



## Chris Castro gives paper at AMS

Protégé Chris Castro presented his master's degree research topic, "The relationship of the North American Monsoon to tropical and North Pacific sea surface temperatures as revealed by observational analyses," at the 80th American Meteorological Society (AMS) Annual Meeting in January in Long Beach, California. Chris is the lead author of the paper; his master's degree advisers Thomas B. McKee and Roger A. Pielke Sr. (both of the Department of Atmospheric Science at Colorado State University) are coauthors.



Chris Castro (center) is flanked by his master's thesis advisers Roger A. Pielke Sr. (left) and Thomas B. McKee at the 80th AMS Annual Meeting. (Photo by Thomas Windham.)

Chris's research centers around why western U.S. summer precipitation varies widely from year to year. He used the National Centers for Environmental Prediction NCEP/NCAR Reanalysis data (1948-98) to compute a 50-year climatology of atmospheric circulation and moisture over the U.S. Then he compared trends in atmospheric moisture and precipitation in the Southwest and Great Plains based on the distribution of Pacific sea surface temperatures.

"What is novel about my approach is that I used a combined index of sea surface temperatures associated with the El Niño Southern Oscillation and the North Pacific Oscillation (NPO) to diagnose variability in evolution of the

North American Monsoon," said Chris. He said that the large-scale summer circulation is a determining factor in the behavior of atmospheric moisture and precipitation associated with the monsoon. During years when both El Niño and high NPO values are present, a trough is located over the central U.S.; the Great Plains are wet while the Southwest is dry. During La Niña years with low NPO

values, a ridge is located over the central U.S.; the Southwest is wet while the Great Plains are dry. These idealized responses are most likely during the early part of the summer. "My research strongly suggests that the occurrence of

wet or dry summers, particularly in the central U.S., has a physical connection to conditions in the Pacific," he continued.

As benchmark years, Chris cited 1993 and 1988. "In 1993 the Great Plains had high precipitation and massive flooding, and the Southwest had a very dry and late monsoon. By contrast, in 1988 the

monsoon came early in the Southwest while the Great Plains experienced a severe drought. The same sort of scenario as 1988 may be setting up for the upcoming summer."

Prior to the AMS meeting, Chris presented his research at the 1999 summer SOARS Protégé Colloquium in Boulder.

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### COMING EVENTS...

SOARS summer program: May 30-August 11, 2000

Protégé colloquium: August 4, 7-9, 2000 — NCAR

2001 application deadline: February 9, 2001

## SOARS

The SOARS newsletter is a biannual publication.

## HIGHLIGHTS

**Andrew Church** and his science research mentor **Mary Barth** coauthored the following published paper: Barth, M., and A. Church, 1999: Regional and global distributions and lifetimes of sulfate aerosols from Mexico City and China. *Journal of Geophysical Research*, **104**, 30, 231-30, 239. Andrew presented a poster on this topic at the Coalition of National Science Funding Conference, May 1999, Washington D.C.

**Preston Heard** and his science research mentor **Benjamin Felzer** coauthored the following published paper: Felzer, B., and P. Heard, 1999: Precipitation differences amongst GCMs used

for the U.S. National Assessment. *Journal of the American Water Resources Association*, **35** (6), 1327-1339.

**Cherelle Blazer** and her science research mentors **Jeffrey Gaffney**, **Nancy Marley**, and **Paul Drayton** (all at Argonne National Laboratory) are coauthors of a paper that has been accepted for publication: Marley, N. A., J. S. Gaffney, J. C. Baird, C. A. Blazer, P. J. Drayton, and J. E. Frederick, (in press): The determination of scattering and absorption coefficients of size-fractionated aerosols for radiative transfer calculations. *Aerosol Science & Technology*. Cherelle

also presented a poster on "Real-time olefin monitor based upon ozone chemiluminescent reactions" (Nancy Marley, Paul Drayton, and Jeffrey Gaffney, coauthors) at the National American Chemical Society Meeting, Undergraduate Research Session, August 1999, New Orleans.

**Rachel Vincent** and her science research mentor **Mark Taylor** are coauthors of a soon-to-be published paper: Taylor, M. A., B. A. Wingate, and R. E. Vincent, (in press): An algorithm for computing Fekete points in the triangle. *SIAM Journal of Numerical Analysis*. Rachel presented a

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# SOARS presents panel on Native American knowledge and Western conventional science

*Editor's note: Three SOARS protégés, an alumnus, and program director Thomas Windham presented a panel at the National Association of Native American Studies Annual Meeting. Here is Thomas's report on their presentation.*

SOARS protégés Shaan Bliss, Theresa Johnson, Jonathan Vigh, Carl Etsitty (a SOARS alumnus) joined me on a panel at the National Association of Native American Studies Annual Meeting in Houston in February. Our topic was "Bridging two worlds: Native American students in science

With these thoughts in mind, I was pleased that SOARS protégés had the opportunity to discuss their research and their thoughts as members of the next generation of Native American scientists. They provided role models for other Native Americans attending the conference who might be interested in pursuing scientific studies.

In my introduction, I said that I view what we now call science and scientific knowledge as being a natural fit with traditional Native American cultures. Detailed knowledge in such areas as agriculture, weather forecasting,

current observational data of climate change and its impacts.

In his presentation, SOARS alumnus Carl Etsitty noted, "For many Native American people, the universe is one emergent, orderly system where everything is interrelated. Consistent with this view is contemporary holistic theory, i.e., complexity, succession, and Gaia theories."

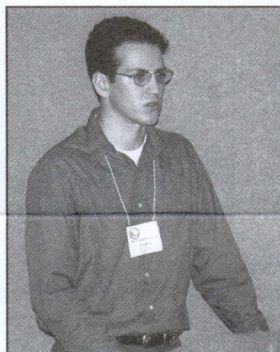
Carl described how Native Americans forecast the timing of the arrival of the seasons in different years through observations



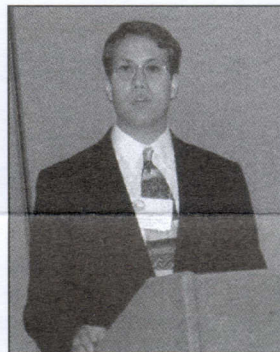
**Thomas Windham**  
(Photo by Carlye Calvin.)



**Carl Etsitty**  
(Photo by Jonathan Vigh.)



**Shaan Bliss**  
(Photo by Jonathan Vigh.)



**Jonathan Vigh**  
(Photo by Carl Etsitty.)



**Theresa Johnson**  
(Photo by Jonathan Vigh.)

benefit from traditional knowledge, values, and practice."

I was not surprised that our presentation was one of the few conference sessions on the physical sciences. Native peoples are underrepresented in scientific careers and in academic science departments. Until recently, Native American scientific knowledge has been devalued as "only folklore and superstition" and largely ignored by Western-trained scientists. Academic courses that include material on traditional Native American knowledge are found in departments of sociology, social anthropology, philosophy, religion, and folklore—not in the physical, atmospheric, or geosciences departments. In academia, the prevailing view seems to be that Native Americans are a group to be studied, but not the source of respected scientific information. In addition to these barriers, many Native American students avoid taking science classes because they view Western science as being at odds with their traditional values and ways of viewing and interacting with the universe.

seasonal changes, astronomy, and animal behavior have guided native cultures for centuries and is embodied in traditional values. This knowledge is passed down through storytelling and mentoring.

With the rise of Western science over the past 200 years, knowledge derived from reductionist models and strict experimental methods gained ascendancy over observations and stories passed down orally. More recently, however, many Western-trained scientists are showing increased interest in traditional Native American science and knowledge.

For example, in 1998 NASA, the American Indian Chamber of Commerce of New Mexico, and the City of Albuquerque cosponsored the U.S. Global Change Research Program's Native Peoples, Native Homelands Climate Change Workshop. For the first time, members of the U.S. National Assessment and local and national political leaders participated with Native American elders, scientists, scholars, tribal leaders, and community members to explore Native American oral histories and

of plants, animal behavior, and the constellations. They use this knowledge to predict whether spring will be wet or dry or come early or late. Historically, Native Americans used their forecasts to decide when to plant or when to migrate to another area.

Shaan Bliss added that in the modern world, humans "own" the land and the water. Land ownership has disrupted the migration of animals and ended the migration cycles of native peoples. Issues of ownership of water have great significance for Native Americans who continue to live on native lands.

"My research interest is the relationships between seasonal weather change and the adjudication of Indian tribal water rights," Shaan said. "Water settlements should take into account how weather and climate alter water flow so long-term sustainability of Indian lands and traditions are protected."

Jonathan Vigh told how stories from his Seneca grandmother and mother predisposed him to see the universe as  
(continued on page 3)



## SOARS presents panel... *(continued from page 2)*

one orderly system. Jonathan's discussion of longwave and shortwave radiative forcing provided an example of how this orderliness is expressed in the atmospheric sciences. "Clouds regulate the earth's energy budget," he noted. "By reflecting sunlight back out to space, and varying the amounts of infrared radiation leaving Earth, clouds regulate global cooling, which drive atmospheric circulation."

"The earth and sky," Jonathan continued, "are gifts from the Creator. Our job is to protect the skies, rivers, plants, and animals for future generations." Native Americans can propose traditional values as guiding principles for scientific inquiry and efforts directed at ecological sustainability, he concluded.

Theresa Johnson continued the theme of the importance of traditional values. She shared her grandparents' stories of how behavioral choices and decisions were made with consideration to the effect of those choices on the children of the seventh generation to come. Theresa described how these stories encouraged her to study air quality. Last summer she studied the long-term effects of temperature on isoprene emissions from aspen leaves. She discussed her concern for the positive relationship between increased global mean temperatures and isoprene emissions that potentially result in harmful pollution, especially ground level ozone.

"Nature is our world and we are a part of it," Theresa said. "Science can help us to better understand and discover how and why things worked as our ancestors believed. Traditional knowledge worked for them. It is not superstition and is valuable to understanding and protecting the earth."

🕒 *Thomas Windham*

## Chris Castro... *(continued from page 1)*

"Drs. Klaus Wolter and Henry Díaz from the NOAA Climate Diagnostics Center attended, and it was helpful to get their feedback," recalled Chris. "After that presentation, I clarified my conclusions and improved the explanation of my methodology. It was clear that Dr. Wolter and I were pursuing the same sort of approaches in our research."

In November Chris presented his research at the 24th Climate Diagnostics and Prediction Workshop in Tucson, Arizona. "There was high interest in climate issues at that workshop and there was an entire session devoted to aspects of interannual variability of the North American Monsoon," reported Chris. "My paper got both praise and constructive criticism, but was generally well received. For example, the criticism helped me see that I needed to emphasize that I had found only a statistical relationship and had not determined the cause and effect." While in Tucson, Chris also met Wayne Higgins from the Climate Prediction Center in Washington, D.C., whose published works were a part of the bases for Chris's research.

In March Chris presented his research to his master's degree committee. He passed his master's defense and is now making final revisions to the paper before it is submitted to a peer-reviewed journal. Chris will continue researching the same problem for his Ph.D. dissertation. In the next phase of their research, Chris and his Ph.D. adviser Roger Pielke Sr. will use the climate version of the Regional Atmospheric Modeling System to

quantify the importance of regional and remote forcing factors on monsoon evolution. They have two grant proposals pending that would fund Chris's Ph.D. research.

Chris was in the inaugural SOARS class in the summer 1996. His topic was "Sensitivity of a short-range forecast to initial and boundary conditions," with science research mentor Tomislava Vukicevic, Climate and Global Dynamics Division. During the 1997 summer, Chris's topic was "The effect of climate change on corn yield in the Susquehanna River basin of Pennsylvania," an extension of the research he did for his senior project at Pennsylvania State University. His science research mentors were Linda Mearns, Environmental and Societal Impacts Group, and Warren Washington, Climate and Global Dynamics Division.

"One of the main things I learned through SOARS is that scientific writing is different than other types of writing," said Chris. "In scientific writing, your opinions, ideas, and theories have to be backed up with evidence. Your work must be based on the previous work of others, which you reference. For your work to be accepted, it must be connected to the previous body of work in your field."

Chris said that having been through the process of writing and revising papers for his two SOARS research projects and his undergraduate senior project helped him when it came time to write his master's thesis. "The actual writing of the first draft took me a little more than a month," he reported.

Chris is grateful to the SOARS program for helping fund the master's degree phase of his graduate studies. "Also," he said, "I'm sure my SOARS research and writing experiences strengthened my application to graduate school."

CSU associate professor Jeff Collett, who serves as graduate student counselor for the Atmospheric Science Department, concurred. "SOARS protégés applying to CSU's graduate program in atmospheric science compete quite effectively with a large pool of outstanding applicants from around the country and abroad for admission to the master's program. The research experience gained by SOARS protégés, as a result of their participation in the SOARS summer program, makes them particularly strong candidates for appointment as graduate research assistants. Three SOARS protégés have been accepted to CSU for fall 2000," he said.

Although Chris spent the 1998 and 1999 summers at CSU working on his master's research, he has maintained both professional and personal connections with other SOARS protégés and staff. "In 1998 the other protégés and I took a trip to Yellowstone over the Fourth of July. It was one of the best times I've had camping, though we all got a lot of mosquito bites!" 🕒 *Nancy Dawson*

## Jonathan Vigh wins AMS scholarship



1999 AMS president George Frederick (left) presents Jonathan Vigh with a certificate for the AMS Guillermo Salazar Rodriguez undergraduate scholarship. (Photo courtesy of AMS.)

SOARS protégé Jonathan Vigh has been awarded an American Meteorological Society (AMS) scholarship for the 1999–2000 academic year. Jonathan was one of two recipients of the Guillermo Salazar Rodriguez undergraduate scholarship, which provides a \$2,500 stipend. As an AMS scholarship recipient, Jonathan also received an all-expenses-paid trip to the annual AMS meeting, which was held in January in Long Beach, California.

“Being at the AMS meeting was a tremendous experience,” said Jonathan. “I got to see how the scientific community works together and how scientists work with representatives from government and private industry.”

AMS awarded 56 undergraduate and graduate scholarships for the 1999–2000 academic year. The recipients ate meals together as a group at the annual meeting, with different AMS members invited to join them each time.


“Usually, there were two AMS members at each table. We got to ask them questions about their research and their jobs,” said Jonathan. Industry sponsors of AMS scholarships also met with students over meals, providing additional networking opportunities.

Scholarship recipients also attended special banquets. Jonathan listened to a luncheon talk by D. James Baker, U.S. undersecretary of commerce for oceans and atmosphere and NOAA administrator. Jonathan was particularly interested in Baker’s discussion of a new NOAA initiative to provide enhanced oceanic and atmospheric observations, including satellite sensing.

Attending AMS wasn’t all eating and networking for Jonathan. He attended many scientific talks and learned more about various fields of research within meteorology.

“I liked going to the poster sessions the best,” recalled Jonathan. “If you go at the scheduled times, you can talk to the person who did the work and ask questions. In contrast, the scheduled talks are usually 10 to 15 minutes and there is little time for discussion.”

After a busy five days at AMS, Jonathan returned to Pennsylvania State University, where he is completing his senior year in meteorology and teaching sections of an introduction to meteorology lab. In April he received Penn State’s John D. Dutton Award for Excellence in Atmospheric Dynamics.

Jonathan is looking forward to returning to Boulder for a second summer of research as a SOARS protégé. Last summer, his research topic was “Diagnosing errors in cloud parameterization of the NCAR Community Climate Model.” His science research mentor was Joel Norris, Advanced Study Program Climate and Global Dynamics Division.  Nancy Dawson

## SOARS protégé working on Ph.D. at Rice



Rachel Vincent discusses her work with Mark Taylor, her 1998 science research mentor. (Photo by Carlye Calvin.)

Rachel Vincent is currently a third-year graduate student in the Ph.D. program in the Department of Computational and Applied Mathematics at Rice University, Houston. She completed her graduate course work during her first two years at Rice and passed her qualifying exams in January 2000.

Rachel has spent this past year defining the parameters and scope of her Ph.D. dissertation topic. “The problem my advisers and I are considering is the automatic detection of

binding sites in proteins, as identified through singular value decomposition analysis,” reported Rachel.


“My project will focus on the development of visualization tools for molecular dynamic visualization and analysis,” she explained. Rachel is working with two advisers: Dan Sorensen in the Department of Computational and Applied Mathematics and George Phillips in the Department of Biochemistry and Cell Biology. Rachel’s work is funded by a Keck Center for Computational Biology fellowship at Rice University.

“As an undergraduate majoring in mathematics, I knew I did not want to pursue just mathematics theory. SOARS gave me the opportunity to explore aspects of computational science,” she recalled. “SOARS also introduced me to atmospheric science.”

In the summer of 1997, Rachel’s SOARS research project was to apply computational models to the analysis of a tropospheric chemistry model. Her science research mentors at NCAR were Peter Hess, Atmospheric Chemistry Division, and Tomislava Vukicevic, Climate and Global Dynamics Division.

“In 1998 I wanted my work to focus more on the development and use of mathematical tools in computational science. The Scientific Computing Division proved to be the ideal division for such work,” said Rachel. Mark Taylor, one of the SCD mathematicians, served as her science research mentor on a project titled, “The computation of Fekete points in a triangular domain.”

At the end of the summer, Rachel returned to Rice and Mark took a job at Los Alamos, but they continued working together on the project during the 1998–99 school year. Mark, Rachel, and Beth Wingate (Los Alamos) are coauthors of “An algorithm for computing Fekete points in the triangle,” which has been accepted by the *SIAM Journal of Numerical Analysis*.

As part of her graduate student responsibilities, Rachel corrects mathematics homework of undergraduates and holds office hours. She also finds time to sing in her church’s choir and tutor children in reading and, of course, mathematics.  Nancy Dawson

## HIGHLIGHTS (continued from page 1)

paper on this topic at the Social Science Research Council–Mellon Minority Summer Conference at Brown University, June 1999, Providence, Rhode Island. (See story on page 4.)

**Chris Castro** presented “The relationship of the North American Monsoon to tropical and North Pacific sea surface temperatures as revealed by observational analyses” (Thomas B. McKee and Roger A. Pielke Sr., coauthors) at the 80th American Meteorological Society (AMS) Annual Meeting, January 2000, Long Beach, California, and at the 24th Annual Climate Diagnostics and Prediction Workshop, November 1999, Tucson, Arizona. (See story on page 1.)

**Jonathan Vigh** received an undergraduate AMS scholarship and attended the 80th AMS Annual Meeting, January 2000, Long Beach, California. (See story on page 4.) **Michelle Dunn**, **Rynda Hudman**, **Jennifer Price**, and **Sarah Tessendorf** also attended the 80th AMS Annual Meeting.

**Stephanie Rivale** and **Thomas Windham** presented “SOARS: Successful strategies for a mentoring community,” at the 13th Annual Diversity in Mentoring Conference, March 2000, New Orleans. **Rynda Hudman** and **Theresa Johnson** also attended the conference.

**Shaan Bliss**, **Carl Etsitty**, **Theresa Johnson**, **Jonathan Vigh**, and **Thomas Windham** presented a panel, “Bridging two worlds: Native American students in science benefit from traditional knowledge, values, and practice,” at the National Association of Native American Studies Annual Meeting, February 2000, Houston. (See story on page 2.)

**Carl Etsitty** is working at the Environmental Protection Agency Office of Pesticide Prevention and Toxic Substances, Bio-pesticide and Pollution Division, in Washington D.C. His job duties include scientist data reviewer for new biological pesticide registration and liaison to the Miami Tribe of Oklahoma.

**Shirley Murillo** presented “Nowcasting hurricane wind fields using the WSR-88D single-doppler velocities—the GBVTD technique” (**Wen-Chau Lee**, Peter Dodge, and Frank D. Marks, coauthors) at the Department of



Left to right: **Andrew Church**, **Rynda Hudman**, **Kanika Benton**, **NSF director Rita Colwell**, **Sarah Tessendorf**, **Rachel Mayfield**, **Waleska Rivera Ríos**, and **Samuel Ajayi** at the 1999 SACNAS National Conference. (Photo by Thomas Windham.)

Meteorology, University of Hawaii at Manoa, December 1999, and at the Joint Typhoon Warning Center, Pearl Harbor, Hawaii, December 1999. She presented a poster on the same topic at the 29th International Conference on Radar Meteorology, July 1999, Montreal, Québec, Canada.

**Sharon Pérez-Suárez** presented “A study of volcanic excess sulfur using NASA’s Total Ozone Mapping Spectrometer (TOMS) sulfur dioxide data” (**Arlin J. Krueger** and Stephen Schaefer, coauthors) at the American Geophysical Union Fall Meeting, December 1999, San Francisco.

**Zobeida Ocasio** presented “Developing a one-dimensional transport-chemistry model with application to Mexico City” at the 10th Model Institution for Excellence Student Symposium, October 1999, San Juan, Puerto Rico.

**Waleska Rivera Ríos** presented “Studies of the tropical tropopause using GPS data” at the Model Institutions for Excellence Fifth Annual Conference, April 2000, Atlanta; at the 10th Model Institution for Excellence Student Symposium, October 1999, San Juan, Puerto Rico; and as a poster at the Society for Advancement of Chicanos and Native Americans in Science (SACNAS) National Conference, October 1999, Portland, Oregon.

**Michelle Dunn** presented “Changes in Northern Hemisphere storm tracks in the NCAR Climate System Model: Control run vs. doubled carbon dioxide” at the 10th Model Institution for

Excellence Student Symposium, October 1999, San Juan, Puerto Rico. She presented a poster on the same topic at the SACNAS National Conference, October 1999, Portland, Oregon.

**Rynda Hudman** presented “Upper atmosphere tides: Latent heat release effects” at San José State University’s Meteorology Seminar Series, September 1999, San José, California. She presented a poster on the same topic at the SACNAS National Conference, October 1999, Portland, Oregon.

Five other protégés had poster sessions at the SACNAS National Conference, October 1999, Portland, Oregon: **Samuel Ajayi**, “Influence of mountain ranges on distribution of polar stratospheric clouds”; **Kanika Benton**, “Effects of carbon dioxide on coral reefs”; **Andrew Church**, “Tornado probabilities”; **Amanda Szymczak**, “Modifying chemical models of the stratopause to more accurately predict ozone”; and **Sarah Tessendorf**, “Climatological distribution of tornadoes within quasi-linear convective systems.” **Rachel Mayfield** also attended the conference.

**Stephanie Rivale** organized a workshop for U.S. and Mexican scientists studying photolysis in Mexico City during the summer of 1999, in preparation for the Megacity Impacts on Regional and Global Environment (MIRAGE-Mexico) Workshop scheduled for the summer of 2000.

**Karen Mozealous** presented a poster on “Wettability alteration of aquifer solids by DNAPL wastes” (Kim F. Hayes, coauthor) at the Environmental Protection Agency STAR Graduate Fellows Conference, July 1999, Washington, D.C.

Interviews with SOARS protégés and mentors are featured in a video that will be shown in middle schools and high schools. *High Hopes: Careers in the Atmospheric Sciences* was produced by UCAR and the Foundation for Advancement in Science and Education (FASE) through an NSF grant. The video is available from FASE, 1-800-404-3273, ext. 267.

## Graduations

**Shaan Bliss** received a bachelor’s degree in environmental science from The Evergreen State College, May 1999.

**Lacey Holland** received a bachelor’s degree cum laude in meteorology from the University of Oklahoma, May 1999. She is a graduate student in meteorology at the University of Utah.

**Jennifer Price** received a bachelor’s degree in civil engineering from Florida A & M University, May 1999. She is a graduate student in urban and regional planning at Florida State University.

**Jennifer Zabel** received a bachelor’s degree in microbiology from Weber State University, May 1999. Jennifer is currently working at Vexcel Corporation in Boulder, Colorado.

**SOARS protégés** who are currently participating in the program:**Graduate students**

**Cherelle Blazer**  
*Hampton University*

**Christopher Castro**  
*Colorado State University*

**Preston Heard**  
*Indiana University*

**Lacey Holland**  
*University of Utah*

**Karen Mozealous**  
*University of Michigan*

**Sharon Pérez-Suárez**  
*University of Florida*

**Jennifer Price**  
*Florida State University*

**Stephanie Rivale**  
*University of Colorado*

**Kiesha Stevens**  
*Clark Atlanta University*

**Rachel Vincent**  
*Rice University*

**Undergraduate students**

**Shaan Bliss**  
*The Evergreen State College*  
*B.S., May 1999*

**Andrew Church**  
*University of New Mexico*

**Naressa Cofield**  
*Alabama A & M University*

**Michelle Dunn**  
*Cornell University*

**Rynda Hudman**  
*San José State University*

**Theresa Johnson**  
*Humboldt State University*

**Paul Lowe**  
*University of Maryland*

**Rachel Mayfield**  
*Humboldt State University*

**Shirley Murillo**  
*NOAA/Hurricane Research*  
*Division*

**Zobeida Ocasio**  
*Universidad Metropolitana*

**Monica Rivera**  
*University of Rochester*

**Waleska Rivera Ríos**  
*Universidad Metropolitana*

**Ismael Rodriguez**  
*University of Puerto Rico*

**Amanda Szymczak**  
*California State University*

**Sarah Tessendorf**  
*University of Nebraska*

**Jonathan Vigh**  
*Pennsylvania State University*

**Jennifer Zabel**  
*Weber State University*  
*B.S., May 1999*

**Alumni**

**Janel Thomas Davis**

**Carl Etsitty**

**Quindi Franco**

SOARS PARTICIPATING UNIVERSITIES: Colorado State University, Cornell University, Dartmouth College, Drexel University, Florida State University, Georgia Institute of Technology, Iowa State University, Michigan Technological University, New Mexico Tech, North Carolina State University, Old Dominion University, Oregon State University, Pennsylvania State University, Purdue University, Rutgers, the State University of New Jersey, Stanford University, University of Alabama at Huntsville, University of Alaska at Fairbanks, University of Arizona, University of California/Irvine, University of California/Los Angeles, University of California/San Diego (Scripps Institution of Oceanography), University of Colorado/Boulder, University of Hawaii, University of Illinois/Urbana-Champaign, University of Iowa, University of Miami, University of Michigan, University of Missouri/Columbia, University of Nebraska/Lincoln, University of Nevada/Reno, University of Nevada/Oakland, University of Oklahoma, University of Rhode Island, University of Texas, University of Utah, University of Washington, University of Wisconsin/Madison, University of Wyoming, Washington State University, Woods Hole Oceanographic Institution.



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**SOARS PROGRAM OFFICE**

FL4 (3300 Mitchell Lane), Suite 240,  
Boulder, CO 80301

**Phone:** 303-497-8623

**E-mail:** soars@ucar.edu

Subscriptions:  
Contact SOARS Program Office

Visit the SOARS Web site at  
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