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

RESULTS FROM SMALL PLOT EXPERIMENTS

RESULTS FROM LANDSCAPE SCALE EXPERIMENTS

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.

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.

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.

TIME SEQUENCE SHOWING FIRE BEHAVIOR

A detail of the data set showing fire motion in a successive frames. The center of the image box contains the flux sensor package U3

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.