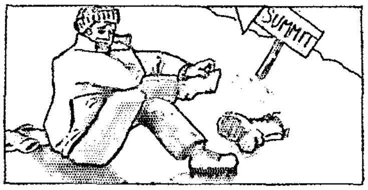
## MONITORING ITCHY AND SCRATCHY

**Have you noticed a persistent itch recently that just cannot be scratched away? Well, you're probably living in one of the America's itchiest cities, as determined by the University of Delaware's Center for Climatic Research and the Lanacane Itch Information Center.[SM] Together, they release a daily index that ranks the itchiness of cities throughout the country in four categories ranging from "high concern" to "minimal concern." The rankings are determined by evaluating relative humidity, temperature, and wind information. Cities that have a relative humidity of below 20% for more than three consecutive days are most liable to be areas of "high concern." Not surprisingly, high-altitude cities tend to be the itchiest. Denver, Colorado, Albuquerque, New Mexico, and Flagstaff, Arizona, are among the locations that are consistently in the "high concern" category.**



Sarah Rodrigo

focused on Philadelphia, and the analysis will soon be extended to include Detroit.

Our general approach involves using a mesoscale atmospheric model (the MM5) to simulate historical weather conditions associated with oppressive air masses. We first establish base-case control simulations and then model the same episodes using modified surface characteristics associated with various levels of citywide implementation of UHI mitigation. Our findings suggest that increasing urban albedo by 0.10 can lead to large regions of air temperature depressions averaging 0.5°C over much of the day. Higher levels of mitigation are possible and are expected to correspond to even more significant temperature depressions.

The modeled differences in urban meteorology are added to the observational data corresponding to each episode and used in conjunction with models relating oppressive air mass characteristics to health. In our approach, air masses are identified using a variety of statistical procedures. The resulting airmass identification scheme places each day within a particular airmass type and permits identification of those air masses historically associated with elevated human mortality. The specific airmass categories are dry polar, dry temperate, dry tropical, moist polar, moist moderate, and moist tropical (a particularly oppressive subset of moist tropical is most responsible for excess deaths). By linking the meteorological model output with the Spatial Synoptic Classification system, we hope to project how large-scale mitigation of the urban heat island might impact the frequency of oppressive air masses and associated heat-related mortality rates.—David J. Sailor (Tulane University), Laurence S. Kalkstein, and Eva Wong. *"The Potential of Urban Heat Island Mitigation to Alleviate Heat-Related Mortality—Methodological Overview and Preliminary Modeling Results for Philadelphia" (Fourth Symposium on the Urban Environment).*

### Land Surface Parameterization Effects in Inland Tropical Storm Simulations

Do land surface processes and land–atmosphere interactions matter even for synoptic weather events such as tropical storms? This is the focus of our ongoing investigation. Traditionally land–atmosphere interactions have been considered important under weak synoptic conditions. However, there is growing evidence that with finer grid spacing in numerical models, the ability to simulate fine scale features and hence the structure and intensity of land–atmosphere feedback becomes more important.

We compared the performance of the MM5 using two different land–atmosphere schemes to understand the importance of land surface processes and land–atmosphere interactions in the mesoscale and synoptic-scale weather associated with Tropical Storm Allison's (2001) movement through North Carolina from 15 to 18 June 2001. Two sets of simulations were performed. The first employed the Oregon State University land surface model coupled with the MRF PBL scheme, while the second simulation was completed using the Pleim–Xiu land surface model coupled with the asymmetric convective model. We used three nests (with 5-, 15-, and 45-km grid spacing) with one-way interaction between the respective domains and integrated the simulations for the 72 h until 0000 UTC 18 June 2001. Results from the two simulations were compared with several surface and remote sensed observations and analysis.

The results indicate that the representation of model land–atmosphere interaction is important even for simulating synoptically driven events. Land surface processes will modulate the evolution of surface fluxes, which in turn drive both the structure and dynamics of mesoscale and synoptic-scale weather phenomena. Indeed if these modulations were important only for synoptically weak weather events, the two simulations developed under this study would yield similar results for boundary layer height, surface heat fluxes, precipitation patterns, and surface temperatures. This study shows that the model simulation of the inland TS structure and intensity could differ significantly based on the land–atmosphere interaction represented in the model.

Future efforts are needed to review the role of different land surface models (coupled to the same boundary layer scheme) and their ability to simulate the structure and intensity of tropical systems particularly as they approach landfall or are already traveling inland.—Peter P. Childs, Dev dutta S. Niyogi, Sethu Raman, Aaron Sims, and Matthew Simpson (North Carolina State University). *"Effect of Two MM5 Land Surface Parameterizations on an Inland Tropical Storm Simulation" (25th Conference on Agricultural and Forest Meteorology).*

## Investigating Super-Fog

Forest and agricultural fires release chemical compounds and particulates into the atmosphere. Although most of this material reduces visibility through haze and reacts with other atmospheric pollutants, sometimes smoke is trapped locally and combines with water vapor to cut visibility to zero. This "super-fog" (smoke/fog) threatens drivers when it drifts over roadways—a problem in the South, especially at night.

Although dense smoke/fog has been implicated in many traffic accidents, especially multiple car pileups, there are no empirical observations of super-fog. Super-fogs tend to occur just before dawn at remote locations. This has led some to question the existence of super-fog. Multicar pileups can be explained by driver behavior in ordinary, local ground fogs. However, testimonials from accident victims and from officers at accident scenes are sufficient to stimulate research to predict smoke movement near the ground at night under entrapment conditions.

Two smoke models designed to simulate the movement of smoke near the ground at night on the scale of an average prescribed burn are being developed. Prescribed Burn (PB) Piedmont simulates smoke movement over terrain typical of the Piedmont of the southeast. PB-Coastal Plain, which simulates smoke movement over the flat coastal plain, also includes circulation induced by differences in land use and land/water surfaces.

Field data are needed to validate the smoke models. Figure 1 shows super-fog observed from an aircraft approximately 1500 m above a stream valley in western Alabama at nighttime. The super-fog was inadvertently produced during a test burn. Fifty bales of hay were soaked in diesel fuel, ignited, and then extinguished with water to produce copious amounts of smoke. Reflected light from the full moon was observed with a video camera equipped with a light-enhancing device. Observers at the ground encountered super-fog with zero visibility—meaning they were unable to see beyond the hood of their vehicle. Though traveling on a narrow, tree-lined service road, they were unable to see the trees and drove off the road.—Gary L. Achtemeier (USDA Forest Service). *"Super Fog – A Combination of Smoke and Water Vapor That Produces Zero Visibility over*

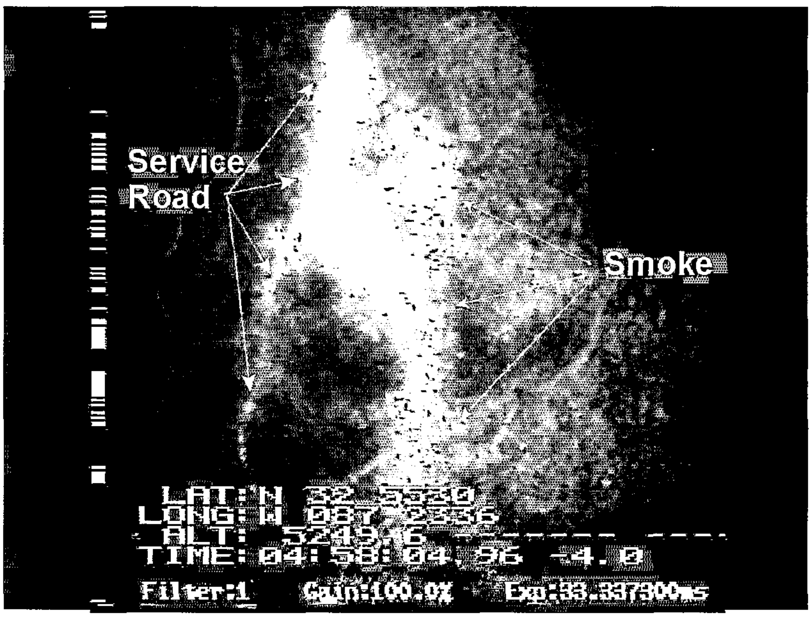



**Fig. 1. Video image of entrapped smoke and fog (super-fog) within a stream valley located on the Oakmulgee National Wildlife Refuge on the Talladega National Forest near Tuscaloosa, AL. Image taken at an elevation of approximately 1500 m AGL at 2258 CST, 20 Mar (0458 UTC, 21 Mar) 1997.**