ASRC Focuses on Ups and Downs of Hudson Valley Weather

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Jeffrey M. Freedman, Ph.D. '00 points out a location on a relief map of the Hudson Valley. Looking on are Matt Czikowsky, M.S. '05; HVAMS co-investigator David Fitzjarrald; Otavio Acevedo, Ph.D. '01 (partially visible); and Alex Tsoyref.

by CAROL OLECHOWSKI

The ups and downs of weather in the Hudson Valley are the focus of a research project led by scientists at the University at Albany's Atmospheric Sciences Research Center (ASRC).

The Hudson Valley Ambient Meteorology Study (HVAMS), funded by the National Science Foundation (NSF), aims to shed new light on the physical mechanisms that lead to differences in weather and climate in the Hudson Valley. ASRC Research Professor **DAVID R. FITZJARRALD** and **JEFFREY M. FREEDMAN**, Ph.D. '00, are working with colleagues, students, and alumni on the project.

A better understanding of valley wind flows will serve as an important resource to those who aim to predict pollutant dispersal, said Fitzjarrald. The researchers also anticipate that, in addition to serving as the basis for future studies, the information they obtain and analyze during the project will prove valuable to anyone seeking "an understanding of what causes large variations in climate over small distances in the valley."

The study's first phase, an intensive field operation, was conducted in September and October by UAlbany researchers working with scientists and technicians from the University of Wyoming; the National Center for Atmospheric Research (NCAR); the National Oceanic and Atmospheric Administration (NOAA); the University of Alabama, Huntsville; the National Weather Service Forecast Office at Albany; and the Schenectady and Kingston-Ulster airports. The team used an array of sophisticated equipment, including a King Air aircraft, automated weather stations, a tethered balloon, a radar wind profiler, and a remote sensing instrument suite to gather data. "ASRC will also operate five weather stations and a 60-foot tower that measures exchanges between the surface and the lower atmosphere. These measurements will continue for two more years," said Fitzjarrald.

During the study's second phase, "all ancillary sources of weather data acquired for the Hudson Valley region will be put into the project database, and detailed analyses of the considerable data obtained during the first phase will be made. The goal is to provide a context for the 'snapshots' that the brief period of intensive operations provides."

According to Fitzjarrald, the project grew out of two earlier ASRC field studies and several papers. "In 1982, the late Dr. J. Jiusto and Dr. G.G. Lala, ASRC's current associate director, organized FOG-82, a study of radiation fogs in the Hudson Valley. A network of surface stations was deployed, and detailed vertical soundings of the lower atmosphere were made. After Dr. Jiusto's untimely death, I joined the ASRC and began work with the FOG-82 data." The result was the 1989 Fitzjarrald-Lala study of how the Hudson Valley channels the wind and how local circulations affect the small-scale variability of temperature, wind, and humidity, or the microclimate.

For another study in 1993, "ASRC took advantage of the Educational Initiative of the University of Wyoming," Fitzjarrald continued. "In this project, graduate students at UAlbany planned and carried out a series of flights using the University of Wyoming's King Air research aircraft, one of the most capable such craft available." Two of those students, Freedman and **RICARDO SAKAI**, earned their doctoral degrees in 2000. Freedman, founder of the consulting firm Atmospheric Information Services (AIS), is HVAMS co-investigator. Sakai, now an AS&E research scientist, is also among the HVAMS researchers.

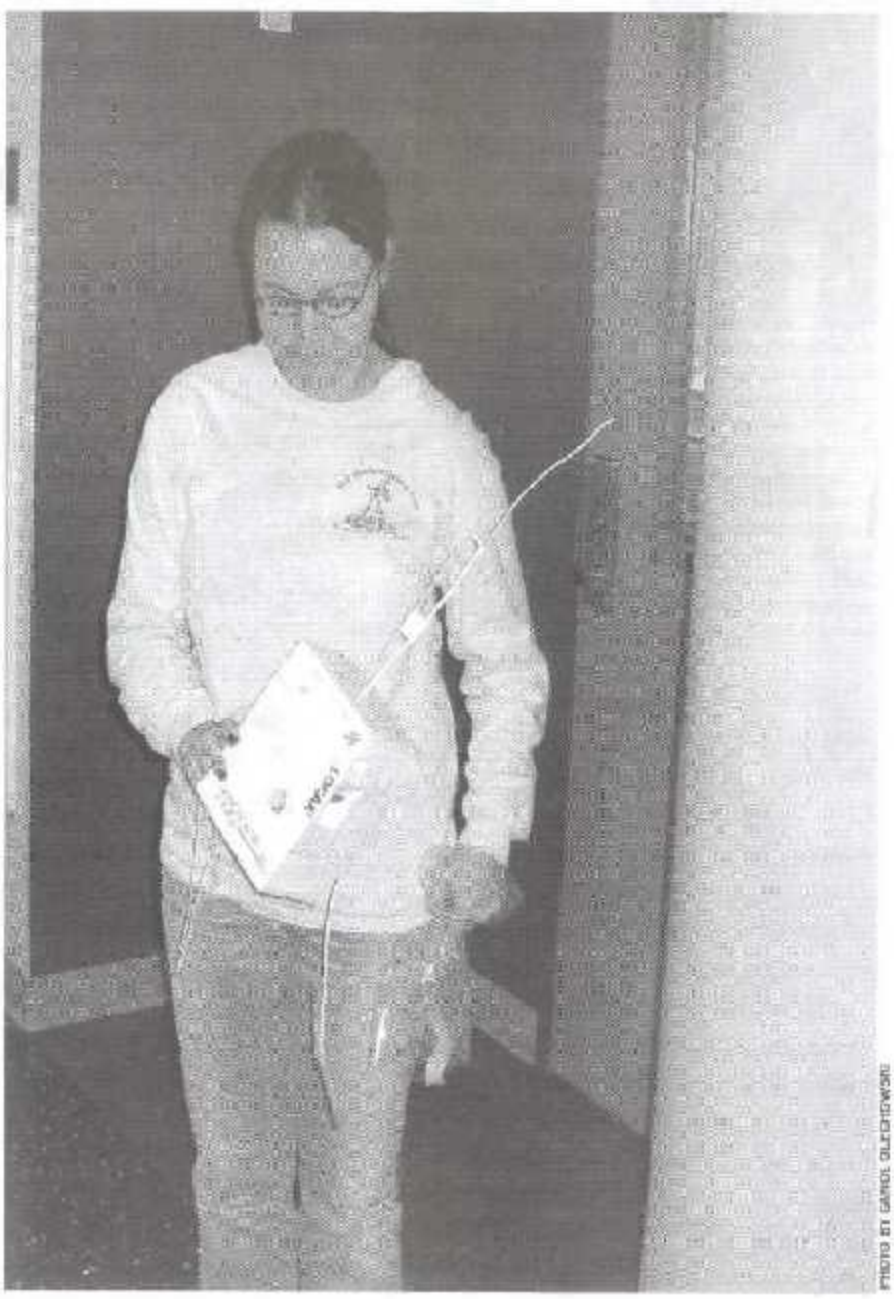
Other UAlbany participants include technician **ALEX TSOYREF**; **MATT CZIKOWSKY**, M.S.'03, project assistant **JESSICA NEILES**, B.S.'03; and undergraduates **JASON HERB**, **KIM SUTKEVICH**, and **AARON FEINBERG**, who are involved in data analysis and management, as well as in helping to maintain sensors in the field. Three collaborators from the University of Santa Maria in Brazil — all of whom have ties to UAlbany — are also involved in the project. They are **OSVALDO MORAES**, a postdoctoral visitor to UAlbany in 1990; **OSVALDO ACEVEDO** Ph.D.'01; and **RODRIGO DA SILVA**, a visiting graduate student.

Topography and land use affect microclimate, which Fitzjarrald defined as "the small-scale deviations of wind speed and direction, temperature, and humidity that owe to the characteristics of a particular site. Hills and depressions; vegetation cover, such as tall trees, shrubs, grass; an urban setting; and such factors as how well the surface reflects incoming sunshine" must be taken into account when gathering and analyzing the HVAMS data. Winds are typically channeled along the valley axis. There is little information now available about the depth and intensity of these channeled flows in the Hudson Valley, particularly at night.

From New York City northward, "more than 12 million people live along and adjacent to the Hudson Valley," Fitzjarrald said, making it a fertile research venue for the team. "The unique meteorological characteristics should be considered when evaluating the sites of new power plants or other potential sources of airborne emissions. HVAMS will obtain temporal and spatial measurements sufficient to accurately resolve the local circulations affecting diffusion and transport of locally generated and imported pollutants."

The $625,000 NSF grant supports the intensive and long-term field observations, data analysis, and modeling for a period of three years. "The project is using another $400,000 from the NSF Facilities Deployment Pool for the aircraft, NCAR stations, and other equipment," added Fitzjarrald.

Jessica Neiles '03 demonstrates a device that measures temperature, relative humidity, and other data to be analyzed in the HVAMS study.



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