DEPARTMENT OF GEOLOGY AND GEOPHYSICS

NUHOU KANAKA PUKA

UNIVERSITY OF HAWAII AT MANOA 2002

Cracks in the Earth

"Cracks in the Earth" was the cover story of "Discover" magazine this past December. Fractures are front-page news because they critically affect the crust of the Earth, influencing many processes over a broad range of scales. Fractures form the largest structures in the Earth's crust, plate boundaries, as well as some of the smallest, dislocations in crystals. Fractures largely determine the strength of the crust, as well as the strength of a hillside slope. They play a key role in the transport of mass and energy through the crust: magmas rise to the Earth's surface through dikes. They are exceedingly important in the flow of groundwater, and as a result have been of great interest in the proposed nuclear waste repository at Yucca Mountain, Nevada. Recent spectacular images of Jupiter's moon Europa show that fractures exert a profound influence on other planetary bodies as well. Fractures are now considered as prime hosts for life in extreme environments in the crust (i.e., depths of more than a kilometer) because they provide protection and sources of water. For all these reasons, fractures have drawn increasing attention from scientists, engineers, and policy makers.

Fracture phenomena have also drawn the attention of faculty and students in the Department of Geology and Geophysics, as well as SOEST as a whole. Neil Frazer has been investigating the effect of fractures on the transmission of seismic waves. Eric Gaidos is examining whether dikes of ice could have erupted on the surface of Mars to provide a source of surface water. Garrett Ito is studying how magma-bearing dikes interact as they propagate through the Earth's crust. Brian Taylor is exploring the fracture pattern on the seafloor near New Guinea as part of his research on the break up of continents. Mike Bevis, Ben Brooks, and others in the Pacific GPS Facility use satellite data to measure deformation in South America in response to locking and unlocking of the subduction zone fault off the South American west coast.

Several undergraduate and graduate students have worked with me on fracture projects as well. We have combined detailed fieldwork and original theoretical treatments in our research. One key problem we have focused on is how faults originate and grow at depth in crystalline rocks, the foundation blocks of the continents. This issue bears on critical matters in earthquake mechanics. More specifically, Margarethe Pfeiffer (BS 1996), Lester Sacks (BS 1993), Bill Boger (MS 1997), and Stephan Bergbauer (MS 1998) and I targeted faults in the granite bedrock of the Sierra Nevada, California. These faults were active many million of years ago at a depth of several kilometers; as a result of uplift of the Sierra and erosion of the overlying rock they are now wonderfully exposed above timberline in some breathtakingly beautiful areas. Our work substantiates that these faults originated not as shear fractures, but rather by shearing of pre-existing joints (fractures that originat-

Koae scarp cavity.

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ed by opening up rather than by sliding). This two-step process has important implications for the physical and chemical behavior of faults at depth, as well as for how faults grow. Stephan addressed the first step—how the precursory joints opened up at a depth of several kilometers, where pressures in the earth are huge. Using several lines of evidence and original theoretical work, he argued compellingly that at least some of these joints developed as thermal contraction cracks when the granite cooled. Geologists have known for years that lava flows at the surface crack as they cool, but Stephan has presented the best case I know of that cooling can control fracturing at a depth of several kilometers. Bill Boger and I were able to show that the diverse map patterns of faulted joints and their accompanying secondary fractures we now see could be more simply considered as horizontal cross sections at different levels through penny-shaped faults with a perimeter of fringing secondary cracks. These findings account for the way that fluids are channeled along many faults; they also show striking similarities and intriguing differences between natural faults and "synthetic faults" grown in laboratory materials. Recently, Matt d'Alessio, a PhD candidate at UC Berkeley, and I discovered a new way for strike-slip faults to form, by the tearing of pre-existing vertical dikes. This provides an answer to the longstanding problem of how strike-slip faults many kilometers long can have straight traces on maps. Here again, fracture opening preceded faulting.

Jason Langley (MS 2000) and Ole Kaven (BS 2001), a current graduate student, have been tackling how certain normal faults on Kilauea form. These faults, spectacularly displayed between the Hilina Pali Road and Kilauea caldera, are accompanied by impressive ground fissures—some more than 10 meters wide! Jason showed that these fissures formed because the faults grow up from depth, first bending the surface, and then breaking it. Ole is investigating how the faults grow laterally. For the second year in a row, undergraduates will visit these faults on a Big Island structural geology field trip. We will also visit Devils Throat, an impressive pit crater just off the Chain of Craters Road. This was a central subject of Chris Okubo's 1997 undergraduate thesis. Chris combined detailed mapping, a review of the archives at the Hawaiian Volcano Observatory, and theoretical work to show that this pit crater, and others on Kilauea, essentially formed above giant subterranean fractures associated with the rift systems. After reading the resulting paper in the Journal of Volcanology and Geothermal Research, George Walker said it was nice to see that someone finally got this problem figured out right. This was a nice compliment, especially since the pit crater problem is one of the many George has worked on.

Last, but not least, Jordan Muller (MS 1999) employed an original analysis method we developed for modeling fracture processes in slopes to address how landslides form. This treatment, though unconventional, has nonetheless been well-received by the community concerned with submarine landslides. I have followed up on Jordan's 2-D analyses, extending them to 3-D, and will be presenting the results at a special session at the 2002 San Francisco AGU meeting. Jordan's experiments with dikes in gelatin have now found their way into the structural geology class as well, where they have been a big hit.

As you can see, GG research on fractures is healthy and active. The combination of careful fieldwork, original mechanical analyses, and lab work on key problems is yielding both well-regarded results and well-rounded students. The research also is coming full circle by making its way into the classroom for both graduate students and undergraduates.

Steve Martel

Nuhou Kanaka Puka

Nuhou Kanaka Puka (which means "alumni news" in Hawaiian) is published annually by the Department of Geology and Geophysics of the School of Ocean and Earth Science and Technology for its alumni. Throughout the year we'd like to hear from you. Contributions of photos, news items, monetary donations, and especially changes in addresses may be sent to Alumni Relations, Department of Geology and Geophysics, University of Hawai'i, 1680 East-West Road, POST 713A, Honolulu, Hawai'i 96822.

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Message from the Chair

Since our last newsletter, the Geology and Geophysics department has completed its far-reaching recruiting efforts that followed the departure of several senior faculty members in late 2000. With the arrival of Greg Ravizza and Kathleen Ruttenberg (the latter split between GG and the Oceanography department) our expertise in paleoceanography has greatly expanded.

With these additions, the department's roster now sports 28 faculty (24 tenure/tenure-track), broken down into 14 professors, 4 associate professors, 7 assistant professors, 2 assistant specialists, and 1 instructor. It truly has the size, breadth, and expertise to continue to be one of the premier departments at the University of Hawaii and indeed in the country.

The fall of 2002 also saw the arrival of a bumper crop of new graduate students. A total of 18 new students (including 3 German exchange students) were admitted this fall, increasing our total number of resident graduate students to 52. The undergraduate enrollment (currently at 38) has also shown signs of a modest but steady improvement, with about 10 or so new majors being admitted into the program each fall. Because of the increasing importance that science, in particular earth science, has in people's lives, the department will try even harder to recruit more undergraduate students to our programs.

The economics of Hawaii and the nation at large continue to linger in the doldrums, and the state of Hawaii's support for its research University continues to be inadequate. We are unlikely to see any fiscal decision-making take place until the next governor has been elected and the new legislature meets in the spring. At that time, spending priorities and support for the University will become clear. What is already abundantly clear is that the flagship Manoa campus is underfunded for a University this size, and that leaves the leadership with two choices: either increase funding to comparable levels found at other state universities, or trim away less successful programs and departments. Unfortunately, the past University administration chose the time-honored "across-the-board" cuts to solve this problem, which is a solution that has the unintended consequence of hurting the best departments the most. We have faith that the new administration under President Evan Dobelle will exercise more appropriate leadership and move us forward.

With the seemingly never-ending series of budget cuts the University (and hence our department) has sustained over the last six years, the department's operating budget has eroded to the point where there is very little left for non-payroll items. This leaves us in the precarious position of being unable to provide adequate travel support for our undergraduates enrolled in required courses with field trips. While the department brings in considerable research funds and hence gets a significant portion of overhead return, such funds are largely earmarked for research and cannot be used to supplement teaching activities. As any graduate of this department can testify, the field trip components are vital to the success and relevance of our program and are not optional exercises that may be cut or scaled back significantly during hard times. Maintaining a healthy slew of field trips is bread-and-butter for any Geology program and will remain a top priority for us. While we will do all we can to continue offering subsidized field trips, I will once again appeal to our alumni to pitch in with tax-exempt donations. Our general Geology and Geophysics fund lets the department have considerable flexibility in how we spend the funds, and if you would prefer your donation to be earmarked for student field trip support then simply let us know. The University of Hawaii Foundation (www.uhf.hawaii.edu) accepts even online donations; make sure you select the "Geology and Geophysics fund" under the SOEST funds. I thank you for your continued support.

Paul Wessel
Chair

Confirmation of Degrees

Undergraduates

Nathaniel Adams (BS, Spring 2002)
Christopher Conger (BS, Summer 2002)
Jason Jutras (BS, Fall 2001)
Joern Ole Kaven (BS, Fall 2001)
Gary Kiyabu (BA, Summer 2002)
Ellen McNulty (BS, Spring 2002)

Master of Science

John Bailey
Geomorphological Evolution of the 1991 Mount Pinatubo Ignimbrite Sheet (Advisor: P. Mouginis-Mark, Fall 2001)

Thomas Giguere
New Perspectives on Lunar Volcanism (Advisor: G.J. Taylor, Fall 2001)

Eric Haskins
Core Drilling of Ko'olau Volcano Reveals a Rapid Change in Shield-Stage Geochemistry: Implications for Compositional Variability of the Hawaiian Source (Advisor: M. Garcia, Spring 2002)

Tara Hicks
Automated Mapping and Modal Analysis of Meteorite Thin Sections Using Image Processing Software (Advisor: K. Keil, Spring 2002)

Margaret Milman
Petrogenesis of Lavas from the Axis of the Northern Chile Ridge (Advisor: J. Karsten, Spring 2002)

Steve Sahetapy-Engel
Tephra Fall Deposit of the AD 1305 Eruption of Tarawera, New Zealand: Reconstruc-tion of Eruption Dynamics (Advisor: B. Houghton, Spring 2002)

Doctor of Philosophy

John Rooney
A Century of Shoreline Change Along the Kihei Coast of Maui, Hawaii (Advisor: C. Fletcher, Spring 2002)

STUDENT AWARDS

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

Ellen McNulty

William T. Coulbourn Fellowship in Marine Geology
Endowed by friends and family in memory of department alumnus and faculty member William T. Coulbourn

Jennifer Engels
Marc McGowan

Harold T. Stearns Fellowship
Endowed by longtime department friend for the purpose of supporting student research on geologi - cal and geophysical problems in Hawaii and the Pacific Basin

Marc McGowan
David Phillips

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

Tara Miller and Sergey Tkachev

ARCS Foundation Award
This award is sponsored by a nation-wide group of women who raise nearly $100,000 annually for university students nation-wide.

Christopher Gregg

G&G Undergraduate Research Fellowship
Awarded annually to undergraduate students solely for research purposes.

Michael Dahilig

Albert L. Tester Memorial Symposium Prize
Sponsored by the University of Hawaii's Zoology Department.

David Phillips

New Faculty and Staff

Doug Pyle

Doug Pyle began his appointment as an Assistant Specialist in the VGP group on April 1, 2002. He has taken over the management, instruction, and daily operation of the SOEST isotope lab of John Mahoney and Ken Rubin. His interest in geology began as an undergraduate at Knox College while field tripping in Big Bend National Park during a spring break sponsored geo-excursion. He completed his BA in geology in 1978 with an interest in oceanic volcanism. After a few years of graduate studies in the Geology department and several years as a research technician in Oceanography at Oregon State University, Doug completed a MS in geology in 1988. His focus was the petrology and geochemistry of basalts from the Southern Oregon Coast Range, a remnant oceanic plateau. During this time he participated in projects that included ^{40}Ar-^{39}Ar dating of Deccan Traps lavas, rare gas systematics of Archean cherts, and trace metal abundances in plankton. In 1994, Doug received his PhD in Oceanography from the Oregon State University's College of Oceanic and Atmospheric Sciences working with David Christie, a former UH graduate student. This work involved geochemical characterization of mid-ocean ridge basalt glass from the Southeast Indian Ridge within and surrounding the Australian-Antarctic Discordance. Doug completed the Sr-Nd-Pb isotope work done for his PhD project in the UH lab he now oversees.

His post-graduate career path began as a post-doctoral scholar at Woods Hole Oceanographic Institution working with Stan Hart and Greg Ravizza on osmium and platinum group elements in mid-ocean ridge basalts. After two years at WHOI, he moved to San Diego State University as a researcher and lecturer teaching introductory oceanography. In 2000, Doug returned to Oregon State University to continue his own research interests and work in the NOAAVENTS group with John Lupton on the regional Pacific Ocean basin helium field.

The crossover between geology and oceanography has led to many varied research interests and participations. Currently Doug's research efforts are continuations of projects begun at OSU, WHOI and SDSU. He is still actively working on basaltic lavas from the Oregon Coast Range and the Southeast Indian Ridge. He is also completing work on ultramafic lavas from Costa Rica, which are thought to represent part of a dismembered Caribbean oceanic plateau. Work with Lupton on the three-dimensional visualization of the helium in the Pacific Ocean continues as well. In all of these studies he utilizes skills collected along his path to UH: Sr-Nd-Pb-Os-He isotope analyses in conjunction with major and trace element data on mafic igneous rocks. Given the high quality of instrumentation and collaboration potential within SOEST, Doug finds UH an exciting place to settle.

Greg Ravizza

Greg Ravizza is very pleased to join the Geology and Geophysics department at UH after many years in the northeastern U.S. Most recently he worked as research scientist at the Woods Hole Oceanographic Institution on Cape Cod in Massachusetts. Before moving to Woods Hole, Greg did his PhD research in the Geology department at Yale University in New Haven, Connecticut. Prior to heading east he did his undergraduate work at UCSD, obtaining a chemistry degree with an emphasis in earth science. As an undergraduate at UCSD Greg had the opportunity to take some courses at Scripps Institute of Oceanography. There he developed an interest in the isotope and trace element geochemistry of marine sediments that continues to motivate much of his research effort.

His current research program includes work on the marine osmium isotope record, emphasizing high resolution sediment records spanning the Eocene-Oligocene transition. This portion of the geologic record is of particular interest because it corresponds to a pronounced shift in global climate conditions from the generally warm, equable conditions characteristic of the Paleogene to the colder, glacial conditions typical of the Neogene. Greg's work on the osmium isotope record provides a unique approach to testing the idea that glacially enhanced chemical weathering rates lowered atmospheric CO_2 levels resulting in additional cooling and ice growth. This type of feedback may have played a key role in so-called "green house to ice house" transition. Greg is also working on the marine Os isotope record of the late Cretaceous. The unusual warmth characteristic of this episode in Earth history provides an excellent framework to examine the interplay between chemical weathering and climate.

Ravizza also investigates the geochemistry of trace elements and their isotopes in seawater and modern

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depositional environments. Some of this work is related to Greg's paleoceanographic interests and follows the Uniformitarian paradigm: "the present is the key to the past." Other aspects of his work on modern marine sediments are environmentally oriented. One ongoing effort concentrates on measuring the distribution of platinum (Pt) and palladium (Pd) in marine sediments in order to identify those areas where human activity has given rise to unusually large concentrations of these metals. Release of these metals from automobile catalytic converters is one pathway that may be causing the background levels of these metals to become elevated even in the most remote areas of the globe. The immediate goal of this work is to quantify the history of atmospheric deposition of these metals in order to establish whether increased rates of atmospheric deposition of Pt and Pd coincide with introduction of automobile catalytic converters in the U.S. and Europe.

Kathleen Ruttenberg

Kathleen Ruttenberg obtained a BA from the University of California at San Diego, with a double major in Chemistry-Earth Science and Anthropology (1982). After spending a year working at the Scripps Institute of Oceanography in the organic geochemistry laboratory of Jeff Bada, she moved on to do graduate work with Robert Berner in the Geology Department at Yale University. She obtained a MPhil in 1985, and a PhD in 1989, for her work on phosphorus geochemistry. Kathleen's thesis work focused on developing a method for separating and quantifying different forms of phosphorus in marine sediments, which she then applied to marine sediments from a variety of locations in the world's oceans. Using the newly developed solid-phase technique along with pore water chemical analysis, Kathleen was able to trace transformations of phosphorus during early diagenesis. These data were then used to reformulate the oceanic phosphorus budget and residence time.

Kathleen began the next chapter of her career in 1990 as a Postdoctoral Scholar in the Marine Chemistry and Geochemistry Department at the Woods Hole Oceanographic Institution (WHOI), where she joined the tenure-track scientific staff in 1994. While at Woods Hole, Kathleen's work branched out to include the biogeochemistry of phosphorus in rivers, lakes, and in the marine water column. Research projects while at Woods Hole included a study of phosphorus transport by the Mississippi and Atchafalaya Rivers, with emphasis on seasonal variations in concentration and chemical form of P, and the impact of in-river chemical transformations on the bioavailability of Pin the oceans; a study of P-limitation in a sewage-impacted glacial kettle pond on Cape Cod; application of ^{31}P-NMR techniques to the study of organic phosphorus in marine sediments; and studies of dissolved organic phosphorus cycling and P-limitation in two coastal marine systems: the Eel River Shelf (northern California), and the Oregon Shelf. These projects reflect Kathleen's research interests, which all revolve around better understanding the biogeochemical cycle of phosphorus on the surficial Earth, including diagenesis in aquatic sediments, biogeochemical cycling in natural waters, and nutrient limitation by phosphorus of aquatic organisms.

Having arrived on the Manoa campus in August 2002, Kathleen will set up a biogeochemistry laboratory in the Marine Sciences Building. Her joint appointment in the Geology and Geophysics Department and the Oceanography Department meshes well with her own interests in both geological and oceanographic aspects of the global phosphorus cycle. Current projects include "Dissolved Organic Phosphorus Cycling in the Coastal Ocean," a project being conducted in tandem with the multi-disciplinary CoOP-COAST project off the Oregon Coast. This project aims to understand the dynamics of transport of nutrients to the upwelling-dominated Oregon coastal system, biological response to nutrient inputs, and advection of biological and dissolved organic materials from the productive coastal system to the open ocean. "Coupled Photoreductive Cycling of Iron and Phosphorus in the Surface Ocean" is a project aimed at understanding how deposition of iron-rich dust may affect phosphorus cycling in oceanic surface waters, either stripping it out of surface waters via sorption reactions, or supplying it to surface waters when the oxidized iron substrate is photoreduced. P-speciation work on sediments continues, with focus on sediments from the California Borderland Basins, and the Mississippi and Atchafalaya Rivers.

Phosphorus participates in both geochemical and biological cycling, and is an essential, biolimiting nutrient. A core motivation for Kathleen's past and ongoing research is that perturbations in the global phosphorus cycle can impact atmospheric geochemistry and climate, through the nutrient-CO_2 connection, and through redox processes that couple phosphorus and iron cycles. She looks forward to continuing her research program at UH, where a number of faculty in the Geology and Geophysics and Oceanography Departments have a strong interest in phosphorus biogeochemistry.

Your turn!

Help us stay in touch with you. Please update your address and other information using either the form below or online at http://www.soest.hawaii.edu/GG/alumni-input.html. We would also like to hear if you've changed jobs, received a promotion, or experienced any notable developments in your professional career or personal life. Please let us know so we can share them with others.

Name _____ Semester & Year Graduated _____

Mailing address _____

Telephone/FAX/E-mail _____

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Firm/Organization _____

Your news (continue on back of this sheet if needed) _____

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Would you prefer to receive this newsletter by regular mail, e-mail, or via the internet? _____

Would you like to be able to contact other alumni through an alumni homepage at the G&G website? If so, is it okay for us to list your name and e-mail address? _____

Alumni information update form (continued)

Current Master's Students

Todd Bianco
BS, University of Rhode Island, 2001
Computational modeling of geophysical processes. (Advisor: Garrett Ito)

Manuel Blumenthal
Geologie-Vordiplom, Aachen, Germany, 2001
Enrolled in a special non-degree program. (Advisor: Steve Martel)

Kate Bridges
BSc Geology, Cardiff University, Wales, UK, 2000
Environments and processes of fragmentation, transport and deposition of submarine-deposited volcaniclastites in the HSDPdrill core. (Advisor: Mike Garcia)

Mark Broich
Geologie-Vordiplom, Aachen, Germany, 2001
Enrolled in a special non-degree program. (Advisor: Aly I. El-Kadi)

Chris Conger
BS Geology and Geophysics, UH Manoa
Sand distribution on a shallow carbonate shelf on a high volcanic island. (Advisor: Charles Fletcher)

Buffy Cushman
BS Geology, University of Florida, 1998
Geochemistry of plume-ridge interaction along the Galapagos spreading center. (Advisor: John Sinton)

Mary Engels
BA (with distinction) Biology, Colorado College, 2000
Holocene reef accretion off the southwest shore of Molokai. Investigation of Holocene reef history by reef coring, development of paleoreef community analogs, paleoclimate reconstruction and investigations into environmental controls on reef growth. (Advisor: Charles Fletcher)

Dolan Eversole
BS Geology and Geophysics, UH Manoa, 1996
Long-term and seasonal variability of shoreline dynamics in Kaanapali, Maui, Hawaii. Coastal erosion, seasonal longshore sediment transport and transport modeling. (Advisor: Chip Fletcher)

Ayesha Genz
BS Chemistry, Drexel University, 1997
Using statistics of historical shoreline data in order to improve prediction of future erosion hazards on beaches in Hawaii. (Advisor: Chip Fletcher)

Richard Hey, Chip Fletcher, and Ole Kaven

Leon R. Geschwind
BS Global Environmental Science, UH Manoa, 2000
Examining satellite and field-based multi-and hyperspectral measurements of active lava flows in order to gain a better understanding of a lava flows' evolving thermal structure. (Advisor: Luke Flynn)

Ole Kaven
BS, UH Manoa, 2001
Normal fault growth in 3-D. (Advisor: Steve Martel)

Seung-Sep Kim
BS, Korea University, 2000
Looking at the topography and isostasy of the Nazca plate and gravity investigation on seamount chains. (Advisor: Paul Wessel)

Marc McGowan
BS Geology, Winona State University, 1999
Quantifying the impacts of submarine groundwater discharge in an Hawaiian estuary and its role in nutrient transport. (Advisor: Craig Glenn)

Tara Miller
BS Marine Science, Coastal Carolina University, 2000
Modern beach dynamics and historical shoreline change in Waikiki. (Advisor: Chip Fletcher)

Aisha R. Morris
BS Geology, Duke University, 1999
Examination of the emplacement of long submarine lava flows by modifying and applying a thermo-rheological model to a well-mapped submarine flow in the North Hawaiian Arch Volcanic Field. (Advisor: Bruce Appelgate)

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Jonathan Weiss

Fabian Schloesser
Vordiplom Physical Oceanography, IfM University of Kiel, Germany, 2001
Geology and geophysics and oceanography. (Advisor: Janet Becker)

Patrick Shamberger
BSE, Princeton University, 2002
Studying xenolith depositions near the summit of Hualalai and the constraints they place on the magma chamber and transport properties of that volcano. (Advisor: Julia Hammer)

Elaine Smid
BA Environmental Science, University of Virginia, 2000
Collecting soil gas CO_2 from a transect up Mauna Kea, analyzing C^{13} values and CO_2 concentrations from the soil, and figuring out how they relate to the C^{13} values found in waters recovered from the HSDP (Hawaiian Scientific Drilling Project) borehole. Data collected may have insight to past and future climates, and will serve as a reference for future climatologists investigating the effects of global warming on the carbon budget in soils. (Advisor: Donald Thomas)

Nile Akel Kevis Sterling
BS Geology and Geophysics, UH Manoa
Modeling absolute plate motion of the Pacific plate based upon geometry and age data from Pacific hotspot trails. Also, correlations of large changes in plate motion with circum-Pacific tectonic events. (Advisor: Paul Wessel)

Deon van Niekerk
BSc Earth Science, Rand Afrikaans University, Johannesburg South Africa, 1997
BSc (Honors) Geology, Rand Afrikaans University, Johannesburg, South Africa, 1998
Currently studying an SNC meteorite believed to have come from Mars. Thesis research will involve working on the oldest rocks known—chondritic meteorites—in order to understand what they can tell about the earliest recorded processes in the primitive solar system. (Advisor: Klaus Keil)

Virginia Dorsey Wanless
BA, Colgate University, 2001
Working on submarine samples from the Southwest Rift Zone of Mauna Loa. (Advisor: Mike Garcia)

Jonathan Randall Weiss
BS Geology, College of William and Mary, Virginia 2000
Multi-channel seismic investigation of active extension in the Gulf of Corinth, Greece. Using geophysical data to characterize fault geometry and sedimentation

Dr. Eric Gaidos has initiated a project with a UH Research Council seed grant to monitor microbial activ - ity and greenhouse gas emissions in the Ka`au Crater wetland, O`ahu. Graduate students Geoffrey Garrison and Mark McGowan are shown obtaining gas samples.

patterns to better understand the evolution/tectonic history of the basin. (Advisor: Brian Taylor)

Hao Zhou
Research topic is an analysis of the shapes that can be achieved by deforming a flexible and slightly extensible spherical cap. (Advisor: Michael Bevis)

Current PhD Students

Nancy Adams
BS Geology, Trinity University, Texas, 1997
MS Geology, Indiana State University, 1999
Studying dynamic shifts in intensity during large explosive silicic eruptions that might represent changes in the ascent and degassing histories of the magma. (Advisor: Bruce Houghton)

John E. Bailey
Mphys (Honors) Physics with Space Science and Systems, University of Kent at Canterbury, 1997
MS Geology and Geophysics, UH Manoa, 2001
Remote sensing of active volcanic landscapes. A study involving the combined use of remote sensing data (obtained by spacecraft, airplanes and instruments on the ground), combined with in-situ field observations, to understand the geomorphology of volcanic landscapes. (Advisor: Peter Mouginis-Mark)

Nathan C. Becker
BS (Honors) Geology, University of Texas, Arlington, 1993
MS Geology and Geophysics, UH Manoa, 1997
Recent volcanic and tectonic evolution of the Southern Mariana Arc. Using swath mapping sonars, especially MR-1 bathymetry and sidescan sonar, to study the tectonic and volcanic evolution of the southern Mariana forearc, arc, and backarc regions. (Advisor: Patricia Fryer)

Eric C. Bergmanis
BA Geology, University of Colorado at Denver, 1990
MS Geology and Geophysics, UH Manoa, 1998
Geology and geochemistry of the Southern East Pacific Rise, 17°-19°S. (Advisor: John Sinton)

Jennifer Engels
BS (Honors) Geology, Oregon State University, 1999
BA (Honors) International Studies, Oregon State University, 1999
MS Geology and Geophysics, UH Manoa, 2001
Examining the effects of polar ice sheets on the submarine geomorphology of the Arctic Basins. The SCICEX data from 1998 and 1999 indicate that large ice masses once extended to depths of ~1000m in portions of the Arctic Basin, a startling discovery and the basis for her PhD investigations. Attempts are being made to constrain the timing and history of these ice advances. (Advisor: Margo Edwards)

John Bailey

James Foster
BSc, University of Edinburgh, Scotland, UK, 1991
Meteorological and climatological applications of the Global Positioning System. (Adviser: Michael Bevis)

Geoffrey Garrison
BS, Stanford University, 1994
MS, Stanford University, 1994
Sedimentation and aquatic biogeochemistry in a coastal pond on Oahu, Hawaii: An integrated study of modern aquatic chemistry, modern sediment production, and a Holocene lacustrine sediment record with regard to interpreting a Holocene climate record for Hawaii. (Advisor: Craig Glenn)

Jamshid (Jim) Gharib
BS Geological Sciences, University of Texas, Austin, 1994
MS Chemical Oceanography, UH Manoa, 2000
Active serpentine mud volcanism in the Mariana Forearc implications for subduction processes. Water-rock and water-sediment interactions; geochemical processes at hydrothermal systems; geochemistry, sedimentology, and petrology at convergent margins. (Advisor: Patricia Fryer)

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In June 2002 Dr. Eric Gaidos led a NSF Biocomplexity-funded expedition that successfuly drilled through the Vatnajokull glacier in the Grimsvotn volcanic caldera, Iceland, to search for microbial life in a subglacial lake. Graduate student Andrew Graham is shown monitoring drilling operations.

Chris E. Gregg
BSc Geology, Tennessee Technological University, 1992
Post Graduate Diploma, Geology, University of Canterbury, New Zealand, 1998
Using social science tools to evaluate aspects of society in Kona, Hawaii that contribute to vulnerability and that will promote resilience in eruptions from Mauna Loa and Hualalai volcanoes. Results of surveys of high school students, their parents, adult public and visitors to Kona provide the first documentation of the nature of risk perception and preparedness in this area of the island where the threat of volcanic hazards is perceived to be low due to the relatively long time intervals since the last damaging eruptions (52 and c. 201 years, respectively). (Advisor: Bruce Houghton)

Toshihiro Ike
BS, Chiba University, Japan
MS, University of Tokyo
Studying marine tectonics, looking at the structure of the Nankai Trough accretionary prism. (Advisor: Greg Moore)

Eric C. Kendrick
BS Mathematics, University of North Carolina, Chapel Hill, 1987
MS Earth Sciences, North Carolina State University, 1997
Research focuses on the use of GPS for the study of crustal deformation in the Central and Southern Andes. (Advisor: Mike Bevis)

Tomoko Kurokawa
BS Geology, Oregon State University, 2000
Studying the processes for the formation of large pillow mounds on the East Pacific Rise Crest. (Advisor: Margo Edwards)

Nicole Lautze
BS, University of California, Los Angeles, 1999
Using physical volcanology and geochemical methods on samples collected at Stromboli and Etna volcanoes, Italy, with the aim of better constraining shallow conduit processes leading to variable eruption dynamics at both volcanoes. (Advisor: Mike Garcia, with Bruce Houghton and Andy Harris)

Samuel Lawrence
BSc Geological Sciences, University of Michigan, Ann Arbor, 2000.
Integrating studies of extraterrestrial materials with remotely sensed data from Mars. (Advisor: Jeff Taylor)

Murray McClintock
BSc (Honors), University of Otago, New Zealand, 1999
MSc, University of Otago, New Zealand, 2001
Characterization of the processes and products of interaction between rising basaltic magma, wet sediment and sedimentary rock during the initial stages of Karoo flood volcanism in South Africa. (Advisor: Bruce Houghton)

Eric Mittelstaedt
BS Astrophysics with a minor in Geophysics, University of California, Los Angeles, 2002
Spreading ridges near hot spots are seen to “jump” from one point on the sea floor toward another closer to the hot spot. By utilizing damage theory, a technique from materials science and engineering, to model the weakening of the lithosphere due to stresses we hope to discover a physical reason for such jumps. (Advisor: Garrett Ito)

Adrienne J. Oakley
BA Geology and French from Bowdoin College, 2001
Analysis of multi-channel seismic profiles of the Mariana subduction factory. Currently working on the interpretation of the internal structure of serpentine mud volcanoes in the forearc. (Advisor: Brian Taylor)

Matt Patrick
BS Geology, Cornell University, 1999

MS Geology, University of Alaska, Fairbanks, 2002
Using satellite remote sensing as a tool to study active volcanism and infrared radiometers to study Strombolian activity. (Advisor: Andy Harris)

David A. Phillips
AA Liberal Arts, Allan Hancock College, Santa Maria, 1992
BS Geology with a minor in Physics, University of Hawaii at Hilo, 1996
Plate tectonics in the Southwest Pacific, volcano monitoring in Hawaii. (Advisor: Michael Bevis)

Kolja Rotzoll
Bachelor in Geography, Christian-Albrechts-University of Kiel, Germany, 1998
Master of Coastal Geoscience and Engineering, Christian-Albrechts-University of Kiel, Germany, 2001
Assessing Hawaiian hydrogeology under highly variable conditions and groundwater modeling of multiphase flow involving non-aqueous phase liquids and their remediation in tidal aquifers. (Advisor: Aly I. El-Kadi)

Julia Sable
BA Geology, Amherst College, 2000
Detailed textural study of the products of two Plinian basaltic eruptions, Etna (Italy) 122BC and Tarawera (New Zealand) 1886. (Advisor: Bruce Houghton)

Steve Sahetapy-Engel
BS Geology, UH Hilo, 1999
MS, UH Manoa, 2002
Looking at hyperspectral data from Santiaguito Dome Complex in Guatemala to determine the thermal characteristics and variations of the dome and using GOES thermal alert system to look at thermal radiance variations for Tungurahua volcano in Ecuador. (Advisor: Luke Flynn)

Donovan Steutel
BS Exercise Physiology, University of California, Davis, 1994
MS Exercise Physiology, University of California, Davis, 2000
MS Geology and Geophysics, UH Manoa, 2002
Applying a radiative transfer theory model to multispectral imaging of the Moon in order to identify and map mineralogy, petrology, and elemental abundance of the Moon on a global scale. Additionally, spectral models of pyroxenes for use in interpretation of multispectral imaging of Mars and development of a polarimetric thermal

infrared hyperspectral imager. (Advisor: Paul Lucey)

Julie Stopar
BS (High Honors) Geological Sciences, University of Michigan, Ann Arbor, 2000
Geology and remote sensing of Mars. (Advisor: Jeff Taylor)

Masako Sugimoto
BS Geology and Geophysics, UH Manoa, 2000
Researching NWAustralian rifted margins. The research involves processing and interpretation of multi-channel seismic reflection data. (Advisor: Dr. Brian Taylor)

Sergey N. Tkachev
Combined BS and MS Physics, M.V. Lomonosov, Moscow State University, Russia, 1991
MS Geophysics, University of Illinois at Urbana-Champaign, 1997
Compressibility of silicate melts at high pressure. Investigation of viscous and elastic properties of natural silicate melts and their analogs at high pressures (P) and temperatures (T) of the Earth's lower crust and upper mantle. (Advisor: Murli H. Manghnani)

Brett B. Wilcox
BA Geological Sciences, Northwestern University, 2002
Using high resolution Lunar Orbiter prints to investigate the morphology and block population of small craters as clues to understanding the lunar the regolith and substrate. (Advisor: Jeff Taylor)

Alumni News

1970s

Stephen Wheatcraft, (PhD'79), a professor at the University of Nevada, chaired the hydrogeology division at the Geological Society of America in 2000.

1980s

Rich Bosher (MS'81) is now in sales at Oildex. **Howard West** (MS'82) recently started his own geological consulting firm with a partner. This international firm has an office in Japan. Howard is working on learning some Japanese. **Carlos Mortera-Gutierrez** (MS'84) is a research associate at Universidad Nacional Autonoma de Mexico where he continues to conduct research in marine geophysics. Carlos fondly recalls having tequila with his old buddies from HIG. In a recent correspondence to **Fred Duennebier** (PhD'72), **Ashraf Uddin** (MS'87) recalls sweating a lot while taking Fred's geophysics course. Is he making his own students sweat in his course at Auburn University? Ashraf's research mostly focuses on the eastern Himalayan foreland basins.

1990s

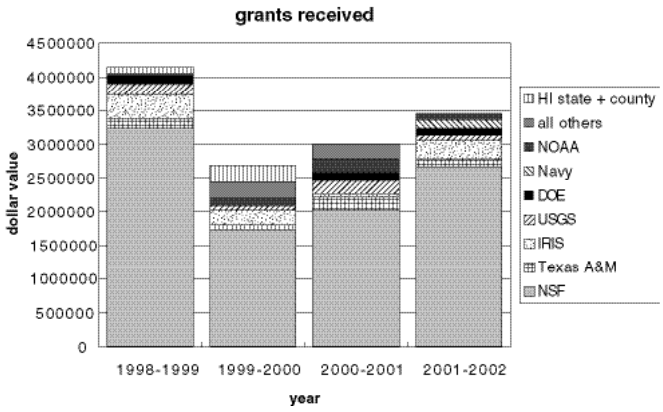
Kelly Klepinger (BS'97) is geologist at CDM in California. His son, Ryan now has a sister, Tomi. **Iris Stewart** (BS'94) accepted a position in the new international PhD program "Environment Water" at the University of Stuttgart. She also is getting re-married after the death of her husband a few years ago. **Wen, Xi Yuan** (MS'95) now works for Earthtech in Honolulu and goes by a western first name—Wendell. **Chris Okubo** (BS'96) is working on his PhD at the University of Nevada Reno in Planetary Geology and Mechanics. He is working on "wrinkle ridges"—the surface expression of buried thrust faults. **Robert Mullane** (MS'96) is an energy planner for the city of Santa Barbara in the Planning Department. **Mike Chandler** (BS'98) is back in Hawaii and working as a data processor at Oceanic Imaging Consultants, Inc. and is planning to attend graduate school in the near future. **Stephan Bergbauer** (MS'98) has successfully defended his PhD at Stanford, is finishing up his thesis revisions, preparing to start a job in Alaska, and preparing for his wedding. The start date for the new job and the date of the wedding are not known at this time. His PhD is on curvature of folds. **Shung Sheng Fu** (PhD'98) is working for the state of Hawaii as an environmental specialist. **Stefano Baffi** (MS'99) is a data manager for Shell International in The Hague. **Scott Calhoun** (PhD'99) recently finished a 2-year post-doc in with the USGS, Santa Cruz. He is now taking courses to earn a science teaching certificate in Seattle School System. **Jordan Muller** (MS'99) is working on his PhD at Stanford with Atilla Aydin on the Anatolian fault in Turkey. He and Stephan were housemates, so Jordan will be looking for a new housemate. **Brandee Pang** (BS'99) is headed to Grand Forks to pursue her master's in geology at the University of North Dakota. **Steven Quane** (MS'99) is pursuing a PhD at the University of British Columbia with Dr. Russel on rheology of ash/pumice mixtures and their application to welding in pyroclastic deposits. That's right—white rocks!! He spent part of the summer in Germany and France doing experimental work. **Aaron Pietruszka** (PhD'99) is currently a post-doc at the University of Maryland working on Mo isotopes and their application to environmental problems and U-series systematics of lavas from another hotspot, Reunion Island. Later this fall Aaron will drive across country to see America and start his new job at San Diego State University as an assistant professor of petrology.

2000s

Jodi Harney (PhD'00) is a USGS Mendenhall Postdoctoral Research Fellow in Santa Cruz. **Georgianna Young** (BS'00) has started graduate school at Notre Dame. **Karl Hibbitts** (PhD'01) is a post-doc at the University of Washington's Department of Earth and Space Sciences. **Michael Davis** (MS'01) is working for an environmental firm near Salt Lake City, Utah. He enjoyed watching the winter Olympics but not the traffic/chaos it caused. **Eric Grossman** (PhD'01) is a post-doc at USGS, Santa Cruz, CA. **Margaret Milman** (MS'02) has started a new job with a Honolulu environmental firm. She occasionally attends TGIF talks and discussion sessions afterwards. **Eric Haskins** (MS'02) is a research associate for the Hawaii Scientific Drilling Program. He participated in the Ultimate Frisbee world competition in Honolulu this summer for the Hawaii team.

Geology and Geophysics Research Grants 1998-2002

Extramural research funding supports many key Department functions. It pays for graduate, post-doc, and technician salaries, modern analytical facilities, and computer equipment. It provides thesis projects for our students, including the travel funds necessary to collect data and attend conferences to report results. University overhead returned to the Department and PIs has become a critical component of our total budget.



Faculty in the Department derive their research funding from numerous sources. The majority of G&G studies are marine, supported by the Ocean Sciences Division of NSF. These include investigations of spreading centers, subduction zones, mid-plate volcanism and mass-wasting, coastal processes, paleoceanography and biogeochemistry. Significant funds also come from the Earth Sciences Division of NSF for studies in earthquake seismology and terrestrial volcanism. Other Federal agencies support G&G faculty studies of faults (DOE), coral reefs and carbonate shelves (USGS and ONR), coastal processes and marine aquaculture (NOAA), and landscape evolution (NASA). Additional federal funding is passed through IRIS and TAMU for research related to seafloor observatories and the ocean drilling program, respectively. State and County agencies have funded studies of coastal sedimentation, erosion and hazards. Variations are typical given the 2-5 year cycle for funding individual projects. Lastly, several other universities and private foundations have invested in a plethora of one-time specialist grants.

Faculty News—G&G Celebrates Three Weddings

(left) Peter Mouginis-Mark and Ada Ui got married on April 12, 2002. (above) Julia Hammer and Rob Dunn (both of SOEST) married in June 2002. (right) Ralph Moberly married Patricia Chun on August 3, 2002.

Announcements

2003 SOEST Open House

The 7th biennial SOEST Open House will be held in October 2003. The response from the public is very favorable with many people asking us to make this an annual event! The Open House continues expand in attendance, with the number of display and exhibits, and expenses. Please contact Tara Hicks, SOEST Outreach Coordinator at 956-3151 or e-mail her at hickst@hawaii.edu if you or the business at which you are employed can make a contribution toward this event. We will be in need of the following types of donations: monetary, supplies of sorts, and time. The first day of this two-day event is aimed at accommodating large school groups while the second day is dedicated to families and the general public. Detailed flyers will be mailed sometime in 2003 so please be on the look out for them!

Early History of Dept of G&G—Now Online!

The early history of G&G written by Ralph Moberly is now available online! Check it out at www.soest.hawaii.edu/GG/about_gg.html.

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Address Correction Requested