

Department of  
GEOLOGY & GEOPHYSICS  
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**Nuhou Kanaka Puka**

*Nuhou Kanaka Puka* ("Alumni News" in Hawaiian) is published by the Department of Geology and Geophysics of the School of Ocean and Earth Science and Technology (SOEST) for its alumni and friends. Throughout the year, we'd like to hear from you. Contributions of photos, news items, changes in address and monetary donations may be sent to Department of Geology & Geophysics, University of Hawaii, 1680 East West Rd., POST 701, Honolulu, HI 96822.

Chair: Charles Fletcher  
 Editors: GG Relations & Honors Committee; Robert Dunn, Chair

E-mail: gg-dept@hawaii.edu  
 Phone: (808) 956-7640  
 FAX: (808) 956-5512

Visit our web site at  
<http://www.soest.hawaii.edu/asp/GG/index.asp>

## 2006 Kiholo Bay Earthquakes Rattle the Hawaiian Islands

Hawaii is one of the most seismically active states in the U.S., and experiences large earthquakes (magnitude (M) > 6.0) on a regular basis, at least every decade or so. All earthquakes in Hawaii are ultimately due to the active and growing volcanoes, although the specific processes causing different earthquakes varies.

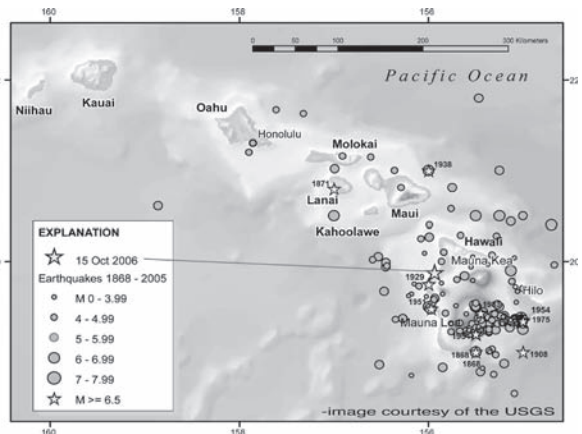
The October 15, 2006, 40-kilometer deep M 6.7 Kiholo Bay earthquake and its aftershocks were types of earthquakes referred to as "deep mantle earthquakes" to distinguish them from the shallower crustal earthquakes (such as the 1975 M 7.7 Kalapana earthquake) that also occur in Ha-



*Kalahikiola Congregational Church in Kapa'au, after the October 15, 2006 Magnitude-6.7 earthquake. Photo courtesy USGS.*

waii. Scientists have long recognized that such deep mantle earthquakes occur at Hawaii: it is believed that these deep events are the result of the stresses generated by the huge weight of the islands and the resultant flexure/bending of the lithosphere.

The M 6.2 Honumu earthquake in 1973 (causing \$4 million damage) was also a deep earthquake and it has been suggested that the 1871 M 6.9 Lanai earthquake



*M6.7 Hawai'i earthquake of October 15, 2006.*

and the 1938 M 6.9 Maui earthquake were likely deep mantle earthquakes as well. Scientists and engineers at the University of Hawaii have served on the Hawaii State Earthquake Advisory Committee (HSEAC) to the Hawaii State Defense, in order to provide advice to the state on earthquake hazard mitigation and emergency response issues [e.g., Pritchard et al., 2007].

*Cecily Wolfe, Associate Professor*

## Message from the Chair

Greetings from the Department of Geology and Geophysics! We always look forward to reaching out to our alumni, friends, and colleagues around the world with our annual newsletter. Inside you'll find information on the activities of our faculty and students, and a description of department achievements.

As in the past, we report on faculty publications. Publishing research findings is recognized globally as the "bread and butter" of the scientific enterprise. SOEST and especially G&G are populated by prolific writers of peer reviewed scientific literature. Our curriculum recognizes that a student's education is not complete until they understand that publishing research results is the final sign of a successfully completed project.

Personally, I advise my students to define their research activities in terms of "publishable units." In this regard student papers are always a special treat. Here are some of the student papers that have been published in the past year.

1. *Denevi, B.W., P.G. Lucey, E.J. Hochberg, and D. Steutel (2007), Near-infrared optical constants of pyroxene as a function of iron and calcium content, J. Geophys. Res., 112, E05009, doi: 10.1029/2006JE002802.*
2. *Carey R.J., B.F. Houghton, J.E. Sable, and C.J.N. Wilson (2006), Contrasting grain size and composition in complex proximal deposits of the 1886 Tarawera basaltic plinian eruption. Bull. Volcanology (online).*
3. *Eason, D. and J. Sinton (2006) Origin of high-Al N-MORB by fractional crystallization in the upper mantle beneath the Galapagos Spreading Center, Earth & Planet. Sci. Letts., 252, 423-436.*
4. *Nosal, E.-M., and L.N. Frazer (in press) Modified pair-wise spectrogram processing for localization of unknown broadband sources, IEEE J. Ocean Engineering.*
5. *Nosal, E.-M., and L.N. Frazer (2006) Delays between direct and reflected arrivals used to track a single sperm whale, Applied Acoustics, 87(11-12), 1187-1201.*
6. *Mittelstaedt, E. (2007) Modeling the sharp compositional interface in the Pu'u 'O'o magma reservoir, Kilauea volcano, Hawai'i. Geochem. Geophys. Geosys., 8, (1).*
7. *Oakley, A.J., B. Taylor, P. Fryer, G.F. Moore, A.M. Goodliffe, and J.K. Morgan (in press) Emplacement, growth, and gravitational deformation of serpentinite seamounts on the Mariana forearc, Geophysical Journal International.*
8. *Rotzoll, K., A.I. El-Kadi, and S.B. Gingerich (2007) Estimating hydraulic properties of volcanic aquifers using constant-rate and variable-rate aquifer tests. J. American Water Resources Assoc., 43, no. 2: 334-345.*
9. *Wilcox, B.B., P.G. Lucey, and B.R. Hawke (2006) Radiative transfer modeling of compositions of lunar pyroclastic deposits, J. Geophys. Res., 111, E09001, doi:10.1029/2006JE002686.*

I hope you all visit the new GG website <http://www.soest.hawaii.edu/asp/GG/index.asp> on a regular basis. We post job opportunities, special announcements, curricular plans for the next 5 years, and profiles of all GG members. Link up and check it out (and while you're at it click the "Create an Opportunity" button and make a donation to the department).

My very best wishes,

Chip Fletcher  
Department Chairperson



# Confirmation of Degrees & Student Awards

## Undergraduates

Penny Larin	(BS, Fall 2006)
Parker Babcock	(BA, Spring 2007)
Jesse Favia	(BS, Spring 2007)
Jeffrey Fennell	(BA, Spring 2007)
Christopher Pollio	(BA, Spring 2007)
Benjamin Sellers	(BS, Spring 2007)
Keli Sproat	(BS, Spring 2007)
Lisa Tatsumi	(BS, Spring 2007)
Michael Theune	(BS, Spring 2007)

## Masters of Science



**Emily Chapp**—*Mariana Forearc Basin Evolution from 14°N to 18°N: A Seismic Stratigraphic Analysis* (Advisor: B. Taylor, Fall 2006)

**Christin Shacat**—*Measuring Surface Displacement with Synthetic Aperture Radar Interferometry (INSAR) and Gamma Software: A Case Study from Kapoho, Island of Hawaii* (Advisor: B. Brooks, Fall 2006)

**Erin Diurba**—*Automated Rugosity Values from High Frequency Multibeam Sonar Data for Benthic Habitat Classification* (Advisor: B. Appelgate, Spring 2007)

**B. Benjamin Studer**—*The SOEST DataHotSpot—What is it, and how to use it* (Advisor: C. Fletcher, Spring 2007)

**Melody Studer**—*Structural Restoration and Application of Dynamic Coulomb Wedge Theory to the Nankai Trough Accretionary Wedge Toe* (Advisor: G. Moore, Spring 2007)

(above) Fall 2006 Graduates: Emily Chapp (MS), Christin Shacat (MS), Penny Larin (BS)



(left) Spring 2007 Graduates: front row—Mike Theune (BS), Keli Sproat (BS), Lisa Tatsumi (BS), back row—Brett Wilcox-Denevi (PhD), Melody Studer (MS), Ben Studer (MS), Jesse Favia (BS), missing—Erin Diurba (MS), Parker Babcock (BA), Jeffrey Fennell (BA), Chris Pollio (BA), Ben Sellers (BS)

## *Doctor of Philosophy*

**Brett Wilcox-Denevi**—*Understanding the Composition of the Lunar Mare Through Reflectance Spectroscopy* (Advisor: P. Lucey, Summer 2007)

### *Student Awards*

#### ***Agatin Abbott Memorial Award***

*Presented to an outstanding senior each year in memory of department faculty Agatin Abbott.*

**Lisa Tatsumi**

#### ***Harold T. Stearns Fellowship***

*Endowed by longtime department friend, Harold T. Stearns, for the purpose of supporting student research on geological and geophysical problems in Hawaii and the Pacific Basin.*

**Jared Marske, Francois Paquay, Kolja Rotzoll**

#### ***J. Watumull Scholarship***

*Awarded annually to the department's outstanding graduate student from an endowment from the Watumull Foundation.*

**Rebecca Carey**

#### ***ARCS***

*Awarded by the Achievement Rewards for College Scientist foundation.*

#### ***Toby Lee Award in Geology***

**Todd Bianco**



*Patty Lee (retired G&G instructor), Todd Bianco and Dan Lee at the G&G Sweet Success year end party on May 3, 2007 where the first ever ARCS Toby Lee Award in Geology was announced. Todd's big smile reflects the overwhelming appreciation he has for the Lee family and the \$10,000 scholarship in honor of their son Toby Lee.*

# *In the News... Honors and Awards*

## *Faculty*

In July 2006, Julia Hammer was notified that she was a recipient of a Presidential Early Career Award for Scientists and Engineers (PECASE)- the highest honor bestowed by the U. S. Government on scientists and engineers beginning their independent careers. This award recognizes Julia for integrating various methodologies to study how magmas accumulate, mix and equilibrate before ascending to the surface during volcanic eruptions on Earth and other planetary bodies, and for developing educational activities and outreach efforts to enhance the scientific literacy of high-school teachers in the State of Hawaii.

In addition to this award, Julia was also recognized by the Geological Society of America as an Exceptional Reviewer for Geology, 2006.

*President Bush shown with several of the 65 PECASE recipients for 2006, twenty of these represent the NSF, Julia Hammer included. She is four persons to the right of the President and one row above.*



## *Students*

**Todd Bianco** received an Outstanding Presentation award at the 2006 Fall AGU meeting for his work “Geographic Variations in Hotspot Geochemistry Caused by 3D Dynamics and Melting of a Heterogeneous Mantle Plume.”

**Tom Fedenczuk** was awarded an Honorable Mention in the MARGINS Student Prize competition for his outstanding presentation at the 2006 AGU Fall Meeting. He received this recognition with a poster presentation entitled “Quantitative Characterization of Topographical Features in Digital Elevation Models (DEM) and Bathymetry Data”.

In November 2006, four graduate students **Will Koeppen, Adrienne Oakley, Chris Bochicchio** and **Jared Marske** shared a community service moment by taking four 3rd grade classes (100 students total) from Salt Lake Elementary on a field trip. Their goal was to teach the children about Hawaiian geology around Waianae. Jared reported “We stopped near the Waianae Health Center to look at carbonates and then to Kaneana cave. We explained what geology is, and what we do as grad students. It was a fun and rewarding experience.”

### **Grad Students WIN the Softball 2007 Challenge, Again**

In the long history of epic battles and glorious combat, when it has come time to defend what is yours, to make a stand, the greatest of commanders have taken to the high ground for the advantage. The 2007 Faculty/Grad Softball Challenge was no different. The grads chose Kamilo Iki Community Park, in the wilds of Hawaii Kai, below the summit of Koko Crater to defend their title and regain the Johnny Geeangee Memorial Trophy of Supreme Power and Ultimate Righteousness.

*(continued on page 6)*

But the faculty, who had suffered in the months following the 2006 loss, now regrouped with vengeance in their hearts and the belief that if you love something, you must set it free, and if it comes back to you, it is truly yours. Almost shorthanded by the “mainlanding” of the entire Fletcher family, faculty members Mike Garcia, Garrett Ito, Brain Popp, and Scott Rowland were bolstered by the rising talent of postdocs and undergrads. The faculty team was a well oiled machine in the field for the first inning, citing various softball textbooks in every play, and suggesting the grads look up “defense” in the dictionary if they perhaps would have liked to see a picture of the faculty.

The grads returned the favor, holding the faculty to three in the bottom of the first. That’s where the pitching duel ended. In the second inning, Adam Johnson threw the sluggish grad team on his back and carried

them with a powerful display of “homerunnery,” starting an epic grad rally from which the faculty would not recover. In the end, the final score of 20-16 did not truly convey grad dominance, so the following poem was commissioned to capture this fact.

The faculty plays softball well.  
Better than the grads.  
Because grads don’t play softball.  
Grad softball is a business.

After the game, good spirit was returned to both sides as they cheered each other, exchanged handshakes, shared an ice bath laugh at Todd Bianco’s cold, shivering expense, and with mutual respect agreed to meet again in 2008.



## *Jenny Engels Returns to G&G as New Faculty*

In August of 2006, Jenny Engels, two-time UH G&G alumnus (Masters and PhD), returned to the department as an Assistant Professor. Jenny was hired to teach the Department's GG101 course entitled "Dynamic Earth", with dual goals of increasing course enrollment and attracting new majors to the Department.

Jenny first arrived at UH in 1999 to complete a Masters degree with Margo Edwards of the Hawaii Mapping Research Group. Her early research focused on the seawater-lava interface during deep sea eruptions at the East Pacific Rise, and gave her a taste for field work and the joys of long hours spent processing data at sea. Margo convinced her to stay on for a PhD in the Department, and her dissertation examined the glacial history of the North Slope of Alaska using seafloor data collected by a nuclear submarine. In the meantime, Jenny and her husband Doug Holdt had fallen in love with Hawaii, and after a brief return to beautiful (but rainy!) Oregon, they decided to make Oahu their permanent home.

After defending her dissertation in 2004, Jenny took a job with the Honolulu office of the international consulting firm URS Corporation. There she worked with fellow UH G&G alums Carol Mitsuyasu, Jack Kronen, Nate Adams, and Donielle Chittenden on a range of government and commercial projects. Of her time spent at URS Jenny said: "Consulting really

opened my eyes to a whole different view of this island paradise we live in. I got to see the landfills, the petroleum and chemical spills, the asbestos sites, and the sewer installation business. It was a great learning experience though!" This view of the "real world" side of geology was one of the reasons that the Department felt she would be a good addition to the instructional faculty in G&G.

Since her arrival in time for Fall semester 2006, Jenny has been busy with teaching, field trips to the Big Island, and advising the Geology Club. In addition, her work with fellow professor Steven Stanley has been a wonderfully enlightening introduction to paleontology, especially animal diversity through time, and has helped her to develop a strong historical geology component in her GG101 course. Of teaching GG101 Jenny says: "I've learned more in the last 9 months of teaching this course than I did the entire 9 years that I spent in college. It's been an invigorating challenge to keep the students interested and motivated. I can't think of anything else I'd rather be doing!"

Jenny will spend a month this summer working in France as UH's resident director for their study abroad program in Annecy, a small town in the foothills of the French Alps. She's looking forward to exploring the Alpine geology while enjoying French food and good company.



(left)  
*Jenny Engels and the  
GG101 and 105 Field  
Trip participants*

## *New Faculty – Eric Hellebrand*

In September 2006, Eric Hellebrand joined G&G as a full-time Assistant Specialist. He keeps the Electron Microprobe and XRF facilities running and teaches the Electron Microprobe Analysis course. In the sparse times when he is not replacing o-rings, valves or electronic boards, he is an igneous petrologist, focusing on magmatic processes in the lower oceanic crust and upper mantle using various microbeam analytical techniques.

Eric and his wife Miranda both grew up in the Netherlands, but they'd lived in Mainz, Germany for ten years before moving to Honolulu. "This has been quite an eventful year, not only having to adapt to a new lab and the associated challenges, also the drastic changes for my family that come with such a big move. My 5-year old daughter, Liv, is going to Kindergarten. It is amazing how fast she's settled in and picked up English. My son Liam just turned 1 year in April. He is such a contagiously happy guy."



*Eric Hellebrand and children Liam (1) and Liv (5)*

At the Max-Planck-Institute for Chemistry in Mainz, Eric finished his Ph.D in 2001. He's become one of the few experts in the world that investigate mid-ocean ridge magmatism by looking at the residues of partial melting: abyssal peridotites. He sailed on five cruises, of which two were to the high Arctic with the German research icebreaker Polarstern. Since his last cruise on Joides Resolution, Eric moved up a bit and now focuses on the formation of the lower oceanic crust. "The ridge community has been making limited progress on improving our understanding of the geodynamic controls on melt formation in the mantle and the mechanism of its migration from mantle to crust to

seafloor. This is because 95% of the research is done on the accessible end product, mid-ocean ridge basalt. I am confident that we will significantly improve our general understanding by devoting more resources to the deeper parts of the plumbing system. My vision is to make Hawaii the center for upper mantle and lower crust research in the world."



*Eric Hellebrand freezing in the Arctic near Spitzbergen*



## New SOEST Young Investigators in G&G

G&G welcomed **Dr. Helge Gonnermann** in November 2006.



*Helge and his wife Elizabeth Lu at the Pali.*

Helge's research interests are in the study of fluids and fluid-like behavior within Earth and near its surface. He received his PhD from the University of California, Berkeley, where he worked with Mark Richards and Michael Manga on analog laboratory experiments of mantle convection. His experiments showed that plate-scale mantle flow, induced by lithospheric plates sinking into the lower mantle, will result in noticeable spatial variations of heat flux across Earth's core-mantle boundary and in the modulation of plume formation. Helge also quantified the rate of mixing during thermal convection of a density-stratified fluid, concluding that a chemically dense lower-mantle reservoir may have persisted throughout Earth's history. More recently Helge investigated the effects of bubble growth and nonNewtonian magma rheology on the eruption and fragmentation of silicic magmas. He developed numerical models to show under what conditions conduit processes such as viscous heating, magma fragmentation, shear localization, and permeable outgassing dominate volcanic eruptions.

Before joining SOEST Helge was a Daly Postdoctoral Fellow at Harvard University, where he worked with noble gas geochemist Sujoy Mukhopadhyay on degassing of mid-ocean ridge and ocean island basalts. "I knew nothing about noble gas geochemistry before I arrived at Harvard. Fortunately Sujoy was patient and we were able

to resolve the decade-old Helium concentration paradox. This has enabled us to provide constraints on the abundance of primordial noble gases in Earth's mantle."

At SOEST Helge has started collaborating with Bruce Houghton and Andrew Harris on studying the fluid dynamics of magma degassing during explosive basaltic volcanism, using a combination of analog fluid dynamics experiments and numerical modeling. He may also participate in a project that involves the study of pore fluid flow in marine sediments. Outside of SOEST, Helge has been learning how to surf and paddle in an outrigger canoe. "Having always been a person who enjoys hiking and running after a ball, I never thought that I would like a sport that confines me to sitting in a boat. Of course, I was completely wrong."

**Dr. Rhea K. Workman** joined G&G this past January 2007. She completed her PhD in Marine Geology in 2005, from the M.I.T./Woods Hole Oceanographic Institution Joint Program where she worked with Stan Hart on determining the chemical composition of Earth's mantle.

Fortunately for her, this research included yearly trips to the Samoan Islands! Land based field work in Samoa included rock sampling across the island chain and the installation of a GPS network to monitor volcanic hazards on the youngest island, Ta'u. Ocean-based research focused on the volcanically active seamount, Vailulu'u (the equivalent to Hawaii's Loihi), along with

*(continued on page 10)*



*Rhea Workman*

mapping, sampling, and dating underwater portions of the Samoan volcanoes. One of the research cruises was on UH's vessel, the R/V Kilo Moana!

Before arriving in Hawaii, Rhea spent one year as a postdoctoral fellow at Caltech, where she continued to study the composition and evolution of Earth – but here she traded her typical work in a clean lab for work in an experimental petrology lab and a stable isotope lab.

Now at UH, Rhea “hopes to find and answer new questions about the chemical dynamics of the Earth using isotope and trace element geochemistry”. She is interested in a wide range of topics, and is excited about

using the powerful analytical facilities that are here, like the 1280 ion microprobe, or soon to arrive, like the multi-collector ICP-MS. Rhea has joined Ken Rubin, John Sinton and John Mahoney on their ongoing study of the Galapagos Spreading Center and has become involved with the Deep Ocean Anti-Neutrino Observatory. In many ways, Rhea says arriving in Hawaii “is much like coming home”. She has been fascinated with the geology and culture of the Hawaiian Islands ever since her first visit here over 10 years ago, when she was an intern at the Hawaiian Volcanoes Observatory.

## *New Students in G&G*

### *New Fall 2006 Undergraduates:*

Emilie Grau  
Lauren Swavelly  
Andrew Thompson  
Jason Turban  
Samantha Weaver

### *New Fall 2006 Graduate Students:*

Maria Carolina Anchieta Fermin  
Michael Chandler  
Darwina Griffin  
Brian McGrane  
Kelly Mitchell  
Francois Paquay  
Lisa Swinnard

### *New Spring 2007 Undergraduates:*

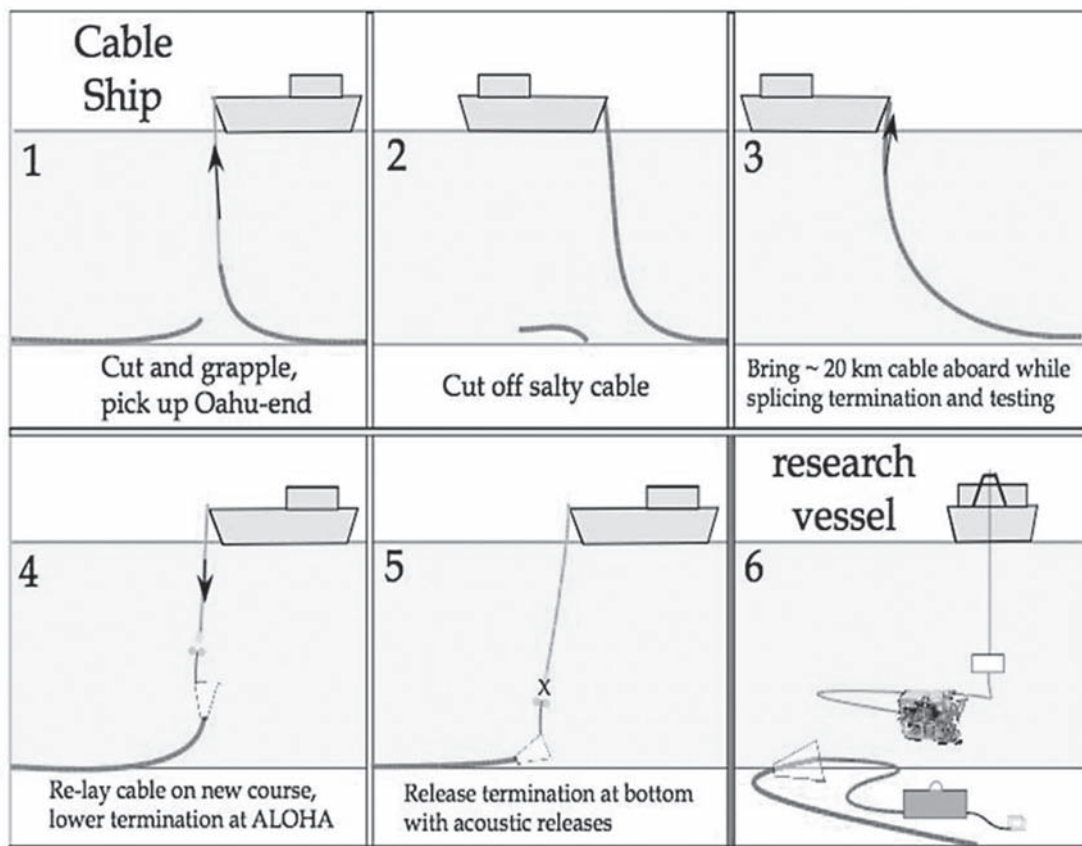
Jeff Fennell  
Maria Janebo  
Noah Kippen  
David Kunat  
Nancy Niklis  
Chandler Penn  
Aaron Rice  
Hayley Williamson

### *New Spring 2007 Graduate Students:*

Arjun Aryal  
Kimberly Binsted  
Carrie Plath  
Thomas Shea

## *New ocean bottom observatory successfully deployed off Hawaii*

At 3:00 AM, February 16, 2007, an acoustic release was fired, allowing the ALOHA Cabled Observatory (ACO) to settle to its new home on the ocean floor in 4,700 m of water at Station ALOHA, the National Science Foundation (NSF) funded oceanographic research site approximately 100 km north of Oahu. Within minutes, observers at the AT&T Makaha Cable Station were listening to humpback whale song via the ocean-bottom sensors. “The cable was cut and moved to Station ALOHA where the termination frame was successfully spliced to the retired HAW-4 fiber optic cable, donated to the project by AT&T, and deployed on the seafloor from the U.S. Navy cable ship USNS Zeus. This “Proof Module’ is to remain operational in this configuration through October,” explains Fred Duennebie, Principal Investigator. “In November 2007 it is to be recovered and replaced with the full observatory, using the Remotely Operated Vehicle (ROV) JASON II from University of Hawaii’s research vessel the R/V Kilo Moana. The full observatory will have eight connectors to power up to eight attached experiment systems.” The location of the ACO is ideal, in that it builds on the research site Station ALOHA, which has been the site of monthly shipboard observations of water column physics, biogeochemistry, and ecosystems for over 18 years under the Hawaii Ocean Time-series (HOT) Program. The ALOHA Observatory will provide power and communications capability necessary for continuous monitoring of the ocean environment for at least a decade. “We have a pressure sensor which can detect changes in sea level of a few mm, so we easily see tides,” adds Duennebie, “We should be able to detect even very small tsunamis, and we’ll see the passage of ocean waves from distant and local storms.” A hydrophone can detect earthquake p-waves and T-phases and possibly signals from distant submarine volcanic eruptions. The hydrophone also picks up the magnificent noises of marine mammals, such as whales. Listen to the initial sounds recorded at [www.soest.hawaii.edu/GG/DeepoceanOBS/index.htm](http://www.soest.hawaii.edu/GG/DeepoceanOBS/index.htm).



*During the five-day cruise, the Zeus Cable Repair ship cut and recovered the retired HAW-4 electro-optical telecommunications cable, pulled aboard 20 km of cable, laid it back out to Station ALOHA, spliced the cable to the ACO cable termination frame, tested the system, and lowered the frame and Proof Module to the ocean floor.*

## *SOEST's Isotope Clean Lab Moves to POST*

After 10 years of waiting, the SOEST Isotope Lab completed its move from HIG to 6th floor POST last year. The lab is now fully operational, with a greatly enhanced and comfortable work environment.

In 1985, J. Mahoney arrived at UH to establish an analytical facility capable of precise strontium, neodymium and lead isotope measurements to understand petrogenetic processes and mantle geochemistry. Acquisition and installation of a VG Sector multi-collector solid-source mass spectrometer, building of a class 1000 clean room (i.e., <1000 particles <0.5 micron in size per ft.<sup>3</sup>) in HIG, and the arrival of Khal Spencer in 1987 were fundamental components of this original endeavor. In 1992, K. Rubin joined SOEST as a Young Investigator and moved into one of the HIG clean rooms, setting up protocols for thorium, uranium, radium, and polonium isotope analysis of rocks and corals. A critical component to the U-Series program was the acquisition of a mass spectrometer capable of making such analyses. This second mass spectrometer (a high abundance sensitivity, ion-counting, multi-collector Sector 54), dedicated to U-series analyses, was installed in 1994.



Detailed plans for a new and larger clean laboratory were included with the original POST Building plans in 1991; however, when construction was completed, the new laboratory did not come close to matching the plans or specifications, and a long period of redesign, rebuilding and remodeling ensued. Finished in March 2006, the main central lab space (~570 ft.<sup>2</sup>) is surrounded by two smaller labs; one for U-series chemistry (~130 ft.<sup>2</sup>) and one for general purpose wet-chemistry, reagent distillation and labware cleaning (~190 ft.<sup>2</sup>). There is also an instrument room that houses our alpha-counting unit, a high-vacuum bake-out apparatus for degassing filaments, a spot welder and bench for assembling filaments, and a binocular microscope for glass and mineral picking. The new clean laboratory complex can comfortably allow 8-10 users working on different research projects.

The SOEST Isotope Lab hosts scientists and students from around the world and attracts many Young Investigator candidates who know the facilities and data quality by reputation. Our mainstay research continues to focus on mantle source evolution and petrogenesis of mid-ocean ridge basalts and ocean island basalts, the geochronology and timing of mantle melting of young oceanic volcanism, the processes of compositionally bi-modal volcanism at active volcanoes in Mexico and Iceland, and large igneous province generation. In addition, projects on environmental contamination and sea level indicators are frequently conducted. The future for isotope analyses in SOEST looks even brighter. Rubin and colleagues have secured NSF support to acquire a multi-collector inductively-coupled plasma mass spectrometer (MC-ICPMS) that will improve speed and precision of some existing analyses (i.e., Pb, Nd, Th, U) and open research avenues into new isotopic systems (e.g., Mg, Fe, B, Hf) by conventional solid-source thermal ionization mass spectrometry. This related facility will operate in concert with, but separate from, the Isotope Lab operation. Remodeling of the POST 620 chemistry lab and instrument room in preparation for installation of a new MC-ICPMS is moving forward and an instrument purchase will be decided during summer of 2007.

## *Distinguished Alumnus: Jim Kauahikaua*

Returning to Hawai‘i for my Master’s degree was the last thing on my mind when I left the islands after graduating from Kamehameha School, but my place of birth became amazingly important to me during my college years braving the cold winters of Southern California.

The summer after graduating from Pomona (with a BA), I joined a science cruise that started at Midway Island and traveled down the island chain to Honolulu. This is exactly what I was after in life—outdoor science work in exotic, warm locales near the ocean.

I was lucky to get a research assistantship with the Hawai‘i Geothermal Project doing resource exploration throughout the islands. Our group worked on the Ko‘olau caldera on O‘ahu, East and West Maui Volcano, and, of course, the volcanoes of Hawai‘i Island. My master’s thesis, with Dr. Gordon Macdonald, developed a simplified way to reduce data from time-domain sounding systems. I still remember



the IBM punch cards and the old UH computing center—not fondly—but I remember. UH was the coolest place to do graduate studies. There was always exciting science going on, mostly involving ocean cruises. Each of the professors was deeply and passionately involved in a variety of fields. It felt like the secrets of the Pacific were being unveiled and, as a student at HIG, I had a front row seat. What I didn’t learn in class, I learned at Friday afternoon beer sessions. Professors socialized with students and technicians in the HIG courtyard. Those sessions were important to my professional development. After graduation, I was offered a one-year Minority Internship with the U.S. Geological Survey to work in their Electromagnetism group in Denver, Colorado. One of my projects with this group was assessing the geothermal potential of an area at the north edge of the Mojave Desert.

I returned to UH for a PhD while still working for the USGS Electromagnetism group. They had long-standing projects at Kilauea volcano measuring the in situ electrical properties of magma in lava lakes. I was able to help with this work, as well as use electromagnetic geophysics for ground water prospecting on islands around the state of Hawai‘i and Micronesia. After my PhD, I accepted a transfer to the Hawaiian Volcano Observatory from the USGS Electromagnetism group in January, 1988, continuing the work of retiring Dallas Jackson. My focus was the application of geophysical methods to volcanological problems. Around 1990, when Kilauea lava flows were advancing through the town of Kalapana on Hawai‘i Island, I became really interested in lava flow dynamics. It was of immediate practical use because we needed to do short-term predictions of where the lava would advance in the next 24 hours. Lava flows and tubes became my primary interest. These studies gradually led to work on the mitigation of volcanic hazards in Hawai‘i. HVO scientists work closely with County and State Emergency Managers on hazard mitigation plans and public education. I’ve attended my share of meetings and lectured publicly. My UH training, augmented with growing up in Hawai‘i, gave me an excellent familiarity with Hawai‘i geology and geophysics that I still use.

*As Scientist in Charge of the USGS Hawai‘i Volcano Observatory, G&G alumnus Jim Kauahikaua is a continuing reminder of where hard work, a keen intellect, and graduate degrees from our department can take a person in life. Throughout his career as a volcanologist and geophysicist Jim has also found time to participate in community outreach efforts. Jim is the G&G Distinguished Alumnus for the 2007 academic year. We asked Jim to send a report of his activities and background.*

*(continued on page 14)*

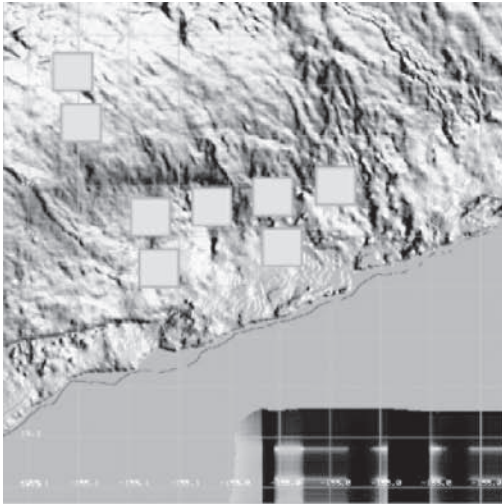
For the last two-plus years, I've been the Scientist-in-Charge of HVO. As a measure of the success of my leadership, I will say that no one has died! The position requires many more meetings and public lectures than I ever thought possible, especially the meetings. I miss the science very much and continue to try different ways to get back to field work when my SIC duties allow.

There is good science going on in the form of UH-HVO collaborations. Don Swanson and Bruce Houghton are mapping the explosive deposits produced by Kilauea volcano and, in the process, rewriting our understanding of basaltic eruption mechanisms. Ben Brooks and James Foster are working with Asta Miklius and Mike Poland studying the surface deformation of Hawaiian volcanoes. Ben and James recently teamed with HVO in a study of slow earthquakes under Kilauea's south flank. Paul Okubo and Cecily Wolfe are extracting a deeper understanding of earthquakes beneath Hawai'i Island. Frank Trusdell has worked with Mike Garcia on Mauna Loa geology. HVO has provided some good students for UH GG—several of our volunteers have been successful students securing advanced degrees from the department. Frank Trusdell, who is now on the HVO staff, obtained a Master's degree at UH. James Foster was a long-time volunteer before securing a PhD at UH. Others on a similar path include Kurti Sharma, Dorsey Wanless, and Darwina Griffin.

Because Hawai'i is often described as the most isolated land mass in the world, then HVO and UH GG must individually be the most isolated advanced geology groups in the world. It is natural for HVO and UH to work together and I look forward to continuing the interaction.

### ***Supporting Field Trips for Students***

The Department benefits from the generosity of alumni who provide financial support for activities that would be otherwise difficult to finance. One of these activities is our undergraduate field trip program, which is essential to broadening the educational experience of our students. The department also accepts funds for graduate student fellowships in support of basic research. For additional information, please see the Department of Geology and Geophysics Web Site ([www.soest.hawaii.edu](http://www.soest.hawaii.edu)). Thank you for past donations.



*Images from the 2007 GG460 field trip to the Big Island. Part of the reason for visiting the active flowfield is to get an idea of how space-based thermal images (left) relate to the actual amount of active lava on the ground ([right] Darwina Griffin collecting a sample for geochemical analysis). Without the ability to download satellite data in the field, however, scientists always have to satisfy themselves with comparison to the previous day's data, e.g., from <http://modis.higp.hawaii.edu/cgi-bin/modis/modisnew.cgi>.*

# Alumni News

## 1960's

**Floyd McCoy** (MS '65) is off to sabbatical for a year, as a Senior Fulbright Scholar to Greece as well as a Visiting Research Professor in the Wiener Laboratory (for geoarchaeology) at the American School of Classical Studies at Athens (foreign work on archaeological grounds in Greece must be done through foreign "schools" [in the Greek sense of the word], including geology). Obligations will include teaching graduate seminars, leading field trips, and advising graduate students. Research will continue to focus on the consequences of the huge Late Bronze Age eruptions of Santorini (Thera) on cultures in the Aegean and eastern Mediterranean region through ash-fall, pyroclastic flows, seismic activity, tsunami, etc. Additional research programs will involve cooperative work in MG&G with the Hellenic Center for Marine Research and Texas A&M University's underwater archaeology group, as well as a program in Israel with the Univ. of Halifa. It will mean abandoning "normal" life at WCC—undergraduate teaching, providing majors to the department, running various undergraduate research programs, etc. But after six years of participating and leading the faculty senate for UH and WCC and watching research programs wither, it is time to return to the basics at Greek haunts and islands.

## 1970's

**Charles Fein** (PhD '71) Vice President at KC Environmental Inc., shared that he's been living on Maui since 1979, and after a 17 year career as an environmental manager at Haleakala High Altitude Observatories, he established an environmental planning firm in 1996 to conduct environmental planning and permitting for government.

**Mayo Ryder** (MS '71) is retired from the U.S. Department of Energy and living in Las Vegas.

## 1980's

**Robert Yonover** (PhD '89) assisted in the development and adoption of the FAA-approved EVAS technology for "Smoke in the Cockpit" emergencies. He invented the SEE/RESCUE® high visibility locating device and recently received DARPA grants to fund the prototype development of the patented LIFE/FLOAT™ technology, the patented Emergency Supplemental Floatation



*Robert Yonover*

System (ESFS or "PocketFloat"), the Enhanced/Covert SEE/RESCUE®, the co-patented Video Search And Rescue (vSAR) technology, the Emergency Pocket Water Desalinator (EPWD), and the Portable Personal Motion Detector (PPMD).

The SEE/RESCUE® technology is now in use by all branches of the U.S. military, including a recent DoD line item for the Self-Deploying Infra-Red SEE/RESCUE ("SDIRS"—for U.S. Air Force ejection-seat fighter pilots). SEE/RESCUE is now on all U.S. Navy Submarines. On the personal side, he's been married to Cindy for 23 years and has two teenage children, Jesse and Kera.

**Michael Jackson** (MS '82) is a Geophysicist at Noble Energy, Inc. in Texas. His generous donations to the G&G Field Trip Fund, with matching donations from his company, has helped many students participate in field work and field trips locally and abroad. Michael was the 2006/2007 G&G Distinguished Alumnus and remains a close friend and benefactor of the department.

**Arthur Gregory** (MS '80) is a Geophysicist for Saudi Aramco living in Saudi Arabia.

**David Grooms** (MS '80) is an Associate Professor at Maui Community College.

Since graduating in 1984, **Brian Terauchi** (BS '84) went to work in Sacramento, CA for the EPA in their Oil and Gas Compliance Division, but after two and a half years he gave it up and came back to Hawaii. He intended to do an MBA, but got involved with the College of Education instead. Brian student-taught at McKinley HS, and started working at Leilehua HS in 1987, soon after

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transferring to Aiea HS, his alma mater. He married Patricia in June of 2004 on the cruise ship the Diamond Princess, in Alaska. Recently, Brian had a great semester at UH, where he took four physics classes, so that he could start up an AP Physics program at Aiea HS.

### 1990's

You can find **Ruth (Multhaupt) Wilmoth** (MS '90) in Vancouver Washington working as an Engineering Geologist/Geotechnical Engineer for Columbia Geotechnical.

**Wendy Zayac** (MS '92) of Environmental Geologists reports from Westlake Ohio that she is "currently dabbling in koi pond and water feature design, installation and maintenance... with some environmental consulting on the side."

**Janet Cushing** (MS '94) is working for USGS, in the Biological Resources Discipline at the HQ office. She says "I'm a bureaucrat now. It is giving me insight into the somewhat chaotic world of DC politics though. I do miss geology though, but at least I can attend some seminars."

**Sue Finstick** (PhD '96) is living in Utah and works for Bulloch Brothers Engineering Inc. as a Hydrogeologist.

**Andrea Kaawaloa-Okita** (BS '97) is living on the Big Island working as a Park Ranger at Hawaii Volcanoes National Park.

**Ji-Cheng Shao** (PhD '98) lives in China and is an Applied Mathematician for the 8<sup>th</sup> Space Academy, Shanghai. He keeps in touch with us (and thanks us) for the newsletters he has received all these years. (You're welcome!)

**Zhao Zhiyong** (PhD '98) is a Senior Geophysicist for Paradigm Geophysical Inc. and lives in Houston, Texas.

**Stefano Baffi** (MS '99) is living in the Netherlands working as a Seismic Interpreter with Horizon Energy Partners B.V. He says that after graduation, he worked for a medium-sized consulting company in LA then moved to Holland in early 2002 to join Shell. Tired of corporate life, he resumed consulting in 2004.

**LTC Joseph Ingignoli** (MS '99) reports "the Army thing is still fun (mostly)." After nearly 20 years active duty, he says he will probably stay for another 3-4 years as he

enjoys taking care of soldiers and their families, however the moving every 1-2 years is hard on the family.

**Susannah Mistr** (MS '99) says she "defected to the 'dark side' and got my MD at the Medical University of South Carolina in 2005, where I have been for the last five years." She currently is doing a pre-residency in clinical/research in Pediatric Ophthalmology with Dr. M Ed Wilson. She is looking forward to a 3-year residency program in Ophthalmology beginning in July 2007, in Baltimore, at the University of Maryland.

**Steven Quane** (MS '99) earned his PhD from the University of British Columbia in 2004, and is currently on the faculty of Colorado College.

### 2000's

Living in Florida, **Jason Langley** (MS '00) is a Senior Staff Geologist pursuing his Florida PG license.

**Thomas (Toby) Vana** (BS '01) is working locally for the USGS Pacific Islands Water Science Center as a Hydrologist.

**Margaret Milman-Barris** (MS '02) is continuing her studies at California Institute of Technology working on her PhD.

**Ebitari Isoun** (MS '02) has been living in the Washington DC metropolitan area since 2002. She is currently working at a mid-sized environmental and information technology consulting firm, Project Performance Corporation. Here she is working to help government and private sector clients solve their most challenging business problems.



Last summer, Ebitari married Matthew Larsen, who went to University of California, Irvine for undergraduate studies and University of Southern California for graduate school.

**Carrie Plath** (BS '04), **Donielle Chittenden** (BS '03) and **Mike Dahilig** (BS '04) returned to campus to donate a few hours after work one evening in Fall 2006 to talk to the current G&G undergrads. Motivated by free pizza, the undergrads heard about a typical day working as a geotechnical geologist, what skills are most useful in the



job market in Hawaii, what to include in their resume and typical pay scales. Alumni interested in sharing your story and job experience with students, please contact Jenny Engels, [engels@hawaii.edu](mailto:engels@hawaii.edu), or Scott Rowland, [scott@hawaii.edu](mailto:scott@hawaii.edu)—we'll buy the pizza and gather the students.

**Eden Feirstein** (BS '04) is living in Tucson, AZ working on her Masters degree and reports "I am developing a groundwater model for the Colorado River Delta in Mexico. It's been an interesting project and has involved some collaboration with a university in Mexico and some fun fieldwork there too." She hopes to complete her degree in December and travel in South America after graduation.

**Jeremy Kimura** (BS '04) is working as a Hydrologist for the state of Hawaii Commission on Water Resources Management. He says he's "still the same slacker everyone remembers."

**Angela (Miller) Peltier** (BS '04) who was married in August 2004, says she is employed as a Geologist at Mountain Edge Environmental in Hawaii.

**Christina Hirsch** (BS '05) is a Geologist with Phelps Dodge Bagdad, Inc. in Arizona. She works on slope stability in an open pit copper porphyry mine while continuing her education as a graduate student at University of Missouri, Rolla pursuing her Masters in mine engineering.

\* \* \*

And... from a recent Aachen exchange student (1998-99) **Ingo Kock**, shared that he graduated from Aachen in Spring 2003 and works as a Scientist for the Research Center Ocean Margins.

***You too can share your life's accomplishments with the G&G ohana by visiting our website.***

***<http://www.soest.hawaii.edu/asp/GG/index.asp>***

***Just click on Alumni Feedback.  
We would love to hear from you!***



*Spring 2007 MS graduates Ben and Melody Studer model the new G&G T-shirts being sold by the Geology Club. Ben was the winner of the logo contest and his design appears on the front of the T-shirt. The back of the T-shirt lets everyone know "Geologists make better lavas." T-shirts are UH green with white lettering. Adult only sizes: S, M, L, XL. Cost: \$12 each. Contact us at [gg-dept@hawaii.edu](mailto:gg-dept@hawaii.edu) to place an order; we will be happy to mail it to you if you include the cost of postage. Supplies are limited, order today!*

## Geology Club Rocks...

The Geology Club has had a full and active school year in 2006-2007. The Club was founded to help support undergraduate field trips in required courses such as Field Methods and Structural Geology, while at the same time building a sense of community among undergraduates via field trips and fun, geology-related activities. Highlights of the year include:

- Overnight camping trip to Malaekahana beach park in February, 2007
- Eight students received partial scholarships from the Geo Club for the Spring 2007 Field Methods course in Death Valley, CA
- First year of participation in the nationwide recycling contest RecycleMania 2007. Geo Club recycling bins around SOEST saw a 250% increase in recycling and earned the club over \$900.

- Rock-climbing class at Makapu'u with Climb Aloha
- New UH G&G T-shirt designed.
- Departmental pizza and Christmas parties and Spring Picnic organized.
- Other fundraising activities included the Geo Club coffee cart, lab manual sales, themed food sales at TGs, baked goods sales, etc.

Everyone is looking forward to the summer break, but we plan to keep going strong with fundraising and fun activities next year, starting with a hiking and camping trip through Haleakala Crater when school starts. Mahalo to everyone who has helped to support us this year!



## *Geology and Geophysics Field Trip Fund at Work!*

### **GG305 goes to Mojave!**

The 2007 version of GG305 (Geological Field Methods) spent 11 sunny, warm, windy, and cold days mapping, and learning to love non-Hawai'i rocks and structures. The students learned how to deal with the elements, with grungy rocks, with fierce cold winds, and even with snakes! Mahalo to Chuck and Hal Helsley, who shared their geological, historical, and natural historical knowledge of the Mojave desert. A big



mahalo also goes out to the Geology & Geophysics Dept. travel fund for generously paying for our field vehicles. In the photo above, the students and Dr. Helsley are relaxing after their final day of mapping on quarried blocks of one of the coolest rocks in the world—the Cronese Hills mylonite. A simple website of the GG305 travels can be found at [http://www.higp.hawaii.edu/~scott/GG305/GG305\\_photos.htm](http://www.higp.hawaii.edu/~scott/GG305/GG305_photos.htm).

### **GG460 goes to the Big Island!**

Each year the GG460 (Geological Remote Sensing) course goes to Kilauea for 3 days of remote-sensing-related field work. We spend one day on the active lava flows learning about thermal remote sensing, and how small active pa-



hoehoe toes manage to ignite 1 km<sup>2</sup> MODIS pixels. Then we spend 2 days ground-truthing the students' final projects. At that point they have seen the area only on computer monitors, so it is an opportunity to see what they got right, what they didn't, and most importantly why they got things right or not. The course and field trip are jointly sponsored by the Hawai'i Space Grant Consortium and the Dept. of Geology & Geophysics' travel fund.

Here is the 2007 GG460 gang (including co-instructor Rob Wright) about to head off and ground-truth their own maps (note Mauna Loa in the background for scale). For more photos, see [http://www.higp.hawaii.edu/~scott/GG\\_460\\_BigIsland/Ground\\_Truth.htm](http://www.higp.hawaii.edu/~scott/GG_460_BigIsland/Ground_Truth.htm).

### **GG601 goes to New Zealand!**

The GG601 Explosive Volcanism class, led by Bruce Houghton and Sarah Fagents, had a very practical introduction to volcanic processes when their field excursion to New Zealand was punctuated by the long-forecast breakout flood and lahar from Mt. Ruapehu's Crater Lake. (March 2007)



## Faculty News

**Garrett Apuzen-Ito** is having as much fun as ever teaching GG304, through which more and more of Oahu's gravity field is being mapped. He also continues to teach graduate classes in geophysics and continuum mechanics. Todd Bianco and Eric Mittelstaedt are Garrett's current PhD students, working on problems related to the generation of hotspot magmatism and the effects of hotspots on mid-ocean ridge tectonics. In addition, Garrett has been using numerical models of asthenosphere-lithosphere dynamics to study the effects of magmatism on the faulting styles and morphology of mid-ocean ridges. Garrett and Kahlil are having loads of fun with Sekai who celebrated her first birthday in February. Sekai has "dog!," "duck!," and "purple!" down very well but needs a little more practice with "time trial" and "linear, viscoelasticity."

**Janet Becker** has continued her research on coastal processes. Specifically, with graduate student Christine Pequignet (OCN) she has been examining wave transformation over a reef at Ipan, Guam as part of the U.S. Army Corp PILOT project. The data collected is providing insights into the reflection and transmission of wave energy, set-up and coastal inundation at reef fringed islands. Additionally, with Merrifield (OCN), Fletcher (GG), Pawlak (ORE), Brooks (HIGP) and students, she has started work on a Sea Grant project to study run-up and coastal flooding on the north shore of Oahu. In her spare time, she enjoys working on Green's functions on a sphere with Wessel (GG) and energy balances in POM with Glenn Carter (OCN).

**Fred Duennebier**, in a joint project with Roger Lukas and Dave Karl in the Oceanography Department, announced the initial installation of a new deep-ocean observatory at Station ALOHA, about 60 miles north of Oahu. The observatory was installed by cutting the HAW-4 electro-optical telecommunications cable retired by AT&T several years ago and donated to the project. This is the first deep-ocean re-use of a retired electro-optical cable for a scientific observatory. The NSF-funded observatory will begin to host user experiments this November when Woods Hole's JASON II installs the main observatory infrastructure. A hydrophone and pressure sensor now installed at the observatory have recorded earthquakes, ocean waves, ships, pingers, rain, and three species of whales since the observatory was installed in February. You can listen to a real-time audio feed by going to our website [www.soest.hawaii.edu/GG/DeeпоceanOBS/index.htm](http://www.soest.hawaii.edu/GG/DeeпоceanOBS/index.htm).

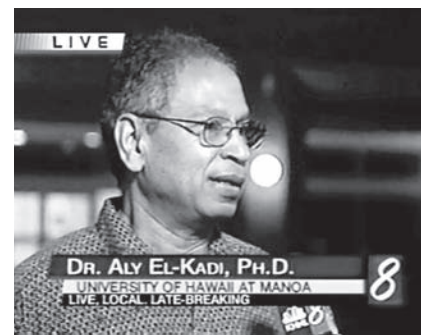
**Robert Dunn** is studying the mantle and lithosphere along the East Pacific Rise and the Arctic ridge system, and is still waiting for ship time for his experiment along the Lau Spreading Center. His graduate student A. Delorey finished his work last year on the mantle beneath the Reykjanes Ridge. Last summer's undergraduate intern, J. Hebden, examined the energy flux of seismic surface waves along mid-ocean ridges and presented his work at the AGU meeting in San Francisco. Visiting student O. Hernandez, from L'Ecole Normale Supérieure in Paris, tracked Blue whales that were recorded during Rob's ocean-bottom seismic experiment along the East Pacific Rise. Robert was elected to the RIDGE steering committee and the OBSIP oversight committee last year.



*Rob Dunn and Julia Hammer welcomed a son, Arjen Alexander Dunnhammer on Dec. 13, 2006.*

**Aly El-Kadi** and the hydrogeology group are involved in a wide range of research subjects. Students in the group are: Bill Cutler (PhD; Remediation of arsenic in Hawaii soils), Pat Hughes (PhD; Petroleum contamination in near-shore aquifers), Elaine Lampitoc (MSc; Modeling groundwater occurrence in Ford Island, Oahu), Jeff Perreault (MSc; Water budget for Tutuila Island, American Samoa), Kolja Rotzoll (PhD; Parameter estimation of volcanic aquifers), and Bob Whittier (PhD; Assessment of surface water and groundwater of the Pahsimeroi Subbasin, Idaho).

In addition, current research projects or those completed in 2006 include demonstrating watershed participatory assessment and action in the North Shore area of Oahu; risk assessment of the Red Hill Fuel Storage Facilities, Oahu; mapping and hydrologic assessment of low elevation lands on Oahu; and source water assessment program (SWAP). Research for the State of Hawaii, such



as SWAP and watershed studies, is used to address regulatory issues that are mandated by the Federal Government. During 2006, Aly was invited to represent the State of Hawaii in the Jeju-Hawaii Water Forum, Jeju, Korea, and presented a talk about history of groundwater research in Hawaii. He also was invited to represent the University of Hawaii for a watershed sustainability meeting in the Philippines, and presented a talk about watershed research in Hawaii. Additionally, he attends meetings of the Wahiawa and North Shore Neighborhood Community Boards to provide advice on hydrological matters.

In 2006, **Sarah Fagents** was successful in obtaining a 3-year NSF award to model the processes of lahar evolution as it both picked up sediment along its flow path and deposited material in the Whangaehu Valley, NZ east of the crater lake. A UH party of Fagents, Bruce Houghton and Rebecca Carey, together with NZ colleagues, was the last group to work in the valley prior to the lahar—documenting the geometry of the potential flow paths from source at Ruapehu Crater Lake to some 9 km down stream—the critical interval where the lahar gains most of its mass. After the GG601 excursion, Fagents, Houghton and two graduate students, Christopher Hamilton and Lucia Costantini, returned to measure the geometry (by GPS) and grain size (sieving) of both the 2007 deposits and the sediment sources incorporated in the lahar, in areas where the deposits will be stripped by stream action over the ensuing winter. Fagents plans to return in February 2008 to complete the process of documenting this unique event.

**Chip Fletcher** Greetings everyone! The Coastal Geology Group this year consisted of stalwart technical staff Matt Barbee, Chyn Lim, Matt Dyer, and Ayesha Genz. Graduate students Chris Bochicchio, Sean Vitousek, and Brad Romine have been working hard on thesis projects including, respectively: reef-top sand field analysis, modeling shoreline response to sea level and wave events on Maui, and historical shoreline change on Oahu. Undergraduate researchers Amanda Vinson, Craig Senter and Morgan Smith have been assisting in shoreline change studies on the islands of Kauai and Oahu. An important project this year has included the amazing programming abilities of Ben Studer who with Chyn Lim, has created the website: [hawaiibeachsafety.org](http://hawaiibeachsafety.org) – a website that captures real-time feeds of wave height and wind speeds from the National Weather Service and uses these to assign beach hazard rankings at over 50 beaches around the state. This site is operational and finding widespread use as the “official” beach safety site for the State of Hawaii.

**Neil Frazer** currently works on predictions of beach erosion with Ayesha Genz (a recent MS) and Chip Fletcher. As sea level rises, beaches are disappearing all around the nation, but storms and other variables make the process unsteady, so rates of loss can be difficult to estimate, and modern methods of estimation are essential. Neil also works with graduate student Eva-Marie Nosal, developing algorithms for tracking sources of underwater sound, including whales. Humpback whales in shallow water create difficult challenges in tracking because of the duration of their sounds and many reflections that occurs in shallow water. Eva-Marie’s work on this subject recently won a prize of a thousand Euros, and has been featured in the newsletter of the IEEE Journal of Oceanic Engineering. Neil also continues to work on the population dynamics of parasite interchange between sea-cage farmed fish and wild fish. Sea-cage fish provide a reservoir host for many pathogens and parasites whose levels in wild fish would otherwise be limited by predation. His work with Martin Krkosek and others recently appeared in the Proceedings of the National Academy of Sciences.

**Eric Gaidos** and his students and postdocs continue to work on a wide range of topics ranging from molecular evolution to the formation and detection of Earth-like planets around other stars. He and his former postdoc Ketil Sorensen have published the first detailed look at the microbiology of coral reef sediments using molecular techniques. Postdoc Antje Rusch is continuing that line of investigation with further studies of reef microbes and their metabolisms. Eric is continuing to work with Jillian Ward on the mysterious, minute animals called placozoans. Jillian is applying molecular techniques to these mm-sized tropical marine invertebrates to understand their evolution and speciation. They have been recently joined by Gayle Philip, a new postdoctoral fellow with the UH/NASA Astrobiology Institute and an expert on the techniques of phylogenetics. Eric and Icelandic colleagues continue their chemical and biological studies of samples obtained last year from a subglacial volcanic lake; an environment that may be analogous to habitats on Mars. Eric and his student Nick Moskovitz at Manoa’s Institute for Astronomy have discovered new asteroids in the main belt that show evidence of past volcanic activity presumably driven by radioactive heat sources in the early Solar System.

**Michael Garcia** and his current and former students were busy in 2006 working on Kilauea’s ongoing Pu’u O’o eruption (Jared Marske, Pat Shamberger, Aaron Pietruszka), Mauna Loa’s submarine geology (Dorsey Wanless), the

*(continued on page 22)*

Hawaii Scientific Drilling Project (Eric Haskins), giant landslides off Oahu (Sarah Sherman) and rejuvenated volcanism on Kaua'i (Chris Gandy and Lisa Swinnard, work in progress). A major new project is a marine expedition with colleagues Garrett Ito and Bruce Applegate and student Lisa Swinnard using the JASON II robotic vehicle to investigate secondary volcanism around the northern Hawaiian Islands of Kaua'i, Ni'ihau and Ka'ula. A proposal to return late in 2007 to the Dry Valleys of Antarctica with an undergraduate is pending.

**Lucia Gurioli** received a 3-year NSF collaborative research grant to work on the integration of textural, chemical and experimental data to understand the style and dynamics of Plinian eruptions (Case study: AD79 Plinian eruption at Vesuvius), with Jessica Larsen, University of Alaska and Bruce Houghton, UH. This three-year award is supporting new PhD student, Thomas Shea, who started in January 2007, and an undergraduate student, Natalie Yakos. Lucia, in collaboration with Lisa Tatsumi (BS '07), is also involved in a project supported by Julia Hammer, to study kinetics of mineral reactions.



However, the most important project in which Lucia is involved, in collaboration with Andrew Harris, is as loving parent of Thomas who arrived on February 15, 2007.

**Julia Hammer** is nearing completion of the Experimental Petrology Laboratory, thus completing a three-year acquisition and installation bonanza supported by the NSF and UH. Lisa Tatsumi (BS '07) and researcher Dr. Lucia Gurioli are performing research that will aid in the interpretation of magma ascent rates at arc volcanoes such as Mount St. Helens. Graduate student Carrie Brugger collected a suite of samples from the remote Volcán Quizapu, and plans to interpret magma ascent processes encoded in the crystal textures. Dr. Julie Bowles joined the group and dove with gusto into experimental studies, performing cooling experiments on basaltic magmas under a variety of conditions to place constraints on the origin of intense magnetic anomalies on Mars. Dr. Jeffrey Gillis-Davis is synthesizing lunar glass samples in order to determine optical constants in the ultraviolet-visible wavelength range. Last July, Hammer was awarded the Presidential Early Career Award for Scientists and Engineers. This summer, her NSF-CAREER award will support a professional development program for two Oahu high school teachers.

**Bruce Houghton** and the physical volcanology group has had a splendid year with three graduating PhD students (Nan Adams, Nicole Lautze, Julia Sable) contributing 6 out of 12 published papers. Nan has a permanent position at Southwest Research Institute, Nicole holds a Mendenhall Fellowship at USGS, Menlo Park and Julia is studying science and natural history filmmaking at Montana State University.

The final touch came this month, with the award of the Watamull Merit Scholarship to Rebecca Carey, for her studies at Askja, Iceland and Tarawera, New Zealand. Our range of expertise has widened greatly with the arrival of Helge Gonnermann as a SOEST Young Investigator and we continue to be totally integrated with our HIGP colleagues Sarah Fagents (Kilauea, Ruapehu) and Andy Harris (Stromboli, Kilauea, Villaricca) and with Don Swanson at USGS, HVO. The group continues to perform physical volcanology in Chile (Villaricca), Iceland (Askja, Laki), Italy (Vesuvio, Stromboli, Etna), Nicaragua (Masaya), and of course Kilauea and New Zealand (Ruapehu, Tarawera, Taupo, Auckland). Our major NSF-funded social science project looking at tsunami awareness and preparedness in the USA is in full swing, coordinated by Penny Larin, a 2006 graduate from the department.

**Stephanie Ingle** is finishing up her second year as a SOEST Young Investigator. This past year, she has been engaged with several Integrated Ocean Drilling Program activities including: participating in a strategic planning workshop to drill ocean crust to Earth's Mohorovicic discontinuity; submitting two drilling proposals to investigate the formation mechanisms and environmental consequences of Earth's two largest igneous provinces and another to examine the style of continental breakup along the western margin of Australia; and serving as a steering committee member for a plenary workshop to coordinate scientific drilling activity aimed at large igneous provinces. The workshop will be held this July in Coleraine, Ireland. Stephanie also enjoyed doing a bit of teaching over the last year. This summer, she begins lab work on a collaborative project to look at the relationship between gabbro lenses in the oceanic crust and overlying lavas, as well as to finish up her work with John Mahoney, Garrett Ito, and John Sinton examining hotspot-ridge interaction along the Galapagos Spreading Center. Stephanie has enjoyed working with colleagues in G&G at SOEST and feels fortunate for the professional growth this position has afforded her. She thanks everyone at SOEST for this magnificent opportunity and for their support over the past two years.

**Kevin Johnson** has had a busy year. In August, he started a one-year assignment as Program Director in the Ocean

Sciences Division at the National Science Foundation in Washington, DC responsible for the Ocean Drilling Program science programs. He's been dividing his time between DC and Hawaii, handing out money, and working on his own research at UH. A month after starting at NSF, he flew to Reunion Island to join French colleagues on the French research vessel Marion Dufresne for six weeks of seafloor mapping and rock dredging in the south central Indian Ocean to study the interaction of Amsterdam Island hotspot with the mid-ocean ridge.

**John Mahoney** reports that he is as busy as (maybe busier than) ever, with ongoing land- sea-, and laboratory-based projects. Recent projects include investigations of the Louisville Seamount Chain, Nova-Canton Trough, and Emeishan flood basalts. Much of his work is being carried out in collaboration with colleagues Scott Anderson, Stephanie Ingle, Garrett Ito, Doug Pyle, Ken Rubin, and John Sinton. Other projects are with current PhD student Loyc Vanderkluysen, and former students and postdocs Marissa Tejada, Jyotiranjan Ray, and Zhaochong Zhang.

**Steve Martel** continues his study of sheeting joints ("exfoliation joints") in Yosemite National Park. Kelly Mitchell, who started in Fall 2006, is working on this with Steve for her MS Last summer, Penny Larin (BS '06) and Steve conducted field work in Yosemite that provided unexpected support for his hypothesis that the fractures form in response to high compressive stresses parallel to curved slopes. He also has funding from NASA to investigate pit craters, a topic Chris Okubo (BS '96) and Steve worked on several years ago. Steve continues to work locally to show how geologists can contribute to informed decisions (and informed policies) on land-use and public safety in Hawaii, especially in the area of slope stability.

**Greg Moore** continues to work on the Nankai Trough. He spent all of 2006 in Japan working with colleagues at JAM-STECC on the first-ever commercial 3D seismic reflection survey collected for purely research purposes. Greg spent 3 weeks on the seismic vessel Nordic Explorer and then worked with French contractor CGG, which processed the data in Kuala Lumpur, Malaysia. After the processing was completed, Greg and others worked quickly to finalize site selections for the up-coming Nankai IODP drilling. Drilling will start in September 2007 and continue for almost a year, so Greg will spend another year in Japan. Graduate student Melody Studer finished her MS degree working on Greg's previous Nankai 3D seismic data set and PhD student Toshi Ike continues his studies of sediment thickness and basement morphology of the northern Philip-

pine Sea plate and their effect on the Nankai accretionary prism during subduction.

**Brian N. Popp** and his students continue stable isotope biogeochemical research. Marian Westley finished a fabulous dissertation on the cycling of laughing gas ( $N_2O$ ) in seawater. We published insightful papers on  $N_2O$  cycling in the Black Sea and on details of mass spectrometric measurements of  $N_2O$ . Marian is now a staff scientist at NOAA's Geophysical Fluid Dynamics Laboratory in Princeton, New Jersey. Congratulations Dr. Westley! Richard Wallsgrove and Amanda Pontius continue their search for exactly where in the upper water column alkenone-producing algae live. Alkenones are used by paleoceanographers to measure past ocean temperatures ( $U^{K}_{37}$  Index) and ancient atmospheric  $CO_2$  levels. Brittany Graham continues her study of the isotope ecology of tropical tuna. Check out our paper in Marine Biology if you want to know what depth to catch large ahi around Oahu! Lastly, Joji Uchikawa finished a fascinating thesis using the  $^{13}C$  and  $^{14}C$  content of compounds derived from leaf waxes from sediments in Ordy Pond to trace and date climate change over the last 10,000 years on the Ewa Plain, Oahu.

**Ken Rubin's** research programs that focus on volcanism in the Pacific Ocean, Iceland, Hawaii and Mexico, and sea level indicators in the Hawaiian Islands were going full swing this past year, including participation in two manned submersible dive programs (one a very exiting visit to a newly detected eruption at  $9^{\circ} 50'N$  on the East Pacific Rise and the other a series of dives on Hawaii's Penguin Banks to search for deposits of the LGM shoreline and deeper structure of the banks). Ken is also keeping himself busy with preparatory work for what will be the newest and perhaps most versatile mass spectrometer to join the GG arsenal. Since July 2006, he has also been the new head of the Volcanology, Geochemistry and Petrology division of the department. Ken continues to teach courses in geochemistry and environmental geochemistry, and this year taught a new graduate seminar on deep submarine eruptions that brought together graduate students and expert faculty from SOEST to discuss multidisciplinary aspects of this interesting topic.

**John Sinton** has happily spent the last academic year on sabbatical. Highlights include summer field work on two 4000 year old lava flows in Iceland with graduate students Deborah Eason and Melissa Rotella, and two months of mapping and sampling of the West Moloka'i volcano in the fall. Since then he has been collecting data, working on

*(continued on page 24)*

manuscripts and enjoying the progress of Melissa Rotella's thesis and the dissertations of Eric Bergmanis and Deborah Eason.

**Steve Stanley** has just sent off the revised version of a large manuscript that will be published next fall as a Paleobiology Memoir. It offers an entirely new view of the history of marine animal diversity, one that shows it to entail unbridled exponential increase punctuated by mass extinctions, rather than increase that has been damped by crowding, as the reigning paradigm has portrayed it. This summer Steve will be at the Smithsonian working on collections that relate to his large project on the taxonomy, paleoecology, paleogeography, and pattern of survivorship (against extinction) of a huge molluscan fauna that inhabited tropical Florida just before the onset of the Northern Hemisphere ice age. Steve recently learned that next fall he will receive the Paleontological Society Medal and next spring the Twenhofel Medal, which is the highest award made by the Society of Sedimentary Geology.

**Paul Wessel** continues to develop GMT, the Generic Mapping Tools scientific software package and during his sabbatical began the development of a new version that can be called as a set of library routines (GMT 5). With Loren Kroenke in HIGP he models plate motions relative to mantle hotspots and with graduate students is exploring the global distribution of seamounts, the nature of the flexural deformation of the lithosphere beneath seamounts, optimization techniques to improve the quality of marine geophysical track-line data, and detection and characterization of oceanic fracture zones from satellite altimetry and their implication for plate kinematics.

### ***Additions to the Curricula***

**GG630—Numerical Modeling of Physical Systems:** A broad variety of physical phenomena are considered by the fields of Geology and Geophysics. Examples include fluid dynamics, elastic deformation, electricity and magnetism, wave mechanics, heat flow, chemical diffusion, and phase transformations. It is fundamental to our science that such physical problems are first described by equivalent mathematical models and then these equations are solved to generate simulations of the physical processes. Most of this course consists of student projects, in which students examine a physical process taken from an aspect of their own research, develop the requisite mathematical model, and then numerically simulate the process for conditions of their choosing. This course was offered last year to ten enthusiastic graduate students as a "Special Topics"

course, GG711, and will be offered as GG630 Spring '08 (Instructor: R. Dunn).

**GG461—Geospatial Information:** This course is an outgrowth of the workforce development efforts of the Hawai'i Space Grant Consortium (HSGC). It has been taught twice previously as GG711, the first time with the help of Mark Davies. The goal is to teach G&G students some of the methods of digital data collection, display, cataloging, and analysis. This includes GPS and d-GPS equipment for data collection, and then automatic display of these data using GPS and GIS software. We spend a couple of days out at Makapu'u collecting GPS data of lines (geologic contacts, unit boundaries) and points (strike and dip measurements, sample collection locations), and then manipulate and analyze these data in the lab. GIS software is used for cataloging and analyzing the data. This software is quite powerful, but also complex (and user-unfriendly); a large amount of computer-lab time is required merely to get to the point of importing data! We also use GPS and laser rangefinder data to generate high-spatial-resolution, small-area DEMs. This course will be offered during odd-numbered Fall semesters (Instructor: S. Rowland).

**GG104—Volcanoes in the Sea:** This is not a new course, but a revamped one. GG104 used to be a summer-session, Intro. Hawaiian Geology course with lots of field trips, but it hadn't been taught for ~10 years. It has been changed to a regular-semester course that looks at the interaction between geology and Pacific island cultures, both ancient and modern. An example topic is the emplacement of different igneous rocks (lava flows and intrusions), the physical properties of these rocks, and how these particular properties make these rocks good for working into particular stone implements. Another example is the relationship of climate change to cultures, including how past ice-ages produced particular geologic features and products that ancient cultures used (e.g., the adze quarry on Mauna Kea due to sub-glacial eruptions), to the problems that modern-day Pacific island cultures are having with human-induced sea-level change (e.g., Tokelau). The course will carry a Hawaiian and Pacific (H) focus designation, and all UH Manoa students are required to take at least one H-focus class to graduate. GG103 (Geology of the Hawaiian Islands) was taught in a similar vein once, and had 88 students enrolled, almost all of them took it because of the H-focus designation. However, by including all the cultural material, so much G and G had to be taken out, that we felt it no longer satisfied the GG103 description. Hence the revamping of GG104. This course will be offered during odd-numbered Fall semesters (Instructor: S. Rowland).



# Geology & Geophysics

## Publications 2006 - 2007

(GG Faculty in **BOLD**, current and former students and postdocs in *italics*)

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## ***SOEST Open House: Ocean Depths to Outer Space!***

The School of Ocean and Earth Science and Technology (SOEST) at the University of Hawaii at Manoa is pleased to announce that the 9th SOEST Open House will be held on Friday, October 19, 2007 (8:30 a.m. to 2:00 p.m.) and Saturday, October 20, 2007 (11:00 a.m. to 3:00 p.m.). On behalf of the Dean of SOEST and the Open House Planning Committee, we would like to invite you to attend this year's Open House. SOEST is home to the academic departments of Oceanography, Geology and Geophysics, Meteorology, and Ocean and Resources Engineering, as well as several related research institutes. SOEST's graduate programs in these sciences are highly ranked nationally and SOEST brings in close to \$70 million dollars in research funding per year. The SOEST Open House presents a diverse array of entertaining and educational "hands-on" activities, which highlight the research conducted by our faculty, students, and staff. You will learn about volcanoes, tsunamis, El Niño, planetary exploration, hurricanes, coastal erosion, and marine ecosystems to mention just a few topics, through a variety of videos, posters, and interactive demonstrations. You will visit state-of-the-art laboratories and hear about cutting-edge research from the scientists who are making the new discoveries! This year's Open House theme will be "Ocean Depths to Outer Space!" Please look for program updates at our Open House website: <http://www.soest.hawaii.edu/openhouse/>. For more information, please contact Tara Hicks Johnson at 808-956-3151; email: [hickst@hawaii.edu](mailto:hickst@hawaii.edu). The SOEST Open House is only offered every two years. **We hope that you will be able to join us for this great event!**



Department of Geology and Geophysics  
University of Hawaii at Manoa  
1680 East-West Road, POST 701  
Honolulu, HI 96822 USA

Address Correction Requested