

Strong mentors key to undergraduate research experiences

by Nicole Gordon

In August, the *Chronicle of Higher Education* published a review of several studies on the experiences of undergraduates doing science research. In particular, the studies tested the commonly accepted belief that undergraduate research opportunities attract students to science careers and make them better candidates for such work.

The conclusion? "They [the studies] found that undergraduates learn and grow significantly from their research experiences, but require a strong mentor relationship to do so," according to the review ("What Good Is Undergraduate Research, Anyway?"; August 17, 2007).

The studies acknowledge that quality mentoring of undergraduates requires a major time investment from scientists and faculty members, and that sometimes the costs of working with students can outweigh benefits to mentors' own research. Yet, dedicated mentors and authentic research experiences produce the best results, they emphasize.

Although the studies are new, they lend data to something that leaders of SOARS and RESESS have known intuitively for years: of all the different resources these programs offer their protégés, effective mentors are most likely to leave lasting



Ezer Patlan with UNAVCO polar engineer and project mentor Seth White working on a polar remote power and communication system

impacts. Both SOARS and RESESS mentors consistently report that they themselves benefit from giving their time, as they find mentoring rewarding and fun.

"It gives me a feeling of satisfaction to be able to introduce a student to aspects of science that he or she hasn't experienced before," says Steve Massie, a scientist in NCAR's Atmospheric Chemistry Division

who has served as a SOARS research mentor at least a dozen times. "In a ten-week program, students can do a reasonable problem and get usable results."

"It's a joy to see how by the end of the summer, protégés have succeeded in conquering a pretty steep learning curve."

Mentoring has boosted Steve's own research as well, even leading to published results on a few occasions. "It gives me the freedom to try a problem that I normally wouldn't have time to do, or to try something I haven't done before," he says. "I'm able to do enough work with the student in a ten-week period to decide if something is worth pursuing further."

Experience has shown over time that time, indeed, is Steve's biggest challenge; the ten weeks of SOARS pass quickly. He's careful to warn protégés that a SOARS summer can feel like a rollercoaster at times. To alleviate some of the pressure, he works closely with protégés to select projects that are manageable within the given time period. (cont. on pg. 4)



Protégé Marcus Walter (middle) with mentors Barbara Brown and Rick Katz

Helping hands

by Rebecca Haacker-Santos

In January, a number of SOARS protégés contributed to rebuilding one of New Orleans' neighborhoods and witnessed first hand the impact of Hurricane Katrina. Ten SOARS protégés and SOARS staff participated in a day-long volunteer effort with Habitat for Humanity, organized as part of the 88th Annual Meeting of the American Meteorological Society (AMS). Along with other AMS members, SOARS protégés and staff worked on houses for the new upper ninth ward neighborhood, Musician's Village, providing housing for many of the local musicians who lost their homes during Katrina. Two more protégés worked in St. Bernard Parish, which had been flooded completely during Katrina. Armand Silva summarized his experience. "I always wanted to help in some way to rebuild New Orleans, so this was a perfect opportunity for me. Arriving at Musician's Village was a bit daunting and confusing for me at first, considering I had never



Armand Silva, McArthur Jones, Theresa Aguilar, Shanna-Shaye Forbes and Cecille Villanueva (clockwise) volunteering for Habitat for Humanity

built a house before, or really anything for that matter. But once I got the hang of whatever small tasks I had to do, it turned out to be a rewarding experience.

I definitely left with the satisfaction that I did my small part to bring back such a special place." ■

SIGNIFICANT OPPORTUNITIES IN ATMOSPHERIC RESEARCH AND SCIENCE

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PRODUCTION

Writing: Susan Eriksson, Nicole Gordon, Rebecca Haacker-Santos, Raj Pandya
 Editing: SOARS staff
 External Review: Tim Barnes
 Photos: UCAR
 Design: Nicole Brinn, Core Design Works, Inc
 Distribution: Lena Miller

SOARS Program Office

University Corporation for Atmospheric Research
 P.O. Box 3000
 Boulder, CO 80307
 Phone: 303-497-8622
 E-mail: soars@ucar.edu
 www.soars.ucar.edu

RESESS Program Office

UNAVCO
 6350 Nautilus Drive, Boulder, CO 80301
 Phone: 303-381-7466
 www.reseSS.unavco.org

Subscriptions: Contact SOARS Program Office

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NEWSLETTER

SPRING 2008

A note from the director: Susan Eriksson

This spring, you'll notice some difference in what has been, until now, the SOARS newsletter. About three years ago, SOARS and Research Experiences in Solid Earth Science for Students (RESESS) entered a partnership designed to support the emerging program. Originally, our plan for working together was for three years, and it was intended—partly at the behest of the National Science Foundation—for SOARS to mentor the RESESS program.

It turns out that the National Science Foundation put together a relationship that grew and matured with time. It has moved from a mentoring relationship to one of peer programs. This summer marks our fourth year together, and in celebration of our collaboration, this issue is the first joint SOARS/RESESS newsletter.

Raj and I recognized early on that having a group of students in atmospheric science and solid earth science would provide a stimulating and supportive community for these students, now and in their future careers. We are both passionate about our work in broadening participation in

geoscience, and working together, we are more effective advocates in building awareness of the advantages of a diverse geoscience workforce. When one of us makes a mistake (usually Raj...just kidding), we can help the other program avoid the same mistake. Finally, in an era in which science is increasingly interdisciplinary, the opportunity for our students to interact with other geoscience disciplines is a valuable preparation for the future.

Raj and I often talk about what our own institutions are doing to support research. This recently led to expanding existing collaborations between UCAR and UNAVCO. UNAVCO became part of UCAR in 1991. Even after separating from UCAR in 2001, our partnership continued through the years in SUOMINET. Based on informal talk between Raj and I, recently the UCAR program COSMIC, the UCAR Africa Initiative and UNAVCO administration met to talk about new initiatives such as joint atmospheric and earth science applications of GPS in Africa. This exemplifies one unintended benefit of the SOARS and RESESS partnership.

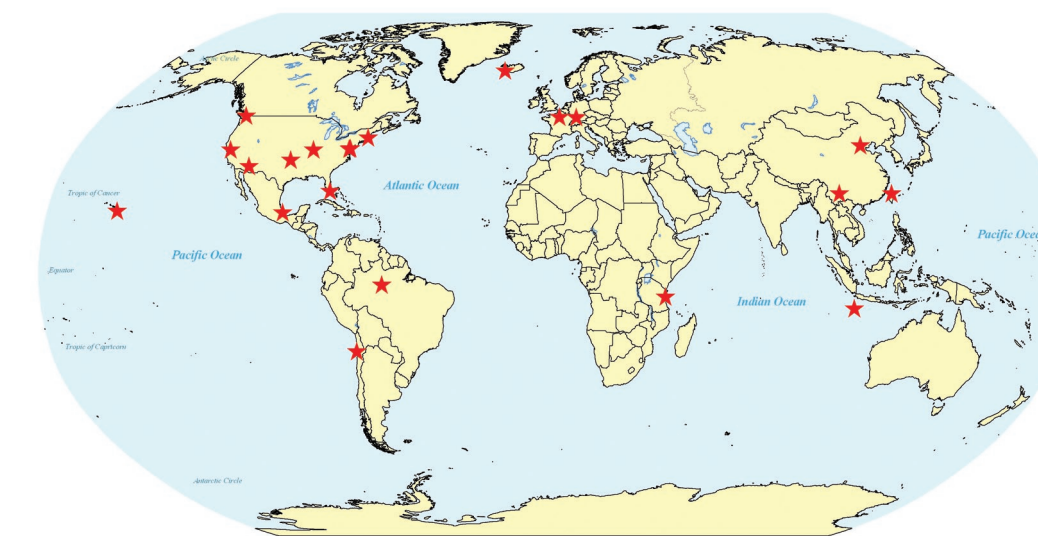


Rajul Pandya and Susan Eriksson

John Braun, COSMIC scientist and SOARS mentor, recently spoke to geodesists at the 2008 UNAVCO Science Workshop about the new advances in atmospheric science and GPS. One UNAVCO emphasis is the monitoring of earthquakes and associated tsunamis using real time GPS data. Additionally John spoke of 'now-casting' weather! It is clear that our SOARS and RESESS students will have new opportunities to work on the interdisciplinary science that these programs support. Here's to productive partnerships! ■

SOARS-RESESS Summer Research Sites 1996-2008

Many SOARS and RESESS protégés have had the opportunity to work on their research at locations across the globe.



The SOARS program is administered by the University Corporation for Atmospheric Research (UCAR), which manages the National Center for Atmospheric Research (NCAR) and the UCAR Office of Programs (UOP). Program funding for 2008 is provided by: NSF, NOAA, CIRES, Center for Multi-Scale Modeling of Atmospheric Processes (CMMAP) at Colorado State University. The RESESS program is administered by UNAVCO, a NSF and NASA funded research consortium, in partnership with Incorporated Research Institutions for Seismology (IRIS) and the United States Geological Survey (USGS) in Golden, Colorado. Primary funding for the RESESS program is provided by the NSF GEO Division.

PROTÉGÉS COMPLETE 2007 CONFERENCE SEASON

During fall 2007 and winter 2008, 23 protégés gave a total of 39 presentations at national conferences.

Ian Colon Pagan, a first-year protégé, received a Recognition for Outstanding Student Poster award at the 2007 Society for Advancement of Chicanos and Native Americans in Science National Conference in Kansas City, MO. Ian presented a poster, on his summer research project, "Hurricanes & Tropical Storm Impacts over the South Florida Metropolitan Area: Mortality and Government," which won in the Social and Behavioral Sciences Category.

National Association of Black Geologists and Geophysicists, National Meeting

Phoenix, Arizona, Sept. 2007

POSTER PRESENTATIONS

Lennox Thompson, "Displacement Modeling of Volcanic Magma Chambers"

ORAL PRESENTATIONS

ZiZi Searles, "The Effect of CO₂ Stabilization on Uptake Rates in the Land and Ocean Sinks as a Function of Ocean Circulation, Vegetation Type, and CO₂ Fertilization."

Society for Advancement of Chicanos and Native Americans in Science (SACNAS), 2007 National Conference

Kansas City, Missouri, Oct. 2007

POSTER PRESENTATIONS

Emanuelle Feliciano Bonilla, "Historical Seismicity of the Northeastern Region of Russia: A Perspective of the M7.6 Earthquake on Koryakia, Russia."

Ian Colon Pagan, "Hurricane and Tropical Storm Impacts Over the South Florida Metropolitan Area: Mortality and Government." (First-place award)

Katherine Fornash, "Plant-Insect Interactions in the Cenozoic."

Alex Gonzalez, "Numerical Modeling of Heat-Induced Large Scale Tropical Circulation."

Michael Hernandez, "Utilizing COSMIC Radio Occultation Soundings to Estimate Convective Potentials over Oceans."

McArthur Jones, Jr., "The Daily Cycle of Winds Along the Coast of the Gulf of California During the North American Monsoon."

Lumari Pardo, "Improving Data Quality when Sampling Oxygen-18 Isotopes in Atmospheric Carbon Dioxide."

Ezer Patlan, "Development of a Power and Communication system for Remote Autonomous GPS and Seismic Stations in Antarctica."

ZiZi Searles, "The Effect of CO₂ Stabilization on Uptake Rates in the Land and Ocean Sinks as a Function of Ocean Circulation, Vegetation Type, and CO₂ Fertilization."

Lennox Thompson, "Displacement Modeling of Volcanic Magma Chambers."

Kimberly Trent, "Simulation of Hurricane-Ocean Interaction for Hurricane Katrina: Difference between coupling WRF with a 1-D and 3-D ocean model."

Cecille Villanueva-Birriel, "Using GPS Radio Occultation Soundings to Study Mesoscale Convective Systems."

Anastasia Yanchilina, "Airborne Measurements of OH, MSA, NH₃, HO₂, HO₂+RO₂ Using the Selected Ion Chemical Ionization Mass Spectrometer."

American Geophysical Union Fall Meeting

San Francisco, California, Dec. 2007

POSTER PRESENTATIONS

Ian Colon Pagan, "Hurricane & Tropical Storm Impacts over the South Florida Metropolitan Area: Mortality & Government."

Anastasia Yanchilina, "Atmospheric Measurements Aboard C-130 During the Pacific Atmospheric Sulfur Experiment."

ORAL PRESENTATIONS

Zi Zi Searles, "The Effect of CO₂ Stabilization on Uptake Rates in Land and Ocean Sinks as a Function of Ocean Circulation, Vegetation Type, and CO₂ Fertilization."



ZiZi Searles (right) presenting her research at SACNAS

American Meteorological Society, 88th Annual Meeting 7th Annual Student Conference

New Orleans, Louisiana, Jan. 2008

POSTER PRESENTATIONS

Theresa Aguilar, "Characterization of Selected Boundary Layer Convergence Zones as Observed in IHOP (2002) and REFRACTT (2006)."

Ian Colon Pagan, "Hurricane & Tropical Storm Impacts over the South Florida Metropolitan Area: Mortality & Government."

Karen Diaz, "Designing an end-to-end decision model for CASA networks."

Alisha Fernandez, "Climate influences on Harmful Algal Blooms (HABs) in Sequim Bay, Washington State."

Shanna-Shaye Forbes, "Implementing a C++ interface for netCDF-4."

Douglas Gavin, "Floods and the Built Environment."

Alex Gonzalez, "Large-scale tropical circulations induced by heat sources in two simple models."

McArthur Jones, Jr., "The Daily Cycle of Winds at Estación Obispo, Mexico, during the North American Monsoon."

Lumari Pardo, "Improving Data Quality when Sampling Oxygen-18 Isotopes in Atmospheric Carbon Dioxide."

Zi Zi Searles, "The effect of CO₂ stabilization on uptake rates in land and ocean sinks as a function of ocean circulation, vegetation type, and CO₂ fertilization."

Armand Silva, "Effects of land cover characteristics on urban hydrological systems: an analysis for the Colorado Front Range."

Kimberly Trent, "Simulation of hurricane-ocean interaction for hurricane Katrina: Coupling the Weather Research and Forecasting (WRF) model with a 1-D ocean model."

Marcus Walter, "Interpretation of Return Levels Under a Changing Climate."

Christopher Williams, "Comparing simulations to observations of photochemical reactive gaseous pollutants above and downwind of Mexico City."

Anastasia Yanchilina, "Atmospheric Measurements aboard C-130 During the Pacific Atmospheric Sulfur Experiment."

American Meteorological Society, 88th Annual Meeting

New Orleans, Louisiana, Jan. 2008

POSTER PRESENTATIONS

Michael Hernandez, "Utilizing COSMIC radio occultation soundings to estimate convective potentials over oceans."

Luna Rodriguez, "Adding Realism to Source Characterization with a Genetic Algorithm."

American Association for the Advancement of Science Annual Meeting

February 2008, Boston, Massachusetts

POSTER PRESENTATIONS

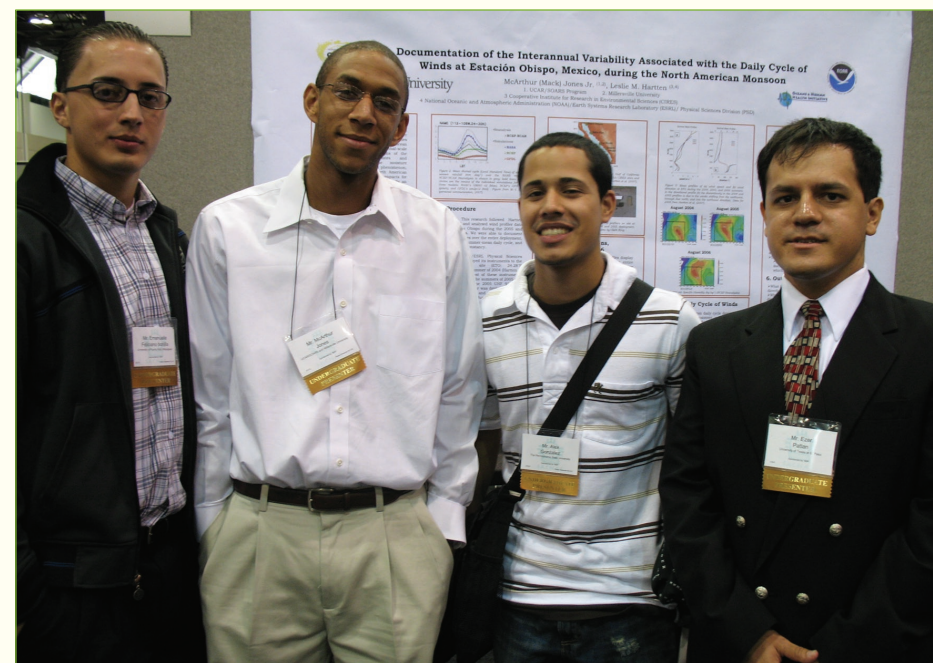
Ian Colon Pagan, "Hurricane & Tropical Storm Impacts over the South Florida Metropolitan Area: Mortality & Government." ■

Alumni and protégé accomplishments

Melissa Burt gave an oral presentation at the 88th Annual AMS Meeting in the 20th Conference on Climate Variability and Change entitled "Paleo-feedbacks in the Hydrological and Energy Cycles in CCSM₃".

Douglas Gavin started a position as a Snow and Ice Analyst at the National Ice Center in Washington DC.

Deanna Hencé earned a Master's degree in Atmospheric Science. She presented



Protégés Emanuelle Bonilla, McArthur Jones, Alex Gonzalez and Ezer Patlan at SACNAS



RECESS and SOARS protégés attending SACNAS conference

her thesis research at the 2007 TRMM science meeting in Atlanta. Her presentation was entitled "Kinematic Structure of Convective-scale Elements in the Rainbands of Hurricanes Katrina and Rita (2005)". Deanna also passed her general exam and is now a PhD candidate.

Michael Hernandez graduated with a BS in meteorology from the University of Miami and started graduate school in the Atmospheric Science department at The Pennsylvania State University.

Stephen Hernandez gave a presentation, "The Ubiquitous Nature of Dynamic Triggering" at the annual meeting of the Seismological Society of America Annual Meeting, Kona, Hawaii and co-authored a paper resulting from this research; accepted by Nature Geoscience.

Miriam García received an Honorable Mention from the National Science Foundation (NSF) Graduate Research Fellowship. (cont. on pg. 4)

(Accomplishments cont. from pg. 3)

Okason Morrison was one of 20 civilian applicants selected from a field of nearly 200 to become pilots in the United States Air Force. He currently works for General Electric Transportation as an Engine Systems Engineer in Erie, Pennsylvania. He will report to the Air Force's Officer Training School in the summer of 2008 followed by Undergraduate Pilot Training in the fall.

Ernesto Munoz earned a Ph.D. degree in Atmospheric and Oceanic Science at the University of Maryland in College Park. The title of his dissertation was "The Caribbean low-level jet: Its structure and interannual variability" and his advisor was Prof. Antonio J. Busalacchi. Part of the research is published in an upcoming article: Munoz, E., A. J. Busalacchi, S. Nigam, and A. Ruiz-Barradas, 2008: winter and summer structure of the Caribbean low-level jet, J. Climate, in press. Dr. Munoz is currently a Postdoc

Strong mentors key (cont. from pg. 5)

Although it's exciting when a student project leads to further research, it's not the only route to having a rewarding experience. "Having been in the role of both protégé and mentor, I feel that a project's success is best measured by the research methods learned during the program rather than by specific results," says Walter Szeliga, a research assistant at CU-Boulder who mentors RECESS protégés. "A successful mentor keeps protégés interested in science."

Marina LaGrave, a translator in UCAR's Education and Outreach program, feels energized by serving as a SOARS community mentor. "The students have different levels of independence as they mature as scientists and as people, too; therefore, there's an interesting dynamic to working with them," she says. "I've learned that each student is unpredictable as he or she is in a very personal process of learning about successes and failures. It's a joy to see how by the end of the summer, protégés have succeeded in conquering a pretty steep learning curve."

at the Cooperative Institute for Marine and Atmospheric Studies (CIMAS), a joint research institute between the University of Miami and NOAA's Atlantic Oceanographic and Meteorological Laboratory (AOML).

Shanna Pitter started a new position as the Weather and Water Program Analyst at NOAA Office of Program Planning and Integration (PPI) in Silver Spring, MD.

Sarah Tessendorf started as a Project Scientist at NCAR. She published two papers: Tessendorf, S.A., K.C. Wiens, and S.A. Rutledge, November 2007: Radar and Lightning Observations of the June 2000 Electrically Inverted Storm from STEPS, Mon. Wea. Rev., 135, 11, 3665-3681. Tessendorf, S.A., S.A. Rutledge, and K.C. Wiens, November 2007: Radar and Lightning Observations of Normal and Inverted Polarity Multicellular Storms from STEPS. Mon. Wea. Rev., 135, 11, 3682-3706.

Harley Benz, a researcher with the United States Geological Survey, also appreciates watching protégés progress over time. "It was interesting to see the progress of the RECESS students over the summer, from uncertain and bewildered at the beginning of the project to confident and excited by the end of the summer," he says. "More extraordinary was seeing my protégé at the annual American Geophysical Union meeting as a student seemingly transformed overnight into a budding scientist."

Bob Henson, a writer/editor with UCAR Communications, is another mentor enjoying the enthusiasm and vitality protégés add to his summers. "It's neat to see them blossom in their careers," he says.

Mentoring has strengthened Bob's own skills for communicating science. "Being in SOARS has helped me think about NCAR's research as it might look from several steps away," he says. "It helps me explain what I do and what NCAR does." ■

Rey Ueyama participated in the AMS Summer Policy Colloquium 2007, through SOARS sponsorship. She is coauthor with her former SOARS mentor Clara Deser on a paper accepted for publication in the February issue of Journal of Climate. It is titled "A Climatology of Diurnal and Semidiurnal Surface Wind Variations over the Tropical Pacific Ocean Based on the Tropical Atmosphere Ocean Moored Buoy Array". She also was awarded the Outstanding Student Presentation Award for her oral presentation ("On the cause of the annual cycle in tropical tropopause temperature") at the AMS Conference on Middle Atmosphere in Portland, Oregon last August. ■

UPCOMING ACTIVITIES

May 21: Mentor Training
May 27: Protégés Arrive in Boulder
May 28-30: Leadership Training



Lumari Pardo with her project mentor James White

Nobody is in a better position to confirm the importance of strong mentors than the protégés themselves. "Truly, my relationships and experiences with strong SOARS mentors have impacts that transcend the scope of scientific research," says Christopher Williams, an undergraduate at Georgia Institute of Technology entering his second summer in the program. "I believe the lessons learned from and friendships built with my mentors have not only enriched my life but also strengthened me as well as the communities to which I belong." ■