UC Santa Barbara Earth Science

Chair's Letter: **Andy Wyss**

Another eventful year has unfolded in the Department of Earth Science.

Highlights include the arrival of Professor Roberta Rudnick (p. 5), who joined us in January. We are also delighted to announce that Dr. Zach Eilon has become a member of our geophysics faculty, arriving on campus next winter.

To provide you, friends of the Department, a glimpse of the enviable quality and accomplishments of our graduate students, we present profiles of two members of our current cohort (pp. 8-9). We take equal pride in our vibrant and burgeoning undergraduate program, the number of majors having jumped more than 70% in the last few years. Professor Phil Gans provides (p. 10) a compelling summary of our capstone *Summer Field* course, which was divided between east-central Nevada and Iceland this year. *Mountains, Boots, & Backpacks*, a course designed to entice beginning undergraduates into the Earth Science major, took place in the Mammoth Lakes region in September, as is recounted by Professor Doug Burbank (p. 2).

The department hosted Professors Bob and Suzanne Anderson (University of Colorado, Boulder) as the 2016-17 John Crowell Distinguished Lecturers. Fascinating in their own right, Bob and Suzanne's series of talks also helped inform our faculty search in Earth Surfaces Process currently underway.

Although public support is sufficient to meet the basic operating demands of our teaching mission, preserving the truly exceptional quality of our undergraduate and graduate programs requires supplemental resources. Our students' learning environment depends vitally on the philanthropic efforts of our community of supporters. As always, we are deeply indebted to your generosity.

Wishing you health and contentment in the New Year.

Faculty Awards

JOHN COTTLE

We are proud to announce that Associate Professor John Cottle has received the Geological Society of America's coveted Early Career Award from its Mineralogy, Geochemistry, Petrology, and Volcanology Division, in recognition of his superior scholarship.

John was lauded by his peers with a second major award, the Mineralogical Society of America's Distinguished Lecturer for 2016-17. This honor recognizes John's eminence as a researcher, as well as his speaking skills.

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A free annual publication of:
Earth Science
1006 Webb Hall
UC Santa Barbara
Santa Barbara, CA 93106–9630
Information: (805) 893.4688
Giving: (805) 893.4604
www.geol.ucsb.edu

Photo: Rainbow Basin by Jackson Cook

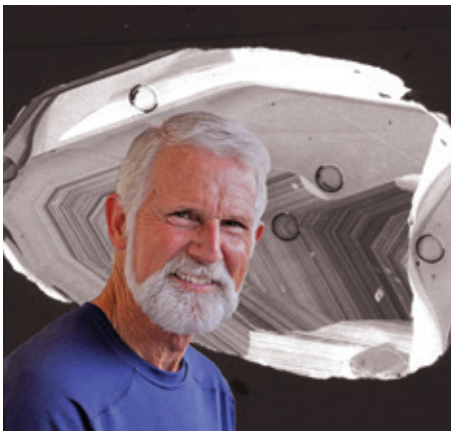
A Field Course in the High Sierra (Earth 6)

by Doug Burbank

Developed by Doug Burbank and Brad Hacker a decade ago, *Mountains, Boots, and Backpacks* takes sophomores into the Sierra to introduce them to the wonders of our natural landscape and history, engage them in making field observations that underpin geologic discovery, and perhaps recruit a few new majors! Held in the two weeks before Fall classes begin, this year 16 students spent 10 days based at SNARL (the Sierra Nevada Aquatic Research Lab: one of the UC Natural Reserves that is situated near Mammoth). Each day has a different focus in an attempt to generate illuminating student insights on diverse geologic processes and history. Early on, students use relative dating techniques on glacial moraines to separate them into past glaciations and calculate paleo-snowlines during Pleistocene glaciations. Thereafter they survey active faults and figure out displacements and approximate slip rates. The rich (and recent) history of Long Valley Caldera and Mono Craters provides an ideal setting to explore volcanic processes, eruptive sequences, and the hazards they produce. Going into deeper magmatic processes, a day in Yosemite examines both magma dynamics and some mapping quandaries: how do we draw boundaries between plutons? As the course wraps up, students gauge the discharge of channels flowing into Mono Lake, and then use data on evaporation, precipitation gradients, and lake geometry to build a water budget for the basin. A favorite day begins on Westgard Pass with a study of the diversity of Early Cambrian Archeocyatha fossils, culminates at 10,000 feet among the 4000-yr-old bristlecone pines, and then uses modern climate and tree-ring records to examine correlations of climate with ring widths. This writing-intensive course also provides repeated, detailed feedback on effective written communication. So, even if these students don't become majors, they have picked up new skills and insights that should serve them well in the future.

Students from Earth 6: *Mountains, Boots, and Backpacks*, and Professor Doug Burbank take a break from mapping glacial moraines above Convict Lake in the Eastern Sierra.

Professor Emeritus Profile



JAMES MATTINSON

Jim came to UCSB in 1973 from the Geophysical Lab in Washington D.C. where he was a post-doc helping develop new zircon U-Pb analytical techniques. Previously, he completed his BA and PhD degrees at UCSB, with Cliff Hopson and George Tilton as advisors. The path to joining the UCSB faculty was complex, to say the least. With his post-doc ending, Jim wrote to his faculty advisors to ask if they would provide references. Instead, then Chair Dick Fisher offered Jim a job as an Assistant Professor to fill the position about to be vacated by an anticipated retirement. But the retirement was delayed, followed by a UC-wide hiring freeze, and then new rules on hiring procedures. After four long years "subsisting" as a researcher (lunar rocks) and lecturer in the Department, Jim finally became an Assistant Professor in 1977. Jim taught a wide range of courses including physical geology, summer field geology, mineralogy, petrology, geochronology, and radiogenic isotope tracers. He also served as Department Chair for a total of 8 years—3 in the early 1990s, and 5 in the mid-2000s

His research focused on U-Pb zircon geochronology of igneous rocks from Alaska to Antarctica. He also continued his quest for improved analytical methods. His greatest success was the invention of his "chemical abrasion" technique, which greatly improved the precision and accuracy of zircon dates. Jim's "chemical abrasion" is now the standard technique in virtually all U-Pb zircon labs world-wide.

Faculty Awards

TANYA ATWATER

Congratulations are in order for Professor Emerita Tanya Atwater. This past year she received the prestigious Career Contribution Award from the Structural Geology & Tectonics Division of the Geological Society of America for "achievements that have led to major advances in the fields of structural geology and tectonics."

No less impressively, Tanya also received an Emmy! Yes, Tanya received an Emmy from the Academy of Television Arts & Sciences for her work on the documentary "Geology Across the American Landscape." Specifically, she received the "2014 Los Angeles Area Emmy for Instructional Programming," for "On Camera Talent." Is this a tantalizing hint of an encore career?

STAFF SPOTLIGHT: PETER GREEN

Peter started working with computers as a kid. "My older brother was into computers from the very beginning and quickly got me hooked. I remember him bringing home borrowed systems that I could tinker with—a Zenith the size of a suitcase, a Commodore 64, an IBM PC 8086 and of course the awesome Macintosh II. I was hooked." Although Peter got his B.A. in English and Comparative Literature, he never lost that passion for computers. After graduating from UCI he worked for Adaptec, based out of Milpitas, CA. He ended up at UCSB where he's been for the last 10 years. "What has been so special about working on our campus," Peter says, "is the people. It's a different environment than Silicon Valley, much more like a family. Earth Science is a great example of that and—they have a reputation. Everyone on campus knows what a great department it is, how happy the people are and how well things work between faculty, staff and students. Believe me, that played a huge part in my coming here. I haven't been disappointed and hope to be here for a very long time."

DISTINGUISHED ALUMNI 2016

Every year, the department honors two of its alumni—one from industry, and one from academia—celebrating their accomplishments and providing our current students with exemplary role models.

RUTH HARRIS

Ruth obtained her BS and MS degrees from MIT and Cornell University, respectively, then worked for a few years before applying to UCSB's Department of Geological Sciences PhD program. UCSB had been highly recommended to her by a former classmate and coworkers.

Ruth reports that the Department made a huge difference in her professional path forward. At UCSB she learned important skills from her supportive geology housemates and her officemates, and from many other friendly and kind classmates too. She appreciates that her advisor, Ralph Archuleta provided her with generous funding and research topic tips. Ralph also gave her advice about how to succeed as a postdoc and transition to a real job, and he has continued to be a supportive mentor through the 20+ years since graduation.

During the course of her UCSB graduate studies, Ruth learned many unexpected things from her professors. "For example," she writes, "during my Comprehensive Exam it was discovered that I had not had any paleontology classes, so I was signed up to take Bruce Tiffney's course, *The History of Life*. Talk about a fantastic opportunity! I also learned that the sisters of professors will help out their siblings when a field trip experiences bad weather. This occurred during John Crowell's San Andreas fault field trip that journeyed from the Mecca Hills to Parkfield. We encountered an unexpected snow storm, and the next thing we knew, our entire class was gratefully bedded down in our sleeping bags inside John's sister's home in Victorville."

(Continued on page 9)

MELISSA MORSE REISH

I came to UCSB in the fall of 1992 with little notion of what I wanted to study. One of my first college courses was Bill Prothero's Oceanography course. It was fascinating! Mid-way through the quarter, I went on a departmental field trip to the Eastern Mojave, led by Art Sylvester, Tanya Atwater, and Bob Norris. After that trip, I was completely hooked!

After finishing my bachelor's in 1996, I stayed on to do my master's with Jim Boles, working on cores from the fluvial deltaic Oficina Formation in Venezuela. We collaborated with geologists from Benton Oil and Gas Company in Carpinteria. This was my introduction to the oil business. From there I interned with Exxon and joined them full-time after finishing my master's in 1999. Living in New Orleans and working offshore in the Gulf of Mexico, I discovered the addictive thrill of drilling for oil. Witnessing the merger of Exxon and Mobil first-hand sparked a second professional passion for me, business. A few years later, while working for Occidental in Long Beach, I earned my MBA from Pepperdine University.

Today, I am fortunate to manage a team of incredibly talented geologists, engineers, and support staff that is focused on developing California's vast heavy oil potential. I am married to an amazing (and amazingly patient) geologist, Nathan Reish, and we have two beautiful and funny sons.

ROBERTA RUDNICK

Dr. Roberta Rudnick, who joined the Department in January of this year, is a geochemist who studies the origin and evolution of Earth's continents. By analyzing the elemental concentrations and isotopic compositions of rocks and minerals she endeavors to gain insights into the composition of the continental crust and underlying mantle lithosphere, and the processes responsible for creating them. Rudnick integrates geophysical data, such as seismic velocities and heat flow measurements, with her petrologic and geochemical studies to place bounds on lithospheric composition. One line of evidence comes from study of xenoliths—literally foreign rock fragments that are carried rapidly to Earth's surface from the lower continental crust and lithospheric mantle. While the deepest drill hole on Earth reached depths of about 12 km (the Russian

drill hole in the Kola Peninsula), xenoliths allow geologists to sample much deeper in the Earth, to depths of 250 km or more. Rudnick equates the volcanic pipes that carry xenoliths as "the poor man's drill hole," and, like drill cuttings, the recovery is incomplete, so Rudnick and her students and collaborators have to piece together lithospheric structure relying on the mineral assemblages in the xenoliths. Her main field areas are eastern China and northern Tanzania where she is investigating how processes such as subduction and continental rifting affect ancient continental lithosphere.

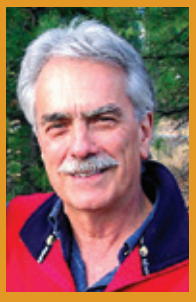
Rudnick came to UCSB after serving 15 years as a Professor at the University of Maryland, in College Park, MD. Prior to that she spent six years on the faculty at Harvard, where she was the only woman on the faculty and was the first woman to receive tenure there. Prior to Harvard she spent five years as a Research Fellow at the Research School of Earth Sciences at the Australian National University (where she had received her PhD in 1988), and two years as an Alexander von Humboldt Fellow at the Max Planck Institute for Chemistry in Mainz, West Germany. Hailing from Portland, OR, where she saw Mt. St. Helens explode as her capstone experience as a senior at Portland State University, Rudnick is happy to be back in the West, where geology is inescapable.

ROBERT D. BALLARD

Dr. Robert D. Ballard joined our ranks as Adjunct Professor in Earth Science, July 2016. Bob received his undergraduate degrees in Geology and Chemistry with minors in Mathematics and Physics from the University of California, Santa Barbara in 1965, along with a Commission in Army Intelligence. In 1967, while attending the Hancock School of Marine Geology at the University of Southern California, he was "called up" for active duty during the Vietnam War and transferred into the U.S. Navy, where he served for 30 years. He was assigned to the Office of Naval Research as the oceanographic liaison officer in the Northeast, which included M.I.T.

(Continued on page 9)

BRUCE LUYENDYK



Professor Emeritus Bruce Luyendyk was honored this year with a mountain named after him! Mount Luyendyk is in Antarctica's remote Fosdick Mountains, a place Bruce knows well from his years conducting field research there. The United States Board on Geographic Names recognized Bruce by noting "his cumulative research, findings, and publications have significantly increased scientific knowledge in Antarctica." Congratulations, Bruce!

UCSB SHIPMATE REUNION

Steve Miller, Antoinette Padgett, Laura Penvenne, Ken Macdonald, Rachel Haymon, Andreas Stollar, Nell Beedle, Suzanne Carbotte.

On May 1, 2016, there was a reunion of about 30 UCSB Earth Science Department alums and others who participated in UCSB-led expeditions from the early 1980s to the present (Chief Scientists: Emeriti Professors Ken Macdonald and Rachel Haymon). Many had gone on one of several expeditions to Easter Island, or to the South Atlantic (traveling from Rio de Janeiro, Brazil, to Capetown, South Africa).

It all started when Steve Miller posted his seagoing photos online, and shared them with his old shipmates. The photos triggered much nostalgia, and led to the terrific idea of a reunion at Ken and Rachel's home in Santa Barbara. Professor Emerita Tanya Atwater generously offered lodgings at her home for anyone who needed a place to stay. Steve put together a great slide show spanning the decades. Attendees and hosts provided a delicious buffet and libations, and Professor Emeritus Cliff Hopson (who went on an Easter Island expedition) brought a beautiful cake. There was no shortage of hugs and sea stories! Also, quite a few fellow alumni and shipmates who could not attend communicated greetings and joyous memories by email.

As we reminisced, we all marveled at our extraordinary shared experience of exploring and learning about the deep sea, and bonding as shipmates and friends. We also celebrated recent honors bestowed upon several of UCSB's seagoing alums: Suzanne Carbotte, Fellow of the American Geophysical Union, Jeff Severinghaus, National Academy of Sciences, and Dawn Wright, the Greg Leptoukh Lecture of the American Geophysical Union. A wonderful time was had by all!

Your Donation Dollars at Work

We are deeply grateful to you, our many alums, colleagues, and friends of the department who have helped us financially this past year! You have helped another group of students travel to Eastern Nevada and Iceland for an unforgettable Summer Field experience. Your support also helped students travel throughout the world.

You have underwritten awards to our many accomplished students, supporting their lab research, and field work, providing them the resources needed to reach their full academic potential.

You have helped us host internationally-renowned scholars, bringing the fruits of their scholarship through our doors.

And your generosity has helped us recruit exceptional faculty and graduate students, raising the already enviable stature of our department globally.

We wish ...

12-passenger van for field trips. This vehicle would save the Department much of the cost of renting vehicles, and give us ready access to mobility when the need arises.

New field equipment: camp stoves, the replacement of aging Bruntons, and new field-oriented technologies.

Revitalization of department's space, especially main office, tectonic work room, computer lab, and seminar rooms.

Your Ideas Welcome

We truly welcome your thoughts. What do you remember as a student here? What needed the most help or support? We are very interested in your input, and greatly value your perspective.

Thank you all so much!
Andy Wyss, Chair

With Appreciation

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Thank you

I am honored by your support and your confidence in my research abilities. ...I can only hope to fulfill your expectations and will work hard to do so —JG

Your generosity makes an enormous difference to graduate students...I plan to use this award to help with the costs of my upcoming field work in Patagonia—a trip which would not have been possible without your donation ... —ES

The leadership award made it possible for me to afford field camp, and for that I cannot thank you enough. I Hope to contribute to the Department for years to come, so I may make it possible for students to achieve more the way you made it possible for me. —LS

LAURA REYNOLDS

I am a 5th year PhD student working with Dr. Alex Simms. I graduated with a B.A. in Earth Science and Creative Writing from Dartmouth College in 2011. For my thesis I conducted a palynological analysis of a New Hampshire lake sediment core, which peaked my interest in using sedimentology to decipher past environmental change.

At UCSB I study the Quaternary evolution of the beautiful coast of Southern California. In my first year, I collaborated with researchers at UCLA and UCI to determine marine radiocarbon reservoir corrections for California estuarine shells. Shortly after, Alex and I compiled radiocarbon dates from southern Californian estuaries to develop the first uplifted-corrected Holocene relative sea-level database for Southern California.

The rest of my thesis is based off sediment cores from Carpinteria Marsh, a structural estuary along the Santa Barbara Channel. I am working on describing the impact of California's "Great Storm" of 1861 on the coast, using a multi-proxy geochronology based on the sedimentological record of historically-dated human impacts (European pollen, byproducts of hydrocarbon combustion, etc.).

I am currently working in Japan with Dr. Yusuke Yokoyama at the University of Tokyo on the final chapter (or two) of my thesis, using stable isotope measurements to identify Holocene environmental changes and subsidence events in Carpinteria Marsh.

As I approach the end of my studies, I am grateful for the opportunities and support I have received from this remarkable community of students, faculty, and staff. From my first scientific conference to my first trip outside of North America, graduate school

has opened the world to me. In my future, I can only hope to pass on what I've learned here: integrity in scientific research, enthusiasm for teaching and outreach, and the joy of being able to look over a landscape and understand a little of how it came to be.

STAFF RETIREMENT: **DAVE ROBBINS**

I began working in the Department in 1988, practically the Pleistocene in IT terms. I led the wiring project of the Department's then-seven buildings; it was September 16, 1991 when I connected Webb Hall to the Internet. On the same day, I opened the Department Mac Lab for student use. And six days later, my wonderful daughter was born. Following that week, I always loved to tell people that I had three babies born that week.

On one occasion while up on a ladder installing the raceway that carried the network cabling through the building, a student walking by asked me if I was installing earthquake reinforcement. There seemed nothing else I could do but answer in the affirmative.

I later led a second wiring project in 1999 to upgrade the network cabling and in 2002, I returned to management of the Mac Lab where in 2008 and again in 2016, I purchased large numbers of Macs to again update the lab.

HAPPY TRAVELS, DAVE!!

TREVOR SMITH

I was born and raised in San Diego, CA. I attended UCSB for my undergrad receiving a B.S. in Geophysics (2014). I started research with Professor Chen Ji during my junior year not knowing much about the field. We had a really cool project that dealt with hydraulic fracturing, a controversial topic. Although I never produced any "official" results, this project required me to learn skills that prepared me for graduate level research. This project intrigued me so much that I decided to continue research on the same project at the graduate level.

Currently finishing my thesis for my M.S. in geophysics, I have really enjoyed my research. I've always been fascinated by the petroleum industry, and I couldn't have asked for a more perfect project to work on during graduate school. Since fracking is a hot-button topic that we've all seen on the news, many places are trying to ban it, including Santa Barbara County. For the last two years, I have been testing an algorithm that detects and locates micro-earthquakes induced by hydraulic injections. The algorithm was successful in detecting more micro-earthquakes compared to traditional methods, and our results reveal more detail about the fracture network. My research is important for the industry because it can be used to assess and mitigate some of the issues associated with fracking.

I'm glad to have spent the past six years at UCSB and I've really enjoyed becoming a part of the Earth Science Department. Thanks.

Ruth Harris

(Continued from Page 4)

Following UCSB, Ruth was an NRC postdoc at the USGS, then after two years of scrambling, writing NSF proposals, etc., for an uncertain future, she was fortunate to be hired into a permanent research position. She says that she enjoys working at the USGS, and that important aspects of her job include the breadth of expertise and kindness of her colleagues, the exciting research topics, and the availability of flexible work hours (she and her husband, whom she married while she was a student at UCSB, have two children who are now college-age). Ruth emphasizes that without the encouragement of her parents, and her UCSB Geological Sciences (Earth Science) education, she would not be where she is today. She has fond memories of her time in the Department, and is happy to see that the same enthusiasm and energy that she remembers from decades ago is still there today.

For more details about her career, please see https://profile.usgs.gov/harris

Robert D. Ballard

(Continued from Page 5)

and the Woods Hole Oceanographic Institution (WHOI). After three years of active duty he entered the Reserve. From 1970 to 1974 he was a member of WHOI's Deep Submergence Group while attending the University of Rhode Island's Graduate School of Oceanography (GSO) where he received his Ph.D. in Oceanography. For the next 30 years, Dr. Ballard moved back and forth between WHOI's Department of Marine Geology and Geophysics and their Department of Applied Ocean Physics and Engineering, where he founded the Deep Submergence Laboratory that developed the first remotely operated vehicle system ARGO/JASON for the academic community. He is now the Founding Director of the Center for Ocean Exploration at GSO and Founding President of the Ocean Exploration Trust that owns and operates the E/V NAUTILUS. He is also a Distinguished Graduate of UCSB and a member of its Board of Trustees, and an "Explorer-in-Residence" of the National Geographic Society.

Credit: Ocean Exploration Trust

Summer Field Geology (Earth 118): 2016 Edition

by Phil Gans

UCSB students standing in a portion of the 1984 Krafla fissure vent system, Iceland (above), and examining the 1875 fallout and surge deposits inside the Askja Caldera, Iceland (bottom right).

The 2016 edition of our capstone *Summer Field* course (Earth 118) was, by all accounts, a great success. Ten undergraduates completed the intensive six-week geologic mapping course under the incomparable guidance of professor Phil Gans. The first four weeks were situated in the Snake Range of eastern Nevada—a spectacular alpine mountain range. This range, with its famed low angle detachment fault, provides an ideal laboratory for students to hone their field skills in a broad spectrum of rock types. Field exercises included (a) preparing a detailed structure contour map of the detachment surface, (b) unraveling the geometry of extensional faulting of upper plate Paleozoic carbonate rocks, and (c) analyzing the strain history in lower plate tectonites. Students concluded this portion of the class by carrying out independent mapping projects in key problem areas.

After the desert heat of Nevada, the class returned to Santa Barbara and boarded flights to Iceland for their final two weeks. Transported to 65° N, students were met with perpetual daylight, cold rainy weather, and a starkly beautiful landscape of waterfalls, glaciers, hot springs, and the most active volcanic systems on Earth. Situated astride the Mid-Atlantic ridge and a mantle plume, Iceland is the only place on Earth where an active spreading center is exposed on land, and many of the landforms and bedrock exposures are Holocene or historic. This portion of field camp was basically an intensive field volcanology course, taught with considerable assistance from the University of Iceland. Field exercises included mapping vents, lava channels, and flow lobes associated with the 1975–1984 Krafla eruptions, measuring fault scarps and fissures across the active rift system, and analyzing the formation of tuff cones, central volcanoes, and subglacial eruptions. The Icelandic culinary experience was memorable as well, from delicious legs of lamb to the more questionable "rotten shark."

Students returned from their summer adventure exhausted but in great spirits. Professor Gans commented: "*I am not sure I have ever had a group that was quite this enthusiastic and engaged in what we were doing—and I have had some great groups before. On one of our scheduled days off, the entire class chose to go out in the field and continue with their current mapping project rather than go to town for some R and R. This has never happened before!*"

Volcano Geophysics Experiment At Yasur Volcano, Vanuatu

by Robin Matoza

In late July to early August 2016, Robin Matoza and graduate student Allison Austin conducted a volcano geophysics field experiment at the active Yasur Volcano, Tanna Island, Vanuatu. This experiment was part of a new collaborative project between UC Santa Barbara and researchers at GNS Science, New Zealand; the University of Alaska, Fairbanks, USA; the University of Canterbury, New Zealand; and the Vanuatu Meteorology and Geohazards Department, Vanuatu.

The field experiment consisted of a deployment of infrasound (low-frequency acoustic, <20 Hz) sensors on tethered balloons (developed by GNS) in tandem with a suite of dense ground-based seismo-acoustic, geochemical, and eruption imaging instrumentation to capture and quantify the Strombolian explosive activity. The research team's observations included data from a temporary network of 11 broadband seismometers, 6 single infrasonic microphones, 7 small-aperture 3-element infrasound arrays, 2 infrasound sensor packages on tethered balloons, an FTIR (Fourier Transform InfraRed) spectrometer, a FLIR (Forward Looking InfraRed) camera, UAV (Unmanned Aerial Vehicle) video imaging and photogrammetry, and various other visual imaging data. The UCSB group contributed an 8-station broadband seismic network and two 3-element infrasound arrays, while recording the volcanic activity using GPS-time stamped, high-frame rate, high-definition video.

Seismo-acoustic wavefields at volcanoes contain rich information on shallow magma transport and subaerial eruption processes. Acoustic wavefields from eruptions are predicted from theory to be directional, but sampling this wavefield directivity is challenging because infrasound sensors are usually deployed on the ground surface. The field data collected this summer represents unprecedented spatial sampling of the seismo-acoustic wavefield from an erupting volcano. These data will be analyzed in detail by the research team over the coming years to help test hypotheses about how volcanoes work and improve volcano monitoring efforts.

Field days were spent digging holes for the seismometers, running cables through the jungle for the infrasound sensors, and observing and imaging the eruptions and

Long-exposure of a strombolian explosion at Yasur during sunset. *Photo: Allison Austin*

pressure waves. At sunset, the spectacular display of fireworks began. The team lodged in a nearby village, just a couple of kilometers from the volcano. From there, the booms from the volcano were audible, and at nighttime, an incandescent orange glow often hung above the mountain.

Deployment of infrasound station on the crater rim of Yasur. Left to right: Alex Iezzi (University of Alaska, Fairbanks); David Fee (University of Alaska, Fairbanks); Robin Matoza. *Photo: Allison Austin*

EARTH SCIENCE NEWS

MT. LUYENDYK, see page 5

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