4-14

Assessing Values of Air Quality and Visibility at Risk from Wildland Fire

Principal Investigators:
Sue A. Ferguson, Tel. *206-553-7815*, Email. *ferguson@dorothy.cfr.washington.edu*, or *sferguson/r6pnw_seattle@fs.fed.us*
David V. Sandberg, Tel. *541-750-7265*, Email. *sandberd@ccmail.orst.edu*, or *dsandberg/r6pnw_corvallis@fs.fed.us*
Richard W. Fisher, Tel. *970-498-1232*, Email. *rfisher@lamar.colostate.edu*

Summary:

The primary objective of this work is to assess the local, regional, and national risks to air quality and visibility from wildland fire. A secondary objective is to make available maps and data layers to all users so they can assess potential dispersion as it relates more specifically to their management concerns and so the data can be linked with other data layers or models for more complete views of associated risks from wildland fire.

To accomplish our task, we define risk to air quality and visibility on the basis of dispersion potential alone, which is a product of surface wind and mixing height. This avoids the cumbersome task of estimating gas and particle concentrations and their relation to air quality and visibility, which can be full of inaccuracies. Also, we are deriving a methodology to define dispersion potential at fine spatial scales during both day and night, a task for which mesoscale models have great difficulty. Therefore, the information not only can be used on its own for risk assessments but can enhance model assessments by providing greater detail where needed.

Forty years of data are being generated twice each day at 5 km for the United States and at 1km resolution for selected sub domains. The statistical summaries as well as mapped means and extremes will be available for the risk assessment. Dispersion probability for each month, for each day of the year, and for each time of day (morning or evening) will be calculated.

Current Status (September 1999):

1. Selected upper-air data in the United States have been compiled for input to the wind model and for evaluation of mixing heights and inversion levels.
2. Surface wind observations and historical inversion and mixing height studies have been compiled to help verify statistical and mapped outputs.
3. We purchased and installed a state-of-the-art, high-speed computing system and modified our programs to run in parallel processing mode.
4. We developed a simple method to estimate the height and strength of nighttime temperature inversions in basins and valleys using a physical algorithm and GIS tools. Also, an experiment was conducted in Alaska and results compared well with the inversion algorithm.
5. We adapted a surface wind model to operate over long time periods and large domains, fixing several original coding errors and improving lapse-rate calculations. Two years of data were generated for a region of the U.S. and successfully compared to surface wind observations. Forty years of wind and mixing height data currently are being generated for the Pacific Northwest. In addition, the domain and input data are being initialized for a region in the southeastern U.S. that includes Georgia, Florida, and South Carolina.
6. A user group of fire and smoke managers is being identified, display software has been purchased, and an interactive web site is being designed to test products for their value in assessing risks to air quality and visibility and in assisting with land-management plans.