



University of Illinois: Air Quality Research

UNIVERSITY OF ILLINOIS AUTOMATES STUDY OF AIR FOR POTENTIAL INFLUENCE ON GLOBAL CHANGE

As part of a long-term global research program, the University of Illinois at Urbana-Champaign (UIUC) is studying ambient aerosols that can potentially counteract global warming caused by greenhouse gases. Dr. Mark Rood and Christian Carrico, air quality engineering specialists in the University's Environmental Engineering and Science Program, are leading the research effort. The team is using a "humidograph" for studying the optical properties of atmospheric ambient aerosol particles at select regional locations: Bondville, Illinois, a continental polluted site; Cape Grim, Tasmania, a clean marine Southern Hemisphere site; and at Sagres, Portugal, where air masses arrive from the European and African continents and are transported over the North Atlantic Ocean.

"Studying ambient aerosols is an important step to a better understanding of the chemistry and physics of the atmosphere and how the atmosphere changes," says Dr. Rood, who has studied air quality issues for the last 15 years. Aerosol particles can potentially influence global change by scattering and absorbing energy from the sun as it radiates through the atmosphere. The aerosol's size and composition determines its ability to scatter and absorb light. Particles that scatter light can potentially counteract global warming caused by greenhouse gases.

The humidograph samples ambient air and uses temperature and relative humidity control for studying light scattered by atmospheric particles. The humidograph is automated by HP hardware and software. HP B-size VXI instrument cards are used for process control and data acquisition. HP VEE is a PC-based visual programming language used for developing test-and-measurement applications. It has helped reduce users' test development by up to 80 percent.

Business Issues/Challenges

Analyzing aerosol particles with a humidograph can yield important, and possibly critical, information in the area of climate change. In

order to reliably acquire data to characterize each site, Dr. Rood and the research team need a reliable and user-friendly method of instrumentation control and data acquisition.

Solution/Benefits

For a solid data acquisition process, the team automated the humidograph by interfacing the HP B-size VXI and HP VEE with a 486-based PC to run continuous tests. The team collaborated with the UIUC Electrical and Computer Engineering Department, who also use HP VXI hardware and HP VEE software.

"Automating the humidograph improves our confidence, reliability, and ability for continuous sampling for weeks to months at a time for characterization of aerosol properties at each site," says Dr. Rood.

"We can also sample nearly 20 detectors and control relative humidity and temperature at about five points in the humidograph at a rate of 0.5 hertz. Troubleshooting is much easier because of these capabilities," he adds.

Eventually, Dr. Rood will make those measurements available as inputs to global climate models. At this point, however, he and the research team are focusing on refining sampling and measurement techniques with the humidograph, and interpreting and integrating the results obtained to date.

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