation during experiment set-up



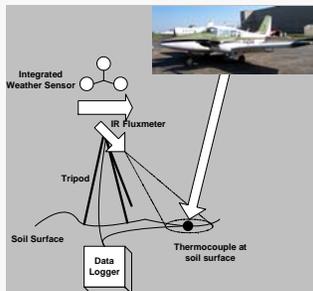
Experiment underway in Eastern Hardwood fuel

RADIANT FLUX IS PROPORTIONAL TO FUEL CONSUMPTION FOR EASTERN HARDWOOD FUEL TYPES



Integrating the detector flux output during the fire (using the method above), we produce a measure of the total radiant energy emitted by the fire (FRE). In this slide, we compare the FRE from our experiments with a model derived from experiment (M. Wooster et al) for similar fuel types.

RESULTS FROM LANDSCAPE SCALE EXPERIMENTS

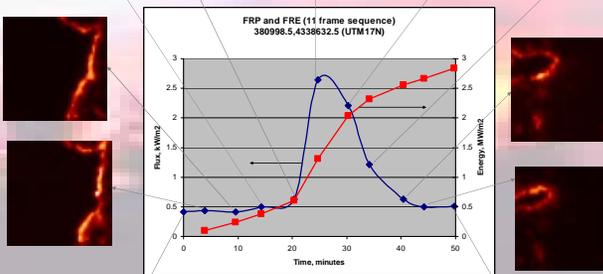
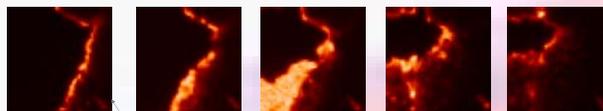


Overhead images are calibrated using in-fire 'flux towers'



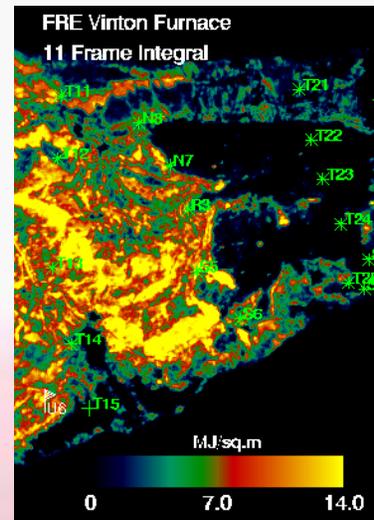
A flux tower being dmoved after the experiment

TIME SEQUENCE SHOWING FIRE EFFECTS



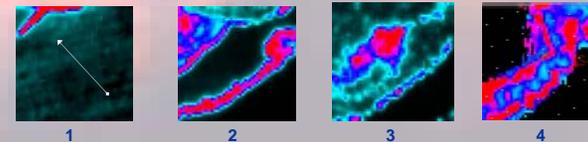
The graph shows the flux for the center pixel (as a function of time) in each frame. The graph also shows the total radiant energy release.

11-FRAME INTEGRATION SHOWING TOTAL RADIATED ENERGY RELEASE (FRE)



The calibrated image to the left is the radiated energy from a prescribed fire at Vinton Furnace, OH. In-scene calibration was used. Eleven frames were time-integrated to produce this image. We have removed the effect of the warm earth surface (~ 310K) in this image. The field shown is 150 X 400 m. The green asterisks indicate the positions of sampling plots and the white flag locates the position of the calibration flux tower.

TIME SEQUENCE SHOWING FIRE BEHAVIOR



- A detail of the data set showing fire motion in a successive frames.
- 1 – Upper drip torch line. Slope direction is shown with an arrow (head uphill)
- 2 – Lower drip torch line + upper line backing down hill.
- 3 – Upper and lower torch lines progressing and coalescing around station U3
- 4 – Integrated output (sum of many frames) and annotations.