

September 2010 to December 2010

To share the research and professional development activities of our faculty and students with the College, Utah State Administrators, and the Board of Trustees.

—The Dean’s Corner—

I am sitting in my office on Friday and looking forward to another “Science Unwrapped,” the monthly presentation of exciting science to a public audience. A committee of representatives from each of the departments in the College puts this activity together. The driving forces are two physicists: Shane and Michelle Larson. Folks from the community swarm to these events by the hundreds. They bring friends and relatives, including children of all ages. The presentations are often given by faculty from the across the campus, often from the College, and sometimes we have guest presenters from around the country. This is not the “talking head” kind of presentation that sometimes dulls the minds of our students. There is generally an after-show activity that everyone can experience. This is learning by doing. Tonight folks will get their hands on rocks, fossils, tree rings, and on and on.

This activity sells the University to the community and we need these positive interactions. This program is continually delivering the message that science is interesting and fun to hundreds people, people who have that spellbound look as our colleagues captivate them. Hopefully, some of the young people who attend these presentations will get the “science bug” and will ultimately want to study with us. GREAT STUFF!



— College of Science Contract & Grant Activity —

\$ Amounts (# of proposals)	September 2010	October 2010	November 2010	December 2010	Cumulative Totals FY10-11
Proposals Submitted	\$3,574,133 (16)	\$3,688,133 (10)	\$3,392,184 (14)	\$3,871,099 (12)	\$35,233,027 (90)
Awards Received	\$1,854,227 (14)	\$121,240 (3)	\$1,226,294 (10)	\$37,012 (4)	\$9,483,722 (52)

— USU Computer Scientists Receive Grant to Decipher Morning Commute —

Getting from A to B should be a straight line, but every commuter knows a host of factors can derail the best laid itinerary in the blink of an eye. Utah State University computer scientists are employing the power of observation, probability, and computation to give transit managers a leg up on heading off ugly traffic snarls.

Omar U. Florez, a doctoral student in USU’s Department of Computer Science, and his faculty mentor Curtis Dyreson are recipients of a \$20,000 IBM Scalable Data Analysis for a Smarter Planet Innovations Award. IBM initiated the university competition in fall of 2010 to foster design and development of systems and solutions to address issues in such areas as transportation, energy, buildings, water, security, and urban life.

“The credit for this award goes to Omar, who is a very smart and independent student,” says Dyreson, assistant professor. “He’s already made several contributions to the state of the art and I anticipate he’ll be a leader in this field in the future.”

The team’s proposal involves streamlining ways of searching and analyzing data from video traffic cameras to determine and predict patterns of commuter behavior. The aim of the project is to provide transit managers with reliable data to guide transportation management decisions, as well as access to real-time information to respond to problem situations.

“We’re examining causal relationships - for example, drivers stop at intersections and pedestrians cross the street,” says Florez, who completed undergraduate studies in systems engineering in his home country of Peru. “We can’t assume that participants in the transportation system will always follow the rules of the road. Transportation systems are very complex and influenced by rapidly changing conditions.” Because video cameras are already in place in many urban areas, they provide a cost-effective and convenient method of data collection, he says. “The drawback is that most video streams are massive, so special algorithms are needed to distill usable data,” Dyreson adds. “Omar is interested in solving difficult problems in searching and analyzing video data.”

To do this, Florez is developing a computer program using a probability distribution known as a hierarchical Dirichlet Process to analyze each “transaction” in a given transportation system. He’s developing computer models to discern frequent actions of moving objects and to explain how, with rules, they interact with each other. “Having this information could be valuable to city leaders, particularly in crisis situations, including the heavy snowfall we’ve recently seen in such cities as Chicago, New York City, and Boston,” he says. “An urban center’s transportation system is its lifeblood.”

Florez completed a four-month internship in service science research this past summer at IBM’s Almaden Research Center in California and hopes to pursue a career in the field. During school breaks he returns to Peru to organize conferences to enable fellow Peruvian graduate students studying throughout the world to present their research to undergraduates.

Little computer science research takes place in Peru, Florez says. “We basically consume technology, but do not produce it. I want to eventually return to Peru and change that.”

by Mary-Ann Muffoletto

For the full story, visit <http://www.usu.edu/ust/index.cfm?article=48714>



USU computer science doctoral student Omar Florez, left, and his faculty mentor Curtis Dyreson are recipients of an inaugural IBM Scalable Data Analysis for a Smarter Planet Innovations Award.

— Research Week: March 28 - April 1, 2011 —

Monday	Tuesday	Wednesday	Thursday	Friday
Faculty Research Day 28	Undergraduate Research Day 29	Scholarship Day 30	Graduate Student Research Day 31	Research Workshop Day 1

For more information on Research Week 2011 please visit: <http://researchweek.usu.edu>

— “Really Tiny, Really Old” Fossils: USU Geologists Study Ancient Life—

Something extraordinary happened to life on Earth some 740 million years ago and Utah State University geologists are exploring the tiniest - and some of the world’s oldest - fossils to find out why. Deep in the fine-grained mudstone of eastern Utah’s Uinta Mountains, doctoral student Dawn Hayes and faculty mentor Carol Dehler have recovered evidence of Bavlinella, a bacterium that “bloomed like crazy,” depleted an already stressed environment of oxygen, crowded out more complex organisms and resulted in widespread die-off of early plant and animal life.

Hayes and Dehler are among more than a dozen USU scientists who presented their research findings at the 122nd annual meeting of the Geological Society of America, October 31 through November 3 in Denver. “Similar evidence found in the rock record in other areas of the world implies some sort of global phenomenon rather than a localized event,” says Hayes, who completed a master’s degree from USU in spring 2010.

Did a giant meteorite strike the Earth? Did a huge volcano erupt? Or does the evidence point to gradual climate change? “There’s no smoking gun,” says Dehler, assistant professor of sedimentology in USU’s Department of Geology. “But increased sulfur and changes in iron compounds suggest depleted oxygen in oceans, which might have been caused by bacterial blooms, along with changes in the carbon cycle that could have been due to increased volcanic activity.”

Hayes and Dehler’s findings, when combined with discoveries from the Grand Canyon, suggest that widespread die-offs occurred before an intense ice age purportedly spanned the globe. According to a theory known as “Snowball Earth,” glaciers encased the planet and led to the demise of early plant and animal life.

“Snowball Earth suggests that glaciation was the cause of die-offs,” Dehler says. “We think something much earlier led to anoxia - lack of oxygen - and caused a ripple effect, enabling bacteria to flourish, further deplete the planet’s oceans of oxygen, and kill off other species.”

– by *Mary-Ann Muffoletto*



USU geologists Carol Dehler, right, and Dawn Hayes are challenging long-held views of the so-called Snowball Earth theory.

For the full story, visit <http://www.usu.edu/ust/index.cfm?article=48339>

— Six Science Students Receive Fall 2010 URCO Grants —

The following students are recipients of Undergraduate Research and Creative Opportunities (URCO) grants for the College of Science for fall 2010:

Name	Department	Project Title	Faculty Mentor
Kirsten Bahr	Geology	Structural and Lithologic Influences on KARST Systems in Tony Grove Area, Northern Utah	W. David Liddell
Kelby Bosshardt	Chemistry & Biochemistry	Structural Characterization of Full-length Rrp6 and Associated Cofactors	Sean Johnson
Nathan Giles	Geology	The Effects of CO ₂ Sequestration and the Resulting Mineralogical Alterations Within Various Lithologies	James P. Evans
David Ingram	Chemistry & Biochemistry	Selection of RNA Aptamers that Bind Asymmetric Dimethylated Arginine ADMA	Joan Hevel
Lindsey Lott	Chemistry & Biochemistry	The Role of the Mtr4 Loop in RNA Surveillance	Sean Johnson
Damon Nitzel	Chemistry & Biochemistry	Molecular Recognition in a PRMT1: Substrate Complex	Joan Hevel

For more information about URCO grants, visit: <http://research.usu.edu/undergrad/hm/funding-opportunities/urco>

— USU Chemist Among Authors of Updated Definition of Hydrogen Bonds —

Nobel laureate Linus Pauling is probably best known for his advocacy of vitamin C for good health. But the quantum chemist, who died in 1994, also developed a definition for hydrogen bonds that's been the textbook standard for more than 50 years. Hydrogen bonding is a molecular phenomenon that explains many of the physical properties of liquids and compounds, including the "rungs" that hold DNA's ladder-like double helix together and why objects float in water.

Pauling's definition is changing, however, as chemists, using such tools as computing and spectroscopy, are discovering more about the interaction of hydrogen atoms. Steve Scheiner, professor in USU's Department of Chemistry and Biochemistry, is one of two leaders of a 14-member team that contributed to a proposed updated definition recently published by the International Union of Pure and Applied Chemistry's Physical and Biophysical Chemistry Division, the world authority on chemical nomenclature. The international chemical community has until the end of March 2011 to respond to the proposal, which is expected to be adopted shortly thereafter. "The new definition doesn't so much change the existing definition; rather it broadens the meaning into a more modern, inclusive definition," says Scheiner.

Many current and former chemistry students will recall that a hydrogen bond is written as "AH - - B," where a hydrogen atom interacts with electronegative atoms (A and B) from such elements as nitrogen, oxygen, or fluorine. "But it isn't necessarily limited to just those elements," says Scheiner, the 2010 recipient of USU's D. Wynne Thorne Career Research Award, the university's top research honor. "A or B could be chlorine, sulfur, or carbon and the 'B' in the formula doesn't necessarily have to be an atom; it could also be a chemical bond between two atoms."

Using computer calculations, he says, scientists can essentially dissect hydrogen bonds and examine the forces that create them. Spectroscopy is another tool at scientists' disposal. In addition to infrared - IR - spectroscopy, which tells chemists about the strengths of chemical bonds, scientists use nuclear magnetic resonance spectroscopy - more commonly known as NMR - to investigate the properties of hydrogen bonds. Scheiner has shown how spectroscopy can be used to characterize a previously overlooked hydrogen bond interaction, known as the CH - - O bond.



USU chemistry professor Steve Scheiner is one of two leaders of a 14-member international team that's expanded the long-standing definition of hydrogen bonds.

Scientific definitions aren't static, Scheiner says. "Before the turn of the 20th century, scientists often thought of space and time as fully separate from one another, as well as constant and unchanging," he says. "But those ideas changed dramatically. It's the same with hydrogen bonding, where we have actual experimental findings to support new ideas."

— by Mary-Ann Muffoletto

For the full story, visit <http://www.usu.edu/ust/index.cfm?article=48416>

— VPR Seed Grants Selected for Funding January 1, 2011 —

Research Catalyst (RC)

- Lisa M. Berreau, Department of Chemistry & Biochemistry, "Preparation and Evaluation of Zinc Flavonolate Complexes of Enhanced Biocompatibility and Water Solubility" \$20,000.
- Timothy E. Doyle, Department of Physics, "Three-Dimensional Optical CT Scanner for Breast and Prostate Cancer" \$19,938.



The funding rate for RC proposals has exceeded 60% over the past two cycles!

Seed Program To Advance Research Collaboration (SPARC)

- Joan Hevel, Sean Johnson, and John Stevens, Department of Chemistry & Biochemistry, "Investigating the Role of Protein Arginine Methylation in RNA Surveillance" \$35,000.

For more information, visit: http://research.usu.edu/htm/faculty-funding-and-startup/grants_funding
Applications must be submitted to the College of Science Dean's Office **no later than 1 April 2011.**

Questions? Contact Lisa M. Berreau at 7-3509 or lisa.berreau@usu.edu.

— USU Biologist Says Mammal Size Increased Sharply After Demise of Dinosaurs —

An international research team co-directed by Utah State University biologist Morgan Ernest found that the extinction of dinosaurs some 65 million years ago paved the way for mammals to get bigger – much bigger. “The demise of dinosaurs provided vast evolutionary opportunities for mammals,” says Ernest, associate professor and co-director of graduate programs in USU’s Department of Biology. “Mammals evolved to sizes nearly a thousand times larger than had been seen before.”

The team’s study, published in the November 26, 2010, issue of the journal *Science*, is the first to quantitatively explore the pattern of body size of mammals after the end of the Dinosaur Age. Funded by a National Science Foundation Research Coordination Network grant, the research brought together paleontologists, evolutionary biologists, and macroecologists from 13 universities and institutions throughout the world.

“It is well known in biology that size profoundly influences everything from how quickly a species reproduces to its vulnerability to extinction,” Ernest says. “The aim of our group is to bring together a diverse group of scientists to investigate unanswered questions about the evolution of size in mammals.”

She and team members found that mammals grew from a size of about twenty-two pounds when sharing the earth with dinosaurs to a whopping maximum of 17 tons afterwards. Moreover, the pattern was surprisingly consistent across space, time, and trophic groups and lineages. “In addition to the strong consistency in the patterns across continents, I was particularly struck by the relationship between the evolution of size in carnivores and herbivores,” Ernest says. “The evolution of maximum size in carnivores tracked increases in size in herbivores, though carnivores remained ten times smaller than their potential prey.”

To document what happened to mammals after the extinction of dinosaurs, she and the team spent three years collecting data on the maximum size for major groups of land mammals on each continent, including Perissodactyla, odd-toed ungulates such as horses and rhinos; Proboscidea, which includes elephants, mammoths and mastodons; Xenarthra, anteaters, tree sloths and armadillos; as well as a number of other extinct groups. “These sorts of comprehensive datasets are important because they allow us to ask questions on a scale not previously possible,” Ernest says.

The maximum size of mammals began to increase sharply about 65 million years ago, peaking about 34 million years ago in Eurasia during the Oligocene Epoch and again about 10 million years ago in Eurasia and Africa during the Miocene Epoch. *Indricotherium transouralicum*, a hornless rhinoceros-like herbivore believed to be the largest mammal that ever walked the earth, weighed in at approximately 17 tons. It stood about 18 feet high at the shoulder and lived in Eurasia some 34 million years ago.

“The results of the study give clues as to what sets the limits on maximum body size on land; namely, the amount of space available to each animal and the climate they live in,” Ernest says. The colder the climate, the bigger the mammals seem to get as larger animals conserve heat better.

“The results also show that no one group of mammals dominates the largest size class,” she says. “The absolute largest mammal belongs to different groups over time and space.”

by *Mary-Ann Muffoletto*

For the full story, visit <http://www.usu.edu/ust/index.cfm?article=48489>



Ernest holds a kangaroo rat at a research field site of The Portal Project, a long-term ecological study in Arizona’s Chihuahuan desert.

— 2011 College of Science Awards Ceremony —

The 2011 College of Science Awards Program will be held April 13th at 3:00 in the Eccles Conference Center Auditorium (Room 216).
Come celebrate our great people!

— STUDENT ACTIVITIES —

Student Awards, Recognition & Grants

undergraduate* graduate**

Computer Science

Steen Monteiro** received a fellowship from Lawrence Livermore National Lab. The annual stipend is \$53,000 for the duration of her PhD program. Faculty mentor: **Renee Bryce**

Geology

Elizabeth Petrie** won an \$8,000 research award from GDL Foundation, December 1, 2010, for her proposal titled “Evaluation of Discontinuities and Diagenesis in Cap-rock Lithologies; and Implications for Secure Storage of CO₂.” Faculty mentor: **James Evans**

Student Presentations

undergraduate* graduate**

Biology

The following presentations were made at the Entomological Society of America National Meeting in San Diego, CA, 12-15 December 2010:

Juanita Rodriguez**, **Carol von Dohlen**, and **James Pitts**. “Historical Biogeography of the Spider Wasp Tribe Aporini (Hymenoptera: Pompilidae).” Juanita received the 1st place President's prize in Biogeography for this oral presentation.

Cecilia Waichert**, **Carol von Dohlen**, and **James Pitts**. “Testing the Monophyly of Ageniellini Genera (Hymenoptera: Pompilidae) with a Molecular Phylogeny, and the Search for Diagnostic Morphological Characters.” Cecilia received the 1st place President's prize in Phylogenetics for this presentation. (talk)

Kevin Williams**, **Carol von Dohlen**, and **James Pitts**. “Does the Thistle-down Velvet Ant (Hymenoptera: Mutillidae) Mimic Creosote Seeds? A Phylogenetic Approach.” Kevin received the 2nd place President's prize in Morphology, Physiology and Character Evolution for this presentation. (talk)

Joe Wilson**, **Carol von Dohlen**, and **James Pitts**. “Phylogeography Reveals Cryptic Speciation in *Sphaerophthalma arota* (Hymenoptera: Mutillidae).” (talk)

David Tanner and **James Pitts**. “Flagrant Flailing and Promiscuous Pinching: The Evolution of Courtship Display in *Melittobia* (Hymenoptera: Eulophidae).” (talk)

David Tanner and **James Pitts**. “The Sun Dance: Evidence for Density-Induced Behavioral Plasticity in *Bembix americana spinolae* (Hymenoptera: Crabronidae).” (poster)

Chemistry & Biochemistry

Marina Fosso** presented a paper titled “Synthesis and Structural Optimization of Antifungal Kanamycin B Analogs” at the 240th American Chemical Society National Meeting, in Boston, MA, 22-26 August 2010.

Geology

Kirsten Bahr* presented a talk titled “Using GIS as a Tool for Cave Studies” at the 2010 SWUG/UGIC Conference, Moab, UT, 22 April 2010.

Marlon Jean* presented a talk titled “Fluid-Mobile Element Enrichment in the Mantle Wedge of Subduction Zones: A View from the Coast Range, Ophiolite, California” at the AGU Fall 2010 Meeting, San Francisco, CA, 13-17 December 2010.

Marlon Jean* presented a poster titled “Space-Time-Isotopic Trends of Snake River Plain Basalts” at the AGU Fall Meeting, San Francisco, CA, 13-17 December 2010.

Elizabeth Petrie* presented a talk titled “Use of Wireline Logs to Estimate Strength of Cap-Rock Lithologies” at the AGU Fall 2010 Meeting, San Francisco, CA, 13-17 December 2010.

Physics

The following presentations were made at the 2010 Four Corners Section of the American Physical Society Fall Meeting, Ogden, UT, 15-16 October 2010:

Jeffrey B. Goodrich*, **Hemang Patel***, **Timothy E. Doyle**, and **Soonjo Kwon**. “Ultrasonic Detection of Microscopic Breast Cancer in Cell Cultures.” (talk)

Vern Hart*, **Timothy Doyle**, **Brent Carruth**, **Yucheng Zhao**, and **Michael Taylor**. “Tomographic Imaging of Noctilucent Clouds.” (talk)

Scott Jensen*, **Timothy Doyle**, **Vern Hart***, **Jeffrey Goodrich***, **Leigh Neumayer**, **Rachel Factor**, and **Christina Ellefson***. “The *Ex-vivo* Detection of Human Breast Cancer Through High-frequency Ultrasound.” (poster)

Hemang Patel*, **Timothy E. Doyle**, **Jeffrey B. Goodrich***, **Soonjo Kwon**, and **Brady J. Ambrose*** presented a poster titled “Real Time Detection of Malignant Breast Mammary Epithelial Cells Using Ultrasonic Spectral Analysis” at the Biomedical Engineering Society 2010 Annual Meeting, Austin, TX, 6-9 October 2010.

Hemang Patel*, **Timothy Doyle**, **Jeffrey Goodrich***, **Brady Ambrose***, **Lee Pearson**, and **Soonjo Kwon**, presented a talk titled “Ultrasonic Differentiation of Normal Versus Malignant Breast Epithelial Cells in Monolayer Cultures” at the Institute of Biological Engineering Western Regional Student Conference, Logan, UT, 29 October 2010.

The Center for Atmospheric & Space Sciences

The following posters were presented at the American Geophysical Union (AGU) Fall meeting, San Francisco, CA, 13-17 December 2010:

Chad S. Fish**, **Jan J. Sojka**, N. J. Mitchell, **Michael J. Taylor**, and Frank T. Berkey. "Long-Term Observations of Winds and Waves Over Bear Lake Observatory."

Janelle Jenniges, Ariel Acebal, **Robert W. Schunk**, **Larry Gardner**, **Ludger Scherliess**, Donald C. Thompson, and **Lie Zhu**. "Uncertainty Associated with Modeling the Global Ionosphere."

Levan Lomidze** and **Ludger Scherliess**. "Morphology and Causes of the Weddell Sea Anomaly."

Michael E. Olson**, **Bela G. Fejer**, Claudia Stolle, and Hermann Luhr. "Seasonal Dependence of Equatorial Electrodynamic Effects During Stratospheric Warming Periods."

Zhonghua Xu**, **Lie Zhu**, **Jan J. Sojka**, **Piotr Kokoszka**, and Agnieszka Jach. "Study of Geomagnetic Disturbances and Ring Current Variability During Storm and Quiet Times Using Wavelet Analysis and Ground-based Magnetic Data From Multiple Stations."

— FACULTY ACTIVITIES —

Awards & Recognition

Biology

Joseph K.-K. Li will serve for two years as a member of the Editorial board of the *Encyclopedia of Life Sciences* sponsored by the Chinese Academy of Sciences and Peking University, PR China.

Michelle Baker's paper in *Journal of Geophysical Research – Biogeosciences* was the second most downloaded paper in the journal for the week of 13 October 2010.

Chemistry & Biochemistry

Cheng-Wei Tom Chang received a patent for Anthraquinone Analogs (provisional patent filed, 2010).

Cheng-Wei Tom Chang and **Jon Takemoto** have received a patent for New Antifungals (international patent filed, 2010, license agreement signed August, 2010 with Baicor, L.C.).

Geology

W. David Liddell received a Seed Grant from USU's International Education Office of Global Management to investigate the potential for student research and study abroad experiences in Gorongosa National Park in Mozambique with a focus on the geosciences in the southern reaches of the East African Rift System.

Physics

Timothy E. Doyle was co-chair of nanoUtah 2010, the 6th Annual Utah Statewide Nanotechnology Conference, held in Salt Lake City, UT, 14-15 October, 2010.

Faculty Grants

Biology

Claudia Nischwitz

"Managing IYSV in Onion by Targeting Weedy Virus Reservoirs and Reproductive Hosts for Onion Thrips"

UAES

2010 - 2015

\$61,574

Ricardo Ramirez

UAES

"Plant Defenses in Alfalfa: The Effect of Disease Resistant Varieties on Above Ground Herbivores"

2010 - 2015

\$42,500

Todd Campbell, Paul Wolf, Daniel Coster, Brett Shelton

National Science Foundation, Discovery Research K-12 Program

"Cyber-enabled Learning: Digital Natives in Integrated Scientific Inquiry Classrooms"

2010 - 2015

\$2,489,331

Terry Griswold

National Science Foundation

"Collaborative Databasing of North American Bee Collections within a Global Informatics Network"

2010 - 2013

\$150,000

Chemistry & Biochemistry

Cheng-Wei Tom Chang

USTAR TCG

"Antifungal Aminoglycoside"

2010 - 2011

\$40,000

Cheng-Wei Tom Chang, Jixun Zhan

NIH

"Chemoenzymatic Synthesis of Pradimicin Analogues for Novel Antifungal and Antiviral Agents"

2010 - 2013

\$421,787

Cheng-Wei Tom Chang
Allosterix Pharmaceuticals, LLC
Training grant
2010
\$7,832

Faculty Presentations & Professional Activities

undergraduate* graduate**

Biology

S. K. Morgan Ernest presented an invited talk titled “Zero-Sum Energetics and Dynamics in Ecosystems” at the Metabolic Basis of Ecology and Evolution Gordon Research Conference, Biddeford, ME, 18-23 July 2010 .

S. K. Morgan Ernest, Thomas J. Valone, and James H. Brown presented an invited talk titled “Why Long-term Data is Important for Understanding Community Responses to Perturbations: A Chihuahuan Desert example” at the Ecological Society of America Annual Meeting, Pittsburgh, PA, 1-6 August 2010.

Jim Cane presented a talk titled “For Wildflower Seed, Bees are Key” at the 7th Conference for the Society of Ecological Restoration, Europe, Avignon, France, 23-27 August 2010.

The following presentations were made at the Entomological Society of America National Meeting, 12-15 December 2010, San Diego, CA:

Jonathan B. Koch**, **James P. Strange** and Jeffrey D. Lozier. “Revisiting the Subspecies Conundrum of the Bumble Bee *Bombus bifarius* Cresson (Hymenoptera: Apidae) in North America.” (talk)

Jonathan B. Koch**, **James P. Strange**, Jeffrey D. Lozier, **Terry L. Griswold**, Sydney A. Cameron, Nils Cordes, Leellen F. Solter and Robbin W. Thorp. “The Conservation Status of Nine Bumble Bee Species in North America.” (poster)

Frank J. Messina and **Jake C. Jones***. “Inheritance of Traits Mediating a Major Host Shift by a Seed Beetle.” (poster)

Jason P. Roth**, **Joseph K.-K. Li**, **John D. Morrey**, and **Dale L. Barnard** presented a talk titled “Recombinant, Infectious Parainfluenza Type 3 Viruses Deficient in the Expression of the D Domain of the PD Protein Show a Reduction in Viral Replication” at the American Society for Virology 29th Annual Meeting, Montana State University, Bozeman, MT, 17-21 July 2010.

Chemistry & Biochemistry

Alexander I. Boldyrev presented a seminar titled “Recent Advances Towards Unified Chemical Bonding Theory” in the Department of Chemistry, Brown University, RI, 10 September 2010.

Joan Hevel presented a talk titled “Getting a Handle on the Decorations in Your Proteome” at Idaho State University, Moscow, ID, 5 November 2010.

Cheng-Wei Tom Chang presented a poster titled “Novel Antibacterial, Antifungal, and Anticancer Agents Recently Developed at Utah State University” at the Medicinal Chemistry Gordon Conference, New London, NH, 8-13 August 2010.

Lisa M. Berreau presented an invited seminar titled “O₂-Reactive Divalent Metal Enolate and Enediolate Complexes: Ligand Effects and CO Release Reactivity” at Clemson University, Clemson, SC, 9 September 2011.

Lisa M. Berreau presented an invited seminar titled “O₂-Reactive Divalent Metal Enolate and Enediolate Complexes: Ligand Effects and CO Release Reactivity” at the University of Wyoming, Laramie, WY, 16 September 2011.

Geology

Susanne U. Janecke and **Robert Q. Oaks, Jr.** (emeritus) presented a talk titled “Reinterpreted Latest Pleistocene Bonneville Failure, Thresholds, Deltas, and Shorelines, Southeastern Idaho, USA” at the Utah Geological Association (UGA) Meeting, Salt Lake City, UT, 12 April 2010.

Susanne Janecke and **David H. Forand*** presented a poster titled “High Lifetime Slip Rate Across the San Jacinto Fault Zone Near Clark Lake” at the annual meeting of the Southern California Earthquake Center, Palm Springs, CA, 12-15 September 2010.

The following talks were presented at the AGU Fall 2010 Meeting, San Francisco, CA, 13-17 December 2010:

Anthony R. Lowry and M. Perez-Gussinye. “A Role for Crustal Silica in Mountain-Building and Rifting.”

J. Puchakayala, C.P. Rajendran, and **Anthony R. Lowry**. “Andaman Post-Seismic Deformation Observations: An Update.”

The following talks were presented at the Geological Society of America Meeting, Denver, CO, 31 October - 3 November 2010:

Megan K. Kenworthy, Jennifer Pierce, and **Tammy M. Rittenour**. “OSL Chronology for Alluvial Fans of the Lost River Range, Idaho: Large-Scale Deposition During OIS 3 & 4.”

Tammy M. Rittenour and **Joel L. Pederson**. “Enhanced Hillslope Sediment Supply to the Colorado River and Its Tributaries during MIS 5-3.”

Daniel Rogers, Martin Kaufman, Kent Murray and **Tammy M. Rittenour**. “Optical Stimulated Luminescence Dating of Glacial and Glacial-Lacustrine Sediments in the Rouge River Watershed in Southeastern Michigan USA.”

James Evans and Jonathan Saul Caine. “Evolution of Understanding of Fluid Flow in Tectonic Environments; Perspectives from Integrated Hydrogeologic and Structural Studies.”

Henry T. Berglund, Anne F. Sheehan, Steven R. Nerem, **Anthony R. Lowry**, Mark H. Murray, Mousumi Roy, Nicolas K. George, and Frederick Blume. “Geodetic Measurements of Deformation in the Rio Grande Rift Region.”

Thomas E. Lachmar. “Ground Water Monitoring for Wellhead Protection, Case Study in a Confined to Semi-Confined Aquifer, Salt Lake County, Utah.”

Joel L. Pederson, Gary O’Brien and Tammy M. Rittenour. “The Arroyo Grand Site of Western Grand Canyon - Archaic to Protohistoric Cultural Features in Detailed Sedimentary-Chronostratigraphic Context.”

Anne Hayden* and Tammy M. Rittenour. “Extending the Record of Arroyo Cycles for the Upper Escalante River, Southern Utah Using OSL and Radiocarbon Dating.”

Sangeetha Madhuri Pasala, Craig B. Forster (Deceased), and **James P. Evans**. “Simulation of the Impacts of Faults on CO₂ Injection Into Sandstone Aquifers.”

Barry Hanan, A. Krishna Sinha, and **John W. Shervais**. “Basaltic Magmatism Associated with Two Supercontinent Dispersals in the Central Appalachian Orogen: Modeling Sources Through Time.”

John W. Shervais, Marlon M. Jean*, and Samuel B. Mukasa. “Initiation of Proto-Franciscan Subduction Along a Transform Fault Zone: Evidence from Serpentinite Melange of the Coast Range Ophiolite Complex.”

Ernest Duebendorfer, Chloe E. Bonamici, Douglas Portis, and **Mitchell Prante***. “Refining the Early History of the Mojave-Yavapai Collision: Pre-Collision Rifting and Post-Collision Gravitational Collapse.”

The following posters were presented at the Geological Society of America Meeting, Denver, CO, 31 October - 3 November 2010:

D. Corey Barton* and James P. Evans. “Analysis of Paleo-Migration of CO₂ Using Satellite Imagery, Correlation of Geophysical and Field Data in an Effort to Determine Top Seal Integrity, with Implications for CO₂ Sequestration.”

Dawn S. Hayes* and Carol Dehler. “Stratigraphic, Microfossil, and Geochemical Analysis of the Neoproterozoic Uinta Mountain Group, Utah: Evidence of Biotic Change Driven by Eutrophication?”

Shannon L. Osterhout, Paul K. Link, and **Carol M. Dehler**. “Stratigraphy and Depositional Facies in the Neoproterozoic Formation of Red Castle, Mount Powell Quadrangle, High Uintas Wilderness, Utah.”

Marlon M. Jean* and **John W. Shervais**. “Scientific Drilling in the Snake River Plain, Idaho: Chemical-Stratigraphic Relationships in Wendell RASA and Sugar City Drillcore.”

Kathleen R. Anderson and Carol M. Dehler. “Looks Are Deceiving: Stable Isotope Data from the Pocatello Formation Cap-Carbonate Sequence and Its Implications for Cap-Carbonate Correlations.”

Ryan Sonntag*, Meagan R. DeRaps*, Paul Lapointe, Hope Sisley, and **Dave Richey****. “Fracture Characterization in Cretaceous Mesaverde Group, Uinta Basin, Utah.”

Kelly K. Bradbury* and **James P. Evans**. “Composition and Structure of SAFOD Phase III Whole Rock Core: Implications for Fault Zone Deformation and Fluid-Rock Interactions.”

Paul Inkenbrandt* and Thomas E. Lachmar. “Estimates of the Hydraulic Parameters of Aquifers in Cache Valley, Utah and Idaho.”

Mathematics & Statistics

Adele Cutler presented “Random Forests” to the US Forest Service and nationwide via broadcast for Forest Service researchers on 26 August 2010.

Nghiem V. Nguyen presented a mini-course titled “Nonlinear Water Waves” at Ho Chi Minh City University of Technology, Ho Chi Minh City, Vietnam, 12-14 July 2010.

The following posters were presented at the International Congress on Alzheimer’s Disease, Honolulu, HI, 11-12 July 2010:

Christopher Corocoran, C. Pieper, Z. Zandi, M. Norton, K. Welsh-Bohmer, J. C. S. Breitner, C. G. Lyketsos, and J. T. Tschanz. “Predictors of Decline in Alzheimer’s: A Joint Analysis of Cognitive, Functional and Neuropsychiatric Symptom Change in the Cache County Dementia Progression Study.”

Christopher Corocoran, K. Piercy, P. V. Rabins, E. Fauth, M. S. DeBerard, C. Snyder, C. Smith, S. Lee, A. Morrison, J. T. Tschanz, M. Norton, and C. G. Lyketsos. “Caregiver Coping Strategies Predict Cognitive Decline in Dementia: The Cache County Dementia Progression Study.”

Christopher Corocoran, K. Piercy, M. S. DeBerard, S. Lee, J. T. Tschanz, M. Norton, C. G. Lyketsos, K. A. Treiber, M. Carlson, B. Foley, D. Stein, K. A. Welsh-Bohmer, and J. C. S. Breitner. “Cognitive Activity and Decline in Alzheimer’s Disease: The Cache County Study.”

Christopher Corcoran, M. C. Norton, K. Hess, E. Fauth, K. Piercy, A. Morrison, P. V. Rabins, C. G. Lyketos, and J. T. Tschanz. “Higher Caregiver Agreeableness Predicts Slower Cognitive Decline in Persons With Alzheimer’s Disease: The Dementia Progression Study.”

Christopher Corcoran, R. G. Munger, R. M. Cawthon, J. T. Tschanz, M. C. Norton, K. Smith, P. Zandi, and K. Bohmer-Welsh. “Prospective Study of Mitochondrial DNA Copy Number and Incident Dementia in Cache County, Utah.”

Piotr Kokoszka presented an invited webex talk titled “Estimation Of the Mean and the Principal Components of Spatially Distributed Functional Data” at the SAMSI workshop, 17 November 2010.

Piotr Kokoszka presented an invited talk titled “Estimation of the Mean and the Principal Components of Spatially Distributed Functional Data” at a colloquium held at the University of Illinois Urbana-Champaign, 4 November 2010.

Piotr Kokoszka presented an invited talk titled “Two Sample Inference in Functional Linear Models” at a colloquium held at Boise State University, 14 October 2010.

Adele Cutler presented a series of three invited talks titled “Random Forests for Regression and Classification” in Ovronnaz, Switzerland, 15, 16, 18 September 2010.

Christopher Corcoran, P. Senchaudhuri and C. Mehta presented an invited talk titled titled “Using the StatXact Correlated Data Module for Exact Tests with Clustered Data” at the University of Utah Medical School, 8 February 2010.

Christopher Corcoran, P. Senchaudhuri and C. Mehta presented an invited talk titled “New Software Tools for Exact Tests with Correlated Data” at an invited session of the 2010 Conference of the International Indian Statistical Association at Andhra University, Visakhapatnam, India, 5 January 2010.

Physics

The following talks were presented at the Second Pan-American/Iberian Meeting on Acoustics, Cancun, Mexico, 15-19 November 2010:

Timothy E. Doyle, Hemang Patel*, **Jeffrey B. Goodrich***, Soonjo Kwon, and **Brady J. Ambrose***. “Ultrasonic Modeling and Measurements of Cultured Normal and Malignant Breast Epithelial Cells.”

Timothy E. Doyle, Silvana Martini, **Scott C. Jensen***, Ricardo J. T. Pichardo*, and **Vern Hart***. “Ultrasonic Spectral Analysis of Cavitation Bubbles in Vegetable Oils.”

Timothy Doyle and **Raymond DeVito** presented a talk titled “Wide-angle Nuclear Detection Array (WANDA)” at the 2010 IEEE International Conference on Technologies for Homeland Security, Waltham, MA, 8-10 November 2010.

The Center for Atmospheric & Space Sciences

The following papers were presented at the American Geophysical Union (AGU) Fall meeting, San Francisco, CA, 13-17 December 2010:

David N. Anderson, T. Fang, Tim J. Fuller-Rowell, R.A. Akmaev, Michael Codrescu, G. H. Millward, **Jan J. Sojka**, **Ludger Scherliess**, J. Vince Eccles, J. M. Retterer, J.D. Huba, G. R. Joyce, Art D. Richmond, A. I. Maute, Geoff Crowley, A. J. Ridley, and G. Vichare. “Equatorial-PRIMO (Problems Related to Ionospheric Models and Observations).”

Herb C. Carlson. “Cusp/Polar Cap Dynamics Challenge Science and Comm./GNSS.”

Herb C. Carlson, Tony Van Eyken, John Kelly, P.-L. Bletly, **Jan J. Sojka**, Geoff Crowley, Craig Heinselmann, Michael Codrescu, John Holt, Y. Rinne, Alan Aylward, and U. P. Lovhaug. “IPY ISR Constraints on Long Term Cooling of the Thermosphere.”

T. Fang, David N. Anderson, Tim J. Fuller-Rowell, R. A. Akmaev, Michael Codrescu, G. H. Millward, **Jan J. Sojka**, **Ludger Scherliess**, J. Vince Eccles, J. M. Retterer, J. D. Huba, G. R. Joyce, Art D. Richmond, A. I. Maute, Geoff Crowley, Aaron J. Ridley, and G. Vichare. “Equatorial-PRIMO (Problems Related to Ionospheric Models and Observations).”

Bela G. Fejer and **Brian D. Tracy***. “Short Term Variability in the Electrodynamics of the Equatorial Ionosphere.”

Ludger Scherliess, **Don C. Thompson**, and **Robert W. Schunk**. “Low Latitude Ionospheric Dynamics: Specifications Using a Physics-Based Data Assimilation Model.” (Invited)

Robert W. Schunk. “Thermosphere-Ionosphere-Magnetosphere Coupling and Mass Outflow – the Thermosphere/Ionosphere-Perspective.” (Invited)

Robert W. Schunk, **Ludger Scherliess**, **Jan J. Sojka**, Donald C. Thompson, and **Lie Zhu**. “Long-Term Space Weather Forecasting: Parameters and Accuracy Needed for the Ionosphere/Thermosphere.”

Jan J. Sojka, **Robert W. Schunk**, and **Michael David**. “Ionospheric Sensitivity to SDO-EVE Spectral Variability.” (Invited)

Charles Swensen, **Chad S. Fish****, **Jan J. Sojka**, E. M. Stromberg, B. Lloyd, and T. Neilson. “The ISS as a Launch Platform for Phenomena of Interest.”

Michael J. Taylor, Yuchen Zhao, Dominique Pautet, C. E. Randall, A. Chandran, S. M. Bailey, and J. Russell. “Characteristics of Gravity Waves in the Summer Polar Mesosphere and Their Dynamical Effects on Polar Mesospheric Clouds.” (Invited)

B. Thurairajah, S. M. Bailey, D. E. Siskind, J.D. Lumpe, Kim Nielsen, C. E. Randall, **Michael J. Taylor**, and J. Russell. “CIPS/AIM Observation of Polar Mesospheric Cloud Structures and NOGAPS-ALPHA Analysis of the Environment in Which These Structures Form.”

W. Kent Tobiska, Herb C. Carlson, Robert W. Schunk, Donald C. Thompson, Jan J. Sojka, Ludger Scherliess, Lie Zhu, and Larry C. Gardner. “Global, Real-time Ionosphere Specification for End-user Communication and Navigation Products.”

The following posters were presented at the Fall American Geophysical Union (AGU), San Francisco, CA, 13-17 December 2010:

M. Austin, M. Guhathakurta, A. Bhattacharjee, D. W. Longscope, and **Jan J. Sojka.** “Heliophysics.”

J. J. Bailey, M. Gruntman, and **W. Kent Tobiska.** “Solar Radiation Output Indices of Importance for Exospheric Properties.”

Michael David, Jan J. Sojka, Robert W. Schunk, and Michael Liemohn. “Mid-Latitude Dayside Ionospheric Response to Storm-Time Electric Fields.”

J. L. Gannon, J. J. Love, P. A. Friberg, and **W. Kent Tobiska.** “USGS One-minute Dst.”

Larry Gardner and Robert W. Schunk. “Modeling Waves in the Thermosphere.”

S. Harrell, C. She, **Titus Yuan, D. A. Krueger, J. M. Plane, and Terry G. Slanger.** “Sodium Nightglow Measurements with the Faraday Filter-Based Spectrometer: An Instrument to Study Sodium and Oxygen Chemistry in the MLT Region.”

Dominique Pautet, Michael J. Taylor, B. P. Williams, and S. E. Palo. “Joint Investigation of Mesospheric Gravity Wave Characteristics and Dynamics over South Pole Station (90°S) during the Austral Winter 2010.”

W. K. Peterson, T. N. Woods, J. M. Fontenia, Phil G. Richards, **W. Kent Tobiska, Stan C. Solomon, and H. P. Warren.** “Photoelectrons as a Tool to Evaluate Spectral and Temporal Variations of Solar EUV and XUV Irradiance Models over Solar Rotation and Solar Cycle Time Scales.”

Ja Soon Shim, M. M. Kuznetsova, L. Rastaetter, Michael Hesse, Dieter Bilitza, Michael Codrescu, Barbara A. Emery, B. T. Foster, Tim J. Fuller-Rowell, J. D. Huba, A. J. Mannucci, Aaron J. Ridley, **Robert W. Schunk, Donald C. Thompson, David N. Anderson, J. L. Chau, J. M. Forbes, Jan J. Sojka, E. K. Sutton, and B. Rideout.** “CEDAR Electrodynamics Thermosphere Ionosphere (ETI) Challenge for Systematic Assessment of Ionospheric Models.”

Jonathan B. Snively, M.P. Hickey, and **Michael J. Taylor.** “Nonlinear airglow Signatures of Ducted Gravity Waves in the Mesosphere and Lower Thermosphere.”

Jan J. Sojka, Robert W. Schunk, Michael Nicholls, and Craig J. Heinselman. “Possibility and Demonstrations of 27 Day Ionospheric Forecasting.”

J. T. Stegman, **Dominique Pautet, and Michael J. Taylor.** “Evolution of an ‘Ice-void’ in a NLC-display Observed from the Ground.”

D. R. Weimer, E. K. Sutton, and **W. Kent Tobiska.** “Predicting the Global Average Temperature of the Thermosphere From an Empirical Model of the Polar Poynting Flux.”

Titus Yuan, T. Kawahara, C. She, and D. A. Krueger. “Monthly-mean Tidal Perturbations of Na Density and Vertical Wind Based on Full-Diurnal-Cycle Na Lidar Observations.”

Lie Zhu, Robert W. Schunk, Ludger Scherliess, and Vince Eccles. “A Physics-based Data Assimilation Model for the High-Latitude Ionosphere: Importance of Data Assimilation Technique in Determining the Model Drivers.”

Faculty Publications

undergraduate* graduate**

Biology

Sarah R. Supp and Ethan P. White.** 2010. Measures of Journal Quality Should Separate Reviews from Original Research. *Ideas in Ecology and Evolution* 3:16-19, doi:10.4033/iee.2010.3.4.c

Todd Campbell, Shaing Kwei Wang, Hui-Yin Hsu, Aaron M. Duffy, and Paul G. Wolf.** 2010. Learning with Web Tools, Simulations, and Other Technologies in Science Classrooms. *Journal of Science Education and Technology* 19:505-511.

Paul G. Wolf, Jessie M. Roper, and Aaron M. Duffy**.** 2010. The Evolution of Chloroplast Genome Structure in Ferns. *Genome* 53:731-738.

Joseph S. Wilson** and **James P. Pitts**. 2010. Phylogeographic Analysis of the Nocturnal Velvet Ant Genus *Dilophotopsis* (Hymenoptera: Mutillidae) Provides Insights into Diversification in the Nearctic Deserts. *Biological Journal of the Linnean Society*. 101:360-375.

J. Jacob Parnell, Giovanni Rompato, **Leigh C. Latta IV****, **Michael E. Pfrender**, Joy Van Nostrand, Zhili He, Jizhong Zhou, Gary Andersen, Patti Champine, Balasubramanian Ganesan, and Bart C. Weimer. Functional Biogeography as Evidence of Gene Transfer in Hypersaline Microbial Communities. *PLoS ONE* 10.1371/journal.pone.0012919.

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Charles W. Fox, Martha L. Bush, and **Frank J. Messina**. 2010. Biotypes of the Seed Beetle *Callosobruchus maculatus* Have Differing Effects on the Germination and Growth of their Legume Hosts. *Agricultural and Forest Entomology* 12:353-362.

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Vince J. Tepedino, **Terry L. Griswold**, and William Bowlin. 2010. Reproductive Biology, Hybridization, and Flower Visitors of Rare Sclerocactus Taxa in Utah's Uintah Basin. *Western North American Naturalist*. 70(3):377-386.

Kenneth G. Karol, Kathiravetpillai Arumuganathan, Jeffrey L. Boore, **Aaron M. Duffy****, Karin D. E. Everett, John D. Hall, S. Kello Hansen, Jennifer V. Kuehl, Dina F. Mandoli, Brent D. Mishler, Richard G. Olmstead, Karen S. Renzaglia, and **Paul G. Wolf**. 2010. Complete Plastome Sequences of *Equisetum arvense* and *Isoetes flaccida*: Implications for Phylogeny and Plastid Genome Evolution of Early Land Plant Lineages. *BMC Evolutionary Biology* 10:321.

Timothy Covino, Brian McGlynn, and **Michelle Baker**. 2010. Separating Physical and Biological Nutrient Retention and Quantifying Uptake Kinetics from Ambient to Saturation in Successive Mountain Stream Reaches. *Journal of Geophysical Research - Biogeosciences* 115:G04010, doi:10.1029/2009JG001263, 2010.

Jason P. Roth, **Joseph K.-K. Li**, and **Dale L. Barnard**. 2010. Human Parainfluenza Virus Type 3 (HPIV-3): Construction and Rescue of an Infectious, Recombinant Virus Expressing the Enhanced Green Fluorescent Protein (GFP). *Current Protocol in Microbiology*, Chapter 15: 1 - 23.

Juanita Rodriguez**, **Carol von Dohlen** and **James Pitts**. 2010. The Genus *Psorthaspis* (Hymenoptera: Pompilidae) in Colombia. *Caldasia* 32: 407-413.

Chemistry & Biochemistry

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Computer Science

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