

MU RECEIVES NSF GRANT TO PROBE THE ATMOSPHERE – VIRTUALLY

At last count, 87.1 million people were gaming online in the U.S., most of student age. While most of the 2,000-plus online games are designed primarily for entertainment, there are many that use this technology as effective supplements to traditional learning. Some include sophisticated visualizations that attempt to synthetically simulate real-world environments, but only a handful immerse the users in real data for an authentic experience, and these visualizations are generally limited to the use of canned data targeted for specific learning scenarios. However, 3-D visualizations of real-time atmospheric data, including gridded output from weather models, are commonplace in the meteorology community. With that in mind, three Millersville researchers set out with the goal to develop a virtual experience that will allow students to immerse themselves and to navigate within real and current data while being guided by a tiered instructional design strategy. The researchers envision that this will lead to enhanced learning and discovery.

Drs. Gary Zoppetti, computer science and Sepideh Yalda and Richard Clark, both from earth sciences, recently received \$350,000 from the National Science Foundation Division of Information and Intelligent Systems-Advanced Learning Technologies Program (NSF-IIS-ALT) to develop a "plug-in," that will provide a student with the ability to explore real-time data interactively at the controls of their personal virtual platform. The project is called "Geosciences Probe of Discovery." "Working with a team of undergraduate students, we will collaborate on the development of a software module that implements an interactive, intuitive interface called the "GEOpod," explained Clark. The GEOpod allows students to probe a 3-D immersion world of authentic geophysical data and use virtual devices to collect data and record observations, while guided by an instructional approach that can be customized for individual learners."

The GEOpod team plans to build and release successively more sophisticated and visually enticing beta-versions of the GEOpod, culminating with the global release of a plug-in that can be installed with an existing open-source application called the Integrated Data Viewer (IDV), developed by software engineers at the Unidata Program Center in Boulder, Colo. IDV is currently being used for 2-D and 3-D visualization of the atmosphere by thousands of students at the 100-plus U.S. universities that offer programs in atmospheric and related sciences and is making inroads at universities and operational meteorology centers throughout the world.

LINKED ENVIRONMENTS FOR ATMOSPHERIC DISCOVERY (LEAD)

Millersville University was one of eight institutions that participated in the NSF-funded project called Linked Environments for Atmospheric Discovery (LEAD). This \$11.25M, 5-year initiative also included scientists and engineers from the University of Oklahoma, Colorado State University, University of Alabama-Huntsville, University of Illinois Urbana-Champaign, Indiana University, Howard University, and the University Corporation for Atmospheric Research - Unidata. LEADs mission was to enable an integrated, scalable framework for use in accessing, preparing, assimilating, predicting, managing, mining/analyzing, and displaying a broad array of meteorological and related information, independent of format and physical location.

Drs. Sepideh Yalda and Richard Clark of Millersville University served as principal investigators responsible for the identification, organization and management of educational testbeds made up of undergraduate students, pre-service teachers, and high and middle school teacher-partners, whose efforts will involve testing, implementing, and integrating the proto-technologies developed by partner institutions into user productivity environments that are scalable and extensible to undergraduate education and research, pre-service science teaching, and high school and middle school science curricula.

WINTER STUDY...

Wintertime Study of Airborne Particles using the Millersville University Tethered Atmospheric Sounding System in Support of MANE-VU

Millersville University (MU) conducted a field study of aloft and surface airborne particulates in January 2004. Two tethered blimps were deployed simultaneously, one to conduct vertical profiles of the atmosphere to an altitude of 1000 meters, and the other to obtain 10-hour time series of variables at constant altitude. Dr. Richard Clark was awarded \$50K from the Northeast States for Coordinated Air Use Management (NESCAUM) to conduct this air quality study, believed to be the first wintertime project of its kind. The project involved about 20 undergraduate students, the majority from the meteorology program but also a few chemistry majors too, who provided the necessary on-site research assistance and post-analysis. Aloft measurements will include air temperature, air pressure, relative humidity/specific humidity, wind speed and direction, aerosol particle

concentration, integrated PM_{2.5} dry mass, and total scattering as a proxy indicator of particulate matter (PM) concentration. A full suite of surface-based instruments monitored the same variables, as well as CO, O₃, SO₂, and NO/NO₂/NO_x concentrations and total and backscatter coefficients. Concurrent with the field study, students at Millersville University archived meteorological field variables generated using the new WRF modeling system, observational data and imagery, and back trajectories to later assist in the analysis and interpretation of field observations.

LARGE-SCALE GLOBAL ATMOSPHERE-OCEAN INTERACTIONS

Dr. Sepi Yalda investigated the effects of large-scale global atmosphere-ocean interactions on local and regional variability over the period of 1950-present. This study focused on the various large-scale cycles that can potentially alter and dominate the local and regional temperature and precipitation patterns. This study was funded by a grant from the Millersville University Environmental Institute/Lancaster Environmental foundation.

M.U. PERFORMS 5-YEAR PRECIPITATION MONITORING

MU Meteorology entered a partnership with the National Atmospheric Deposition Program (NADP), the Mercury Deposition Network (MDN), and the PA-Department of Environmental Protection (DEP) to monitor the chemical makeup and mercury content in precipitation. Dr. Richard Clark and a select group of meteorology and chemistry students committed to collecting weekly precipitation samples from standardized collection units located about 1.5 miles west of Millersville for a period of at least five years. New students were brought into the program as others graduated. Over the lifetime of the project, about 30 students were exposed to the techniques of sampling and chemical analysis of precipitation.

NORTH-EAST CORRIDOR OXIDANT AND PARTICLE STUDY (NEC-OPS)

Millersville Meteorology participated in the three-year North-East Corridor Oxidant and Particle Study (NEC-OPS). Along with researchers from Harvard and Penn State, Dr. Richard Clark led a group of MU researchers who used our Tethered Balloon to gather air samples up to 1000 feet.

SOUTHEAST PENNSYLVANIA LIGHTNING CLIMATOLOGY

Dr. Alex DeCaria used data collected from the National Lightning Detection NetworkTM over a seven-year period (1995 - 2001) to construct a preliminary lightning climatology for Lancaster County and Southeastern Pennsylvania. Correlations between lightning strike density and geographic factors were explored using Geographic Information System technologies.