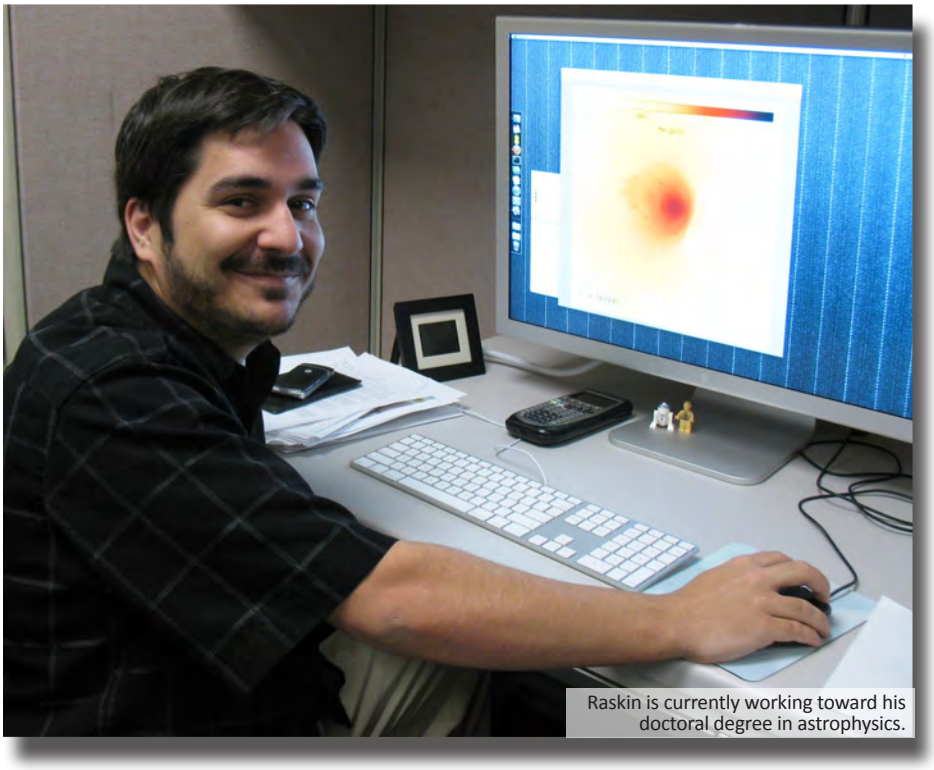
ASU School of Earth & Space Exploration
ARIZONA STATE UNIVERSITY

Volume 2, Issue 1

SESE Source

... the official newsletter
of the School of Earth and Space Exploration



Raskin is currently working toward his doctoral degree in astrophysics.

Upcoming Events:

GeoClub Spring Break Trip:	Mar. 17-21
Astronomy Open House:	Mar. 26
AEG/AHS Student Night:	April 6
Mineral Sale on Tyler Mall:	April 13-15
Earth Fissure Tour:	April 17

Reminder:

Students for the Exploration and Development of Space (SEDS) meets Mondays at 7 p.m. in PSF 166.

Contents

Student selected to meet with Nobel laureates in Germany this summer

Since 1951, Nobel laureates in chemistry, physics and physiology/medicine convene annually in Lindau, Germany, to have open and informal meetings with students and young researchers. Each year about 30 outstanding graduate students are chosen to attend this prestigious, week-long meeting. This year Cody Raskin, a graduate student in the School of Earth and Space Exploration, was selected.

Groups of top young researchers will be brought from the U.S. Department of Energy (DOE) Office of Science, National Science Foundation (NSF) Directorate for Mathematical and Physical Sciences, National Institutes of Health National Institute of General Medical Sciences, and Oak Ridge Associated Universities. The DOE/NSF delegation consists of U.S. doctoral students whose current research at their universities is funded by one of the sponsoring agencies. Raskin will be attending as part of the NSF delegation since his current research on supernova progenitors is sponsored by that agency.

Raskin is currently working toward his doctoral degree in astrophysics. In 2008, he received his master's degree in Physics. Moving to the School of Earth and Space Exploration from the physics department was a natural step for him given his interest in astrophysics.

The selected graduate students and junior researchers from around the world will participate in discussions with the Nobel laureates this summer, June 27 to July 2. During the meeting, the laureates will lecture on the topics of their choice related to physics in the mornings and participate in less formal small group discussions with the students in the afternoons and some evenings. More than 60 Nobel laureates are scheduled to participate, including American particle physicist James Cronin (renowned for his 1964 experiment that implied that reversing the direction of time seems not to precisely reverse the course of certain reactions of subatomic particles), French physicist Albert Fert (recognized for boosting the efficiency of hard drives and their readers, allowing drastic reduction), and Robert Laughlin (awarded for his discovery of a new form of quantum fluid with fractionally charged excitations).

"Meeting these scientific pioneers would be an enormous honor and an opportunity to learn about the trials and pitfalls of pursuing new and unique research," explains Raskin. "It's not only an opportunity for academic and research advice, but also for practical career advice and avenues for possible collaborations in the future."

In addition to the interactions with the Nobel laureates, Raskin and the other participants will enjoy the picturesque

STORY CONTINUED ON PAGE 2

STORY CONTINUED FROM PAGE 1

island city of Lindau, which is located at the eastern end of Lake Constance, just north of the Swiss Alps. Situated at the common border of Austria, Germany and Switzerland, the medieval city is rich in central European culture.

The competition is stiff, with more than 25,000 applicants globally and only about 70 selected. Assistant Professor Evan Scannapieco and Professor Frank Timmes, Raskin's thesis advisor and co-advisor, respectively, pursued his nomination.

"Cody is among the best graduate students I have had the opportunity to work with," says Timmes, an astrophysicist in the School of Earth and Space Exploration. Raskin's research focuses primarily on supernova progenitors and he applies a variety of techniques and models to try to determine which kinds of stars are responsible for certain kinds of supernovae. "Cody has the potential to become a leader in the field. His published work on Type 1a supernovae, our premier probes of the accelerating universe, is already having an impact on the field," Timmes says.

Raskin helped develop and implement a completely new observational approach to determine the types of stars that result in Type 1a supernovae, a method that has already been incorporated into the science plans of several upcoming large projects and space missions. He also carried out a series of massively-parallel computations that identified a completely new mechanism for forming Type 1a supernovae, through the collision of two white dwarf stars. This resulted in a paper that is opening up a whole new subfield of research, and according to Scannapieco, his ongoing work is keeping him at the forefront of this area.

"Cody is a fantastic student whose physical intuition, talent, and passion for his work set him apart from his peers," explains Scannapieco, a theoretical astrophysicist. "In the little over a year he has been in our school's Ph.D. program in astrophysics, he has already published two remarkable first author refereed papers."

With a career goal of becoming a tenure-track astronomy professor at a major university, Raskin is well on his way.

"Hopefully, I can bring ASU's unique approach to collaborative science to light among the group," says Raskin.

"We can't solve problems by using the same kind of thinking we used when we created them."

Albert Einstein

Astronomy picture of the day

Each day a different image or photograph of our fascinating universe is featured, along with a brief explanation written by a professional astronomer, on the Astronomy Picture of the Day web site.

View image at: http://apod.nasa.gov/apod/ap100207.html. Credit & Copyright: J. Rhoads (ASU) et al., WIYN, AURA, NOAO, NSF. The "et al" in the credit includes Sangeeta Malhotra, Ian Dell'Antonio, and Nigel Sharp.

On February 7, an image of the Einstein Cross Gravitational Lens was selected as the Astronomy Picture of the Day. SESE professor James Rhoads and colleagues are credited for this image. The image is a composite of 5 WFPC2 images in the V band (5400 A), with exposures from 200-800 seconds, obtained under the instrument team's observing program with Westphal as PI. In orientation, celestial north is about 35 degrees counterclockwise from vertical.

Most galaxies have a single nucleus — does this galaxy have four? The strange answer leads astronomers to conclude that the nucleus of the surrounding galaxy is not even visible in this image. The central cloverleaf is rather light emitted from a background quasar. The gravitational field of the visible foreground galaxy breaks light from this distant quasar into four distinct images.

The quasar must be properly aligned behind the center of a massive galaxy for a mirage like this to be evident. The general effect is known as gravitational lensing, and this specific case is known as the Einstein Cross. Stranger still, the images of the Einstein Cross vary in relative brightness, enhanced occasionally by the additional gravitational microlensing effect of specific stars in the foreground galaxy.

Hawaii: A lunar geologist's paradise?

Sandy beaches, lush jungles and vibrant flowers, inviting waters — Hawaii is a tropical paradise prime for … research? For most geologists, the answer to this question is a definitive yes! Hawaii is indeed a geological paradise that just happens to be co-located in one of the most beautiful tourist destinations on Earth. In a geological nutshell, Hawaii is arguably one of the best analog sites on Earth for the Moon and Mars. Much of the island is covered by basalt – a dark, fine grained volcanic rock that is very similar in composition to common surface materials found on the Moon and Mars. Mauna Kea is a dormant volcano located on the north side of Hawaii. While Mauna Kea is perhaps best known for its world-class astronomical facilities, most notably, the famous Keck Observatory, its lower slopes have also provided field locations for a variety of planetary exploration activities, including astronaut training designed to prepare us for future lunar exploration, for testing enabling technologies for future missions and for conducting scientific studies to better interpret the origin and history of other places in our solar system.

Postdoctoral student Jorge Nunez tests soil samples with the MMI. Courtesy Jack Farmer.

In February, Professor Jack Farmer participated in NASA-sponsored field trials on Mauna Kea designed to evaluate the performance of several new technologies currently being developed for future lunar exploration. The primary focus was In-Situ Resource Utilization (ISRU for short) at the Moon, key words that describe technologies that will allow human and robotic explorers to use naturally occurring geological materials on the Moon, to produce water, oxygen, hydrogen and other chemical resources required for human survival (e.g. breathable oxygen and water), and rocket fuel for returning home.

Farmer is the principal investigator of the Multispectral Microscopic Imager (MMI) instrument, which ASU has been developing for future flight missions in collaboration with technologists at JPL. The MMI produces multispectral images of rocks and soils for robotic characterization of different types of lunar materials for ISRU. Along with the MMI, Farmer provided a portable X-ray Diffraction Instrument (the Terra) which provided independent assessments of mineralogy. The two instruments operated along side with a Mossbauer spectrometer, provided by Johnson Space Center. Together, these suites of instruments provided the primary information needed to prospect at the site for the best feedstock materials to feed the ISRU experiments. Farmer's doctoral student, Jorge Nunez, was also part of the field test.

Although sequestered on one of the world's most beautiful islands, Farmer's typical day didn't include (any) lounging on sandy beaches. He was on site, in the field by 7 a.m., working on dusty volcanic slopes until dusk, when it was time to return to the Mauna Kea dorms.

"Each day we focused on something different," says Farmer, "but always with the goal of characterizing the mineralogy and microtexture of materials coming out of drill holes at various sites which were the feedstock materials for the main ISRU instruments. Our analysis provided a crucial step for assessing the best materials at the site to feed the front end of the various experiments. Prospecting for the best materials at a site ultimately determines the efficiency of resource production and what will be available for use by human explorers on the other end of the process."

San Andreas Fault study unearths new quake information

Collaborative studies of stream channel offsets along the San Andreas Fault by researchers in SESE and at UC Irvine reveal new information about fault behavior – affecting how we understand the potential for damaging earthquakes.

The researchers' findings encompasses their work at the Carrizo Plain, which is located 100 miles north of Los Angeles and site of the original "Big One" – the Fort Tejon quake of 1857. The SESE-UCI team presented a pair of studies that appeared in the Feb. 26 issue of *Science* that incorporates the most comprehensive analysis of this part of the San Andreas fault system to date.

In one of the studies, Associate Professor Ramon Arrowsmith and Dr. Olaf Zielke employed topographic measurements from LiDAR (Light Detection and Ranging), which provide a view of the earth's surface at a resolution at least 10 times higher than previously available, enabling the scientists to "see" and measure fault movement, or offset.

Olaf Zielke and Ramon Arrowsmith stand in the bottom of a trench across the San Andreas fault zone and discuss the exposures of faulted sediments and channel gravel visible in the walls. Credit: Bidart Fan San Andreas fault research team, University of California Irvine and Arizona State University

To study older earthquakes, researchers turn to offset landforms such as stream channels which cross the fault at a high angle. A once straight stream channel will have a sharp jog right along the fault and indicate that prior offset. This highly detailed overhead view of Carrizo Plain stream channels measured the offset features linked to large earthquakes in this section of the southern San Andreas Fault.

"This virtual approach is not a substitute for going out and looking at the features on the ground," says Zielke, who earned his Ph.D. under Arrowsmith. "But it is a powerful and somewhat objective approach that is also repeatable by other scientists."

In the second study, a team led by UCI's Lisa Grant Ludwig determined the age of offset in a few Carrizo Plain dry stream channels by studying how much the fault slipped during previous earthquakes. The distance that a fault 'slips', or moves, determines its offset.

By digging trenches across the fault, radiocarbon-dating sediment samples and studying historic and older weather data of these Carrizo Plain channels, and combining them with the LiDAR data, the researchers found something other than what scientists had thought. Instead of having the same slip repeat in characteristic ways, researchers found that slip varied from earthquake to earthquake.

"When we combine our offset measurements with estimates of the ages of the offset features determined by Lisa's team and the ages of prior earthquakes, we find that the earthquake offset from event to event in the Carrizo Plain is not constant, as is current thinking" Arrowsmith said.

"The idea of slips repeating in characteristic ways along the San Andreas Fault is very appealing, because if you can figure that out, you are on your way to forecasting earthquakes with some reasonable confidence," added Ludwig. "But our results show that we don't understand the San Andreas Fault as well as we thought we did, and therefore we don't know the chances of earthquakes as well as we thought we knew them."

Before these studies, the M 7.8 Fort Tejon earthquake of 1857 (the most recent earthquake along the southern San Andreas Fault) was thought to have caused a 9 to 10 meter slip along the Carrizo Plain. But the data the teams acquired show that it was actually half as much, and that slip in some of the prior earthquakes may have been even less. The researchers also found that none of the past five large earthquakes in the Carrizo Plain dating back 500 years produced slip anywhere near nine meters. In fact, the maximum slip seen was about 5-6 meters, which includes the slip caused by the Fort Tejon quake.

This result changes how we think the San Andreas Fault behaves: it probably is not as segmented in its release of accumulated stress. This makes forecasting future earthquakes a bit harder because we cannot rely on the assumption of constant behavior for each section. It could mean that earthquakes are more common along the San Andreas, but some of those events are probably smaller than we had previously expected.

Since the 1857 quake, an approximate five meters of strain, or potential slip, has been building up on the San Andreas Fault in the Carrizo Plain, ready to be released in a future earthquake. In the last five earthquakes, the most slip that has been released was 5-6 meters in the big 1857 quake. This finding points to the potential of a large temblor along the southern San Andreas Fault.

"Our collaboration has produced important information about how the San Andreas Fault works. Like all science, it is pushed forward by hard work, good ideas, and new technology. I am optimistic that these results, which change how we think about how faults work, are moving us to a more subtle understanding of the complexity of the earthquake process," said Arrowsmith.

Both studies were supported by the National Science Foundation, US Geological Survey, and Southern California Earthquake Center.

All Hands Recap

The 2010 All Hands meeting of the ASU Follow the Elements Team of the NASA Astrobiology Institute brought together more than 60 scientists interested in the search for life beyond Earth.

This meeting provided team members a chance to learn about the team's progress at the end of its first year. Updates were given by members of the team's three research themes, "The Stoichiometry of Life", "The Habitability of Water-rich Environments" and "The Astrophysical Context of Life".

Presentations were given on future explorations of Mars and Europa, as well as a potential mission for asteroid sample return and future astrophysics missions, and on education and outreach activities of the team. Graduate students and post docs presented 20 posters, giving them an opportunity to discuss and showcase their research. Plans were initiated for the second year of the project. The program culminated with an outreach event for undergraduate students titled "Who Wants to be a One-in-a-Millionaire" about the probability that life exists beyond Earth.

For more information, please visit:
http://astrobiology.asu.edu

Credit: Elizabeth McHugh

Detecting water in other solar systems

Writer Anuradha Herath's story about a new technique that is being developed to detect water in the protoplanetary disks of other solar systems appeared on Astrobiology Magazine's web site Feb. 18 and also on Space.com Feb. 24. The story revolves around a study published in the December 2009 issue of the journal Astrobiology by Melissa Morris, a 2009 SESE doctoral graduate, and Associate Professor Steven Desch.

In the paper, Morris and Desch describe modeling of the infrared spectroscopy of dust surrounding young stars in our Galaxy, to determine whether it is possible to detect the presence of hydrous minerals called phyllosilicates. One of the simplest examples of phyllosilicates is clay minerals; water is an important part of their chemical structure.

According to lead author Morris, a visiting professor in the Department of Physics, Astronomy and Materials Science at Missouri State University and an affiliate of Arizona State University's School of Earth and Space Exploration, "If you find phyllosilicates, you have most likely found liquid water. The objective was to try to determine whether we could actually detect these wonderful signatures of hydrated minerals almost always produced by the interaction of liquid water with rock."

Morris and her co-author Desch claim that unique features indicative of phyllosilicates in the mid-infrared spectra should


An artist's rendition of a protoplanetary disk. Credit: NASA/JPL-Caltech/T. Pyle

make it possible to detect those minerals in protoplanetary disks. She says "the outcome of this study shows only that, based on the computer models, it should be possible to detect the presence of phyllosilicates in protoplanetary disks. It is only the first step in the detection of water in other solar systems."

They plan to use data from the Spitzer Space Telescope and the Stratospheric Observatory for Infrared Astronomy to look for these features in the spectra from dust around young stars.

Planetarium offers visitors a narrated night sky

Ric Alling isn't your average undergraduate student. He controls the night sky — at least within the confines of the ASU Planetarium. The *SESE Source* talks with him about the latest developments with the story dome he calls home.

SS: So, Ric, you recently came onboard as the planetarium coordinator. Tell us a little about yourself and what brought you to our planetarium.

RA: I have always had a passionate interest in the night sky. Not only the typical amateur astronomy interest, but how past cultures have seen the sky, ritualized its rhythms and used astronomical cycles as the basis for our calendar. I am also one who studies antique star charts for clues to how sophisticated or not our predecessors were in their observations and depiction of the celestial knowledge. The history of astronomy is the history of man; each culture in turn has used the sky as a tool to understand their place in the natural world.

I started volunteering at the Dorrance Planetarium at the Arizona Science Center. There I learned that there is an almost universal desire by the public to learn about astronomy. People enjoy star lore, and they feel empowered with even the most cursory explanation of current research and technology. People are fascinated by the exploits of the Mars Rovers, the awesome images of the Hubble Space telescope and the latest research into Dark Matter and Dark Energy. There seems no better forum for a public with casual interest in space science than a planetarium. I can act as a translator of science and a transporter to understanding the physical universe by reinforcing how we are connected by curiosity and the human nature of exploration.

SS: Shows recently resumed in January. Can you tell us a little about this semester's program?

RA: Because our planetarium is small (40 to 50 capacity) I can tailor a presentation to a very specific age, or background, or general interest of the audience. Typically, the show includes the night sky as we see it in the evening for that specific time of year. This means that we talk about constellations that are relevant to the season and therefore changes every couple months. I also feature a topic following the seasonal sky.

Earlier this year I talked about Galileo's contribution to astronomy and the 400th anniversary of the use of a telescope for astronomical observation. Now, I am talking about attributes of stars like size, brightness, spectral class, etc. This time of year is good for this because of the variety of very bright stars and star color in the southern sky.

I am preparing a Mars topic that will look at how we have come to know Mars throughout history and introduce some of the work that is happening in our school at the Mars Space Flight Facility.

SS: Very interesting and relevant! Who do you have showing up at your door for a planetarium show?

RA: The planetarium has three audiences. The first group is college students. I support the labs associated with the astronomy lecture course work. About 350 students will have three sessions in the planetarium.

K-12 school groups from around the valley is the second audience. Because the school embraces outreach missions such as this, we don't charge a fee for shows. Teachers find the planetarium and other SESE attractions a great resource for reinforcing their own classroom instruction. About 300 students age 5 to 15 have been to the planetarium in the first months of 2010.

Finally, I offer a free public show each Monday and Wednesday evenings. The audience for this varies from families to life-long learners to amateur enthusiasts. I have also had cub scouts and girl scouts seeking to earn their astronomy badge. Evenings shows also give the audience to view through telescope on the roof our buildings.

SS: Do you have any big plans for special events in the future?

RA: I would like to explore the idea of doing special functions in the planetarium like poetry reading or live music. There is an amazing amount of literature associated with the night sky. It would be fun to present these humanistic concepts under the dome. I hope to start a tradition this semester and keep improving on it in the future.

Another plan is to collect star stories. Not cultural cosmologies but, personal, individual stories, hopefully supplied by ASU students. I would like to section a portion of the web site to publish these and build the volume of personal reflections that will grow over time.

For more information, please visit:
http://sese.asu.edu/planetarium

ASU team goes 'Down Under'

SESE faculty and staff traveled down under to participate in an international symposium in Sydney, Australia Feb. 13 that featured the premiere screening of the documentary film "Mud Max: Investigative Documentary - Sidoarjo Mud Volcano Disaster." The film received publicity toward the end of last year when SESE hosted a premiere screening in Scottsdale, but the Asia-Pacific premiere at the Museum of Contemporary Art in Sydney set the stage for it to reach a wider audience.

Also known as LUSI (a contraction of lumpur Sidoarjo, or Sidoarjo mud), the disaster has inflicted billions of dollars worth of damage since the mud started flowing on May 29, 2006. For nearly four years now the Sidoarjo mudflow has inundated more than a dozen villages. The homes, factories and farms of local residents have disappeared, and nearly 40,000 residents have been left homeless and even more displaced.

With a format similar to that of the Arizona premiere, the Sydney screening began with the viewing of the film and was followed by a panel discussion of earth scientists from leading international institutions. Professors Amanda Clarke, Hilairy Hartnett and Jon Fink participated as panelists. Hartnett, a biogeochemist, has run experiments on the mud samples, while Clarke and Fink, both volcanologists, focused on their area of expertise. In producing "Mud Max," the researchers sought out geologists, drilling experts and scientists who had investigated the disaster. The film's creators discovered Clarke while she was conducting research in Indonesia.

Filmed over two and a half years by Immodicus SA, the nearly 50-minute documentary examines the eruption of the mud volcano and the economic, social and political fallout left in its wake. The film aims to highlight the facts and views from every side, but leaves the decision to the viewer as to what caused the mud volcano eruption. Many investigations have been conducted to establish the cause of the mud volcano's eruption — earthquake or industrial drilling — and international experts have been divided over the cause of the mud eruption.

Professors Hilairy Hartnett, Amanda Clarke, and Jon Fink, joined by SESE Media Coordinator Nikki Staab, meet with the press prior to the Sydney film premiere.

Rather than dwelling on the causes of the eruption, the panelists emphasized the importance of seeking out solutions and using LUSI as a learning opportunity.

Chris Skiba recognized with employee award

Chris Skiba, facilities manager for SESE, and two other CLAS staff were recognized as inaugural recipients of the college's Exemplar Employee Award. Their good works were celebrated Feb. 3 during a breakfast hosted by the deans. Skiba and the two other recipients were selected from the nominees for their high level of dedication and professionalism in their day-to-day work. They distinguished themselves with specific acts that made them stand out as exemplars of excellence in the college.

At the breakfast, Professor Kelin Whipple represented nearly two dozen faculty and research professors in SESE who nominated Skiba for the honor. Although awarded for this Fall, the award is for Skiba's years of dedicated service above and beyond the call of duty -- supported by citations from numerous faculty members.

"Chris Skiba has a deep and wide-ranging understanding of facilities-related issues and has the personal creativity (including at least one patent) to understand what it takes to empower faculty to do their best work," Whipple noted. "Chris is our ace in the hole. He's the guy who lets us attract the best faculty members, once they see the facilities we have. He's pushed us to get modern-age facilities and office spaces," Whipple said at the award presentation.

"Chris is the guy who understands what scientists need to set up for work," Whipple added, crediting Skiba for helping set up a number of research facilities, including the Mars Space Flight Facility, W.M. Keck Bioimaging Laboratory, and the Lunar Reconnaissance Orbiter Camera Science Operations Center.

Graduate student recruiting days

SESE graduate students (from L-R) Patty Lin, Jean-Francois Smekens, Matt Rossi, Liz Rampe, Curtis Wheeler, Jon Oiler serve up a delicious meal prepared by Professor Ed Garnero.

SESE recruiting days kicked off with a special SESE-wide welcome reception February 18 for the 25 new graduate student recruits visiting campus. The SESE community came out in strong numbers during the two days of focused recruiting efforts to show support and warmly welcome the prospective students. The recruits had opportunities to mingle with faculty members and students, and engage in face-to-face dialogues with prospective research group members.

Although no formal award was presented to him, Professor Ed Garnero and his wife Pam Neuharth deserve recognition as stellar hosts (and Ed as primary chef!). Ed and several students treated 80+ people to a home-cooked meal the first night, truly a family experience for the prospective recruits.

Friday morning, recruits were welcomed and introduced to SESE by Professor Matt Fouch and Director Kip Hodges. To better familiarize the recruits with the school, facility tours to CMS, LROC, Keck and the Mars Space Flight Facility were provided. Following a pizza lunch, recruits visited with research groups to get a feel for the exciting range of research conducted in SESE. The recruits wrapped up the day by enjoying an evening hosted by SESE graduate students.

The recruiting days went extremely well thanks to extensive involvement by faculty and graduate students alike. The graduate recruiting leadership team (Liz Rampe, Mike Pagano, and Jon Oiler) helped with many of the logistics for the event. A key component of the success of the event was the high level of graduate student participation, including hosting recruits and helping with all other aspects of the recruiting days. Professors Steve Semken, Chris Groppi, and Arjun Heimsath led the recruits on a field trip through Superior, the Magma Mine, Mt. Lemmon and on to a snow-covered Kitt Peak on Saturday. The joint Astro-Geo field trip united the strengths of SESE and culminated with a fun-filled dinner at a "dive" Mexican place outside Tucson before returning the tired and happy recruits to Tempe.

A record number of prospective students were hosted and SESE is poised to receive an excellent crop of new graduate students.

Research scientists discuss future of lunar geophysical exploration

Approximately 50 planetary and terrestrial geophysicists met at ASU Jan. 21-22, for an interdisciplinary workshop focusing on the Moon. Participants reviewed the current state of knowledge of the Moon and past geophysical studies, discussed existing plans, and began making preparations for the future.

"We are at a very exciting time where there are multiple lunar geophysical missions in various stages of development by NASA and international space agencies," explains seismologist Matthew Fouch, a professor in SESE and co-convener of the workshop. "This is an important opportunity for us to revisit what we learned from the geophysical data collected by Apollo astronauts, and how we can make significant forward progress based both on those experiences and current efforts to return to the lunar surface."

This high-level workshop for the scientific community, which pulled participants and presenters from universities and research institutes around the world, including NASA centers, was divided into a two-day program organized into lectures, poster sessions, breakout groups, and group discussions. Talks and posters presented topics as diverse as seismic exploration of the Moon, measuring heat flow on the lunar surface, and characterizing the Moon's interior. Former astronaut Harrison Schmitt, one of the last of the Apollo astronauts to walk on the Moon, delivered the first day's keynote talk.

Besides providing a unique opportunity for research scientists from both the terrestrial and planetary communities to interact, the workshop highlighted how the geophysical community can contribute to NASA's long-term plans to install a series of autonomous geophysical stations on the Moon.

"The goal of the scientific exchange," says Fouch, "is to provide NASA and the broader scientific community with ideas and recommendations about how to most efficiently and effectively collect new geophysical data from the lunar surface, using everything from landers to robots to astronauts, and over a range of scales."

"Given ASU's historical success as a top planetary geology program, our growth as a top Earth interiors research program, and the recent addition of the LROC facility, it's quite appropriate that SESE hosts this meeting," says Fouch.

The workshop was sponsored jointly by NASA, SESE, the Lunar and Planetary Institute, and the Incorporated Research Institutions for Seismology (IRIS).

GeoClub Update

Looking for a great way to spend Spring Break? Join GeoClub March 17-21 on a trip to southern California.

The trip begins March 17 with ventifact collecting and camping at Joshua Tree State Park. The second day includes a visit to the San Gabriel Mountains as well as a stop at the Cascade Canyon. You can collect rubies, fuchsite, and lapis! There is also a stop at the California Institute of Technology (Cal Tech) to see the Dana Collection before driving to Malibu to camp for the night. The next day will be an early start to be on the beach at dawn to see the Malibu sunrise. There will also be time to go whale watching. The group will go to San Diego along the Pacific Coast Highway. It costs $50 per person to dig for tourmalines at Himalaya Mine, but GeoClub will play for half of it so it will only be $25 out of pocket. The next item on the itinerary is a drive back south of Salton Sea with a possible mud volcano stop, and arrive back in Tempe on March 21.

Upcoming Events

GeoClub is co-sponsoring the AEG/AHS Phoenix Chapter Student Night April 6. This event is for all Arizona students and professionals in groundwater, environmental, and engineering geology, geotechnical engineering and geological engineering Fields. It will be held in the Cochise and Mohave rooms of the Memorial Union from 5:30 to 9 p.m. This is an excellent opportunity for students to present research in a small, friendly format before going to a national or regional conference.

April 17 is the Earth Fissure Tour. Students and professionals will tour and examine local earth fissures to understand how different geological related fields approach these real life hazards. GeoClub is hosting and sponsoring this event with members from AEG and ADWR leading the tour.

Students for the Exploration and Development of Space (SEDS) News:

SEDS-ASU is fully underway! Recently, we have begun working on a project with Daedalus Astronautics at ASU. We are building a payload for their next rocket, scheduled to launch this summer. Also, with the help of Steve Desch and Chris Groppi, some of our members will be working on the OSIRIS-Rex (Origins Spectral Interpretation Resource Identification Security Regolith Explorer) New Frontiers mission proposal with students and researchers at UA in order to retrieve an asteroid sample return.

We are also going to be doing some outreach soon with the Mars Space Flight Facility in getting K-12 kids excited about the wonders of space and the endless opportunities the space industry holds. A few events we have coming up are Yuri's Night (a celebration of Yuri Gagarin, the first man in space) and the International Space Development Conference (ISDC). Yuri's Night will be sometime in mid-April, the time and place has yet to be determined. ISDC is May 27-31 in Chicago, IL, and will involve nearly every aspect of the space community. Speakers include NASA Administrator and Astronaut Charles Bolden, NSS Board of Governors Chairman Hugh Downs, Astronaut Buzz Aldrin, among many others.

As always, if you would like to get involved or want more information, come to one of our chapter meetings every Monday, 7:00 p.m. in PSF 166. For more information contact Jim Crowell at james.crowell@asu.edu.

Hello from the SESE Graduate Council

We held our first General Body meeting on Friday, Feb. 5 to introduce ourselves and what we have accomplished thus far. Why do we have a Grad Council and what do we plan to do? We aim to: 1) Be a liaison between graduate students and faculty, 2) Be a point of contact for current and incoming/future students when in doubt of what to do, and 3) Ensure that graduate students have their interests represented when changes are made to department policies.

We will accomplish these goals through representation on faculty Committees, such as Oversight, Recruiting, and Computing and other committees as needed as well as through communication with the graduate students during General Body meetings and e-mail discussions.

We have a listserv: SESEGC@asu.edu. This listserv is primarily for graduate student queries and should serve as the primary method of contacting the Council, but anyone may e-mail us with Grad Council-related business. We are also working on developing a comprehensive web calendar that includes department, student group, and other outreach and educational events as a one-stop source for activities; if you have activities you'd like to include, please e-mail us!

Thanks from the SESE Grad Council: Allie Griffin (President), Becky Frus (Outreach Coordinator), Jean-François Smekens (Oversight Committee Representative), Jon Oiler (Recruiting Committee Representative), Lillian Ostrach (Secretary), Liz Rampe (Recruiting Committee Representative), Matt Mechtley (Website Coordinator), and Mike Pagano (Recruiting Committee Representative)

SESE degree takes alumnus back to the classroom, but this time as the professor

George Hilley

B.S. Stanford University, 1996
Ph.D. Arizona State University, 2001

I carried out my Ph.D. under the guidance of Associate Professor Ramon Arrowsmith. I first met Ramon when I was his undergraduate research assistant at Stanford. I ultimately settled on working on the geomorphic development of a landform he had identified during his (undergraduate!) thesis that was located in the Carrizo Plain (turn to page 4 to learn more about Arrowsmith's most current research). Using high-resolution topography, I studied how the processes that uplifted and eroded this landform were related to its topographic form. The experience that I gained working with Ramon in his group have served me well throughout my entire career since.

In addition, while I was at ASU, the program was heavily field-based, which provided me with a far better field education than that to which I had been exposed at Stanford. Many of the faculty dedicated a large amount of their personal time to making sure that students were well-versed in field relationships and mapping skills — these skills have been indispensable since moving on from ASU, and I am grateful to all of the faculty for the time and inspiration that they devoted (and continue to devote) to the field program there.

Since leaving ASU, I served as an Alexander von Humboldt Fellow at the University of Potsdam in Germany working with Manfred Strecker. There, I had the chance to study the evolution of sedimentary basins flanking the eastern boarder of the Andes in northwestern Argentina to decipher how the uplift of ranges along this margin, regional climate changes and climate changes resulting from the construction of upwind topography, and the development of the sedimentary basins were related throughout the last ~4 million years. Additionally, I was able to study the evolution of a fold-and-thrust belt in central Argentina to infer how erosional processes may have influenced the geometry of this growing mountain belt.

I spent several years at the University of California, Berkeley working with Roland Burgmann. There, I had the chance to learn how to use geodetic observations to study active ground deformation. This included imaging crustal deformation due to plate motions over decades using Global Positioning System measurements, as well as imaging the seasonal motion of active landslides using Synthetic Aperture Radar Interferometry. Finally, I had the chance to use low-temperature thermochronology, geologic mapping, and topographic analysis to understand the tectonic and topographic evolution of a restraining bend in the San Andreas Fault located in the vicinity of Santa Cruz.

Currently, I am an assistant professor at Stanford University. Since I arrived here, I have become interested in using cosmogenic isotopes to infer tectonic activity along the San Andreas Fault, analyzing Airborne Laser Swath Mapping (ALSM) data to extract features of the fault zone geomorphology along the plate boundary, exploring the potential feedbacks between chemical weathering and denudation and the resulting supply of nutrients to ecosystems, creating new tools to analyze paleoseismic data along the San Andreas Fault and infer the at-depth geometry of structures based on ALSM data, and quantifying the surface distribution of carbon dioxide efflux using meteorological and geophysical inversion methods. I have been lucky to have a wonderful set of graduate students while I have been here — they certainly have made a tough job much easier!

The training that I received at ASU provided me with essential field knowledge, modeling tools, and critical thinking skills that I have used virtually every day since. Perhaps one of the most important aspects of my training at ASU was the ready availability and dedication of the faculty. In particular, my Ph.D. advisor Ramon Arrowsmith was always willing to interrupt his day during his pre-tenure sprint to have detailed conversations about San Andreas Fault geology, fault zone geomorphology, and modeling ideas. This "face time" was very valuable for developing ideas, and in this regard, I have modeled my own mentoring after this philosophy.

The SESE Source is always interested in hearing from our past students. Please share how your ASU/SESE degree has helped you arrive on your current career path. To learn more, contact Nikki Staab (nstaab@asu.edu).