

Analysis of Tracer Dispersion Data and Pollutant Emission Rates during a Prescribed Fire Event

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Objective

In order to avoid catastrophe wildfires, federal land managers are implementing wide spread prescribed forest fires in many regions of the country. Air quality management issues with these prescribed fires include visibility impact, health and visibility impacts due to elevated particulate matter, and increases in regional ozone due to VOC and NO_x precursor emissions from fires. To investigate these issues, WSU is a partner with the US Forest Service and San Jose State University in a field program to measure smoke dispersion rates and pollutant emissions from prescribed forest fires. The objective of this REU project is to analyze the data from the first prescribe fire field study, conducted in Feb, 2010 in North Carolina, and to develop estimates of smoke dispersion rates and pollutant emissions for this case study.

Preliminary Training

The analysis will involve spreadsheet type calculations and graphics which can be performed using Excel or a more powerful package such as IGOR. Igor is a powerful program, but has a somewhat steep learning curve. The REU researcher will be introduced to the experimental design and the specific instruments used in the study as background information.

Project Tasks

1. The first task will be to inventory all of the data files from the various measurement systems and to make decisions about the preferred analysis approach in each case.
2. Initial analyses will include graphing time series of all of the data. This will include quality assurance of the data and initial investigation of patterns and correlations in the results.
3. Smoke dispersion rates will be investigated using a combination of the SF₆ tracer and pollutant concentration data. Vertical and horizontal profiles of these species will be used to estimate plume spread and lift that occurred during the course of the burn.
4. Pollutant emission patterns and rates will be derived from the concentration measurements using ratio of species and other mass budget methods.
5. A poster will be prepared summarizing the results for the end-of-summer symposium.