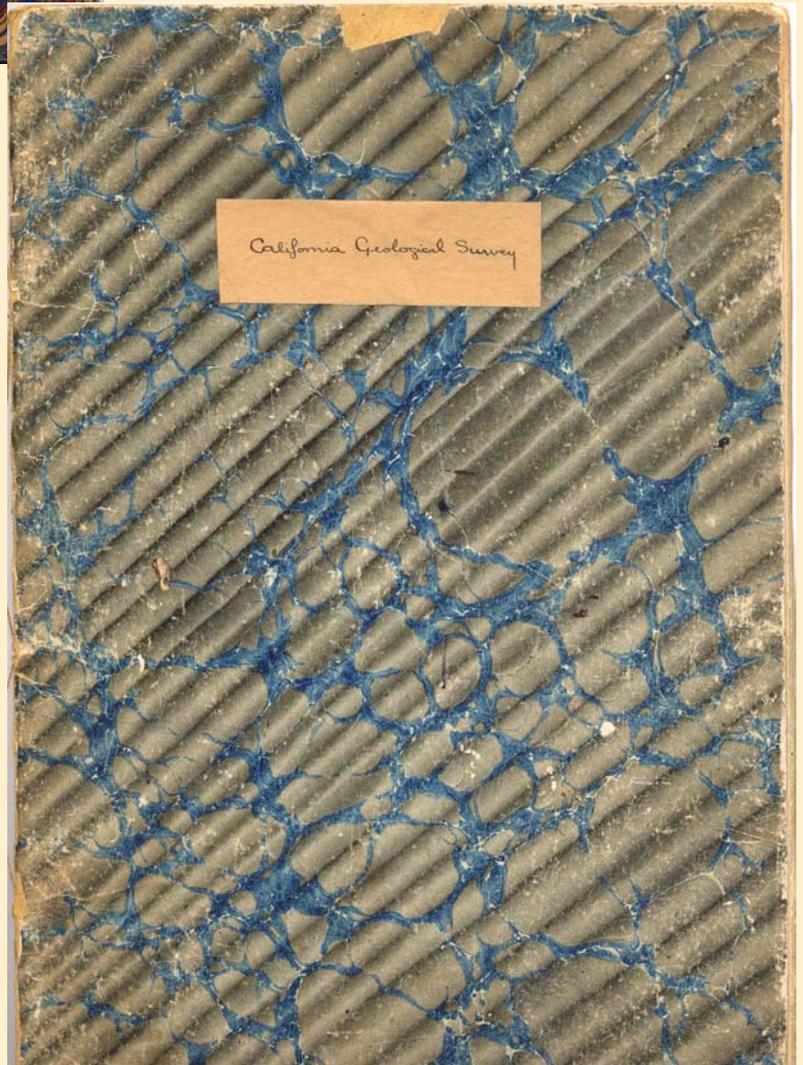


**DEPARTMENT OF
EARTH & PLANETARY
SCIENCE**

**ANNUAL REPORT
2005 – 2006**



UNIVERSITY OF CALIFORNIA, BERKELEY



EPS staff (L to R): Gretchen vonDuering, David Smith, Kent Ross, Catherine Pauling, Clarissa Pal, Raluca Iordache, Margje Winn, Micaelee Ellsnythe, Jason Mickela; standing: Tim Teague, Matt Cataleta.



Peggy Gennaro

Raluca and Ionut Iordache.



Catherine Pauling (center back) and EPS undergraduates in front of new display in McCone Hall lobby.



Matt Cataleta, Tim Teague and David Smith placing blueschist from Dean Mark Richards' backyard in the rock garden in front of McCone Hall.



Peggy Gennaro

At the spring staff picnic at Rudy Wenk's vineyard, May 2006 (L to R): Pat Mimoto, Rudy Wenk, Kent Ross, Hank Houck, Julia Wenk, Matt Cataleta, Catherine Pauling, Cathy Cooper.



Peggy Gennaro

Cathy Cooper and Hank Houck at the staff picnic.

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*Peggy Gennaro's retirement party, November 2005.
From left: Ann Goolsby, Peggy, Don DePaolo.*



*Hank Houck presents a retirement gift to
Peggy.*

THE STATE OF THE DEPARTMENT, 2005-2006



Dear Alumni and Friends,

In July Barbara Romanowicz finished four years as Chair during which she brought the Department to unprecedented distinction. As new Chair I will try to continue the tradition. This year we were ranked fourth in the U.S. News Survey, but first among public universities and only behind much larger private university departments. Jill Banfield was elected to the National Academy of Sciences, our eighth member to achieve this honor. Michael Manga is not only prominent as a distinguished MacArthur Fellow but also was next to Bono in the Sexiest Men Issue of People Magazine. Paul Renne received the Bowen Award from AGU and Bill Dietrich the David Linton Award from the British Geomorphological Research Group. Mark Richards was appointed Executive Dean of the College of Letters and Science. He gave our commencement speech in May and reminded new graduates of the value of a University degree and the importance of having support for public higher education.

We mourn for two colleagues: Dick Hay passed away on February 10, 2006 and Luna Leopold died on February 23, 2006. Highlights of their lives are presented later in this report.

We have a few changes among faculty: Jim Bishop joins us as full-time professor but retains some of his research relations in oceanography with LBNL. Dave Alumbaugh from Schlumberger is an Adjunct Professor and teaches a course in applied geophysics. The youngest and newest member of our faculty, Richard Allen, brings vitality and enthusiasm to our department. The enrollment in his Lower Division "Earthquake" class increased from 57 (in 2004) to 244 (in 2006). Awareness raised by the San Francisco earthquake centennial may have helped. Richard came to Berkeley in 2004 but rather than describing his research and achievements I will let him introduce himself (see p. 6). Geophysics now has our largest group of majors, ahead of marine sciences and geology.

There have been some changes in staff: Hank Houck and Peggy Gennaro retired and Pat Mimoto left us to assume a position in another Department. Micaelee Ellswythe and Raluca Iordache joined our office staff to help in accounting and grant management. Jason Mickela is in charge of the webpage and assists PC users. MSO Cathy Cooper has been on leave since August and we hope she returns soon. Our staff is a congenial group and everyone works hard to keep this complex operation going.

You may notice that the format of this report has changed a little. One reason is the departure of Peggy, who was an expert and perfectionist in managing this document and taking and collecting pictures. Another reason is more mundane: costs of producing a color brochure have skyrocketed and outpaced the average donations we receive. I thought you would not mind getting the same information in black/white so that a larger portion of the donations can be applied to direct needs such as student support. Finally and most importantly, we would like to hear more from you and use this report as a forum for exchange. We have added two new sections to complement the "Alumni Notes:" A selection of alumni to tell us where they are and how they got there. Bruce Marsh (Ph.D. 1974) describes the exciting research he is doing in Antarctica and Aric Cunningham (B.A. 1981; M.S. 1984) gives us a taste of oil and smells like "From Russia with Love...". We also have a section on "Reminiscences." This year I have invited a few to contribute. In the future please volunteer and send notes and pictures.

If you are interested in current research of our faculty, go to our webpage where you can download PDF's of most of the recent published articles ranging from climate change to seismic anisotropy in the inner core. I want to give special mention to Doris Sloan's book on *Geology of the San Francisco Bay Region* that just appeared (UC Press) and make you aware of the novels of Gordon Gastil (*Follow the Sun*) and Lionel Weiss (*Latent Images* and *Cairn Seventeen*) that go far beyond geology.

While cleaning up storage rooms, we came across some real treasures and we are grateful to Hank Houck for identifying them. They are old catalogs of rocks and minerals dating back to the 1860s (older than the University of California) of the Brewer/Whitney, Sutro and Pioche collections, as well as the California Geological Survey and we still have some of the samples (see front cover). Particularly, the Brewer catalog is unique and parallels his recently republished report *Up and Down California* (UC Press), a wonderful account of field trips in the post Gold Rush days. These documents are now safely protected in the Bancroft Library. And concerning the library: The Berkeley Digital Map website received rave reviews from the *Journal of American History* (“...one of the most useful map collections on the World Wide Web...”)

Donations have indeed made a difference and some of them visibly. On your next visit to Berkeley, come to McCone Hall to see Catherine Pauling's improved signage for the Department of Earth and Planetary Science. With help from the Ramsden bequest we were able to complete long-needed renovations to our classrooms and to add a Ramsden Study Center for undergraduates. Cathy Cooper was instrumental in putting this together. Hallway displays have changed under the guidance of Kent Ross and undergraduate students working as Ramsden fellows. We have added a display of California minerals and are working on another one of “Berkeley minerals” such as lawsonite, pabstite, carmichaelite, alpersite (yes, this is the latest, a beautiful blue copper sulfate: Congratulations, Charlie!) as well as a display with the State mineral (gold), State gem (benitoite) and State rock (serpentinite). Above all: A thick dust cover on all specimens has been removed and they shine in their old glory.

Ramsden fellowships went to Kris MacLennan and Jacob Siegel for imaginative research projects. Kate Fletcher received a Turner fellowship to work on Quaternary isotope geology in the Grand Canyon region. From the Larson bequest faculty received seed funds to initiate new projects. The weightiest gift to the Department is from our Dean Mark Richards: a block of blueschist from his garden in Berkeley that was added to our decorative rock display in front of the building (see inside front cover).

I would like to thank Doris Sloan who served as a talented editor of this report, Nat Vonnegut (MSO in Geography, who is helping us in EPS during Cathy Cooper's absence), who did the impressive composition and all those who contributed. Please stay in touch with us. We always like to hear from you either through letters or e-mail (wenk@berkeley.edu). Please send us your e-mail address so that we can update our database. It will be kept confidential but make communication with our alumni much easier. Also mark on your calendar December 9, 2006 for Santa Barbara's Day and May 17, 2007 for Commencement. To both events you are cordially invited. Details will be announced on the EPS webpage.



Rudy Wenk

Faculty party at the home of Rudy and Julia Wenk, September 2006.

DEPARTMENT FACULTY — FIELDS OF SPECIALIZATION



Allen, Richard M., Assistant Professor, Ph.D., 2001, Princeton University. Seismic imaging of deep Earth processes; crust and mantle interactions; kinematics and dynamics of fault rupture; earthquake initiation processes and warning systems.



Alumbaugh, David L., Adjunct Professor, Ph.D., 1993, University of California, Berkeley. Geophysics, special interests in the physics of electromagnetic induction and propagation in the earth, and imaging the structure of the earth using inverse methods and large scale numerical calculations for the interpretation of electromagnetic data.



Alvarez, Walter, Professor, Ph.D., 1967, Princeton University. Impacts and mass extinctions; Mediterranean stratigraphy and tectonics, especially in the Italian Apennines; magnetic reversals and the geologic time scale; global tectonics; Colorado Plateau stratigraphy; landscape evolution.



Banfield, Jillian F., Professor, Ph.D., 1990, Johns Hopkins University. Geomicrobiology, microbial ecology and evolution; nanoparticles in the environment.



Berry, William B.N., Professor, Ph.D., 1957, Yale University. Climate changes, related environmental changes and mass extinctions; Bay Area watershed and wetlands restorations; K-12 environmental science education; hypoxic-anoxic environments; cool water limestones.



Bishop, James K.B., Professor, Sc.D., 1977, MIT/WHOI Joint Program in Oceanography. Chemical, physical, and biological controls on the cycles of carbon and related chemical species in the ocean; robotic instruments for ocean exploration; satellite oceanography.



Boering, Kristie A., Associate Professor, Ph.D., 1992, Stanford University. Atmospheric chemistry and climate; field, laboratory, and modeling studies of the stable isotopic compositions of atmospheric trace gases; photochemical isotope effects; laboratory studies of the kinetics and optical properties of atmospheric aerosols relevant to early Earth, early Mars, Titan, and other anoxic planetary atmospheres.



Brimhall, George H., Professor, Ph.D., 1972, University of California, Berkeley. Development of digital mapping systems, mineral exploration, geo-politics and earth resource issues, geoscience education reform.



Bürgmann, Roland, Professor, Ph.D., 1993, Stanford University. Active tectonics, space geodesy and structural geology; observations and models of crustal deformation associated with active faults and volcanoes.



Chiang, Eugene, Associate Professor, Ph.D., 2000, California Institute of Technology. Theoretical astrophysics, emphasizing the origin of planetary systems. Current research areas include the dynamical evolution of circumstellar disks, including the Kuiper belt; photoionized winds from extrasolar giant planets; and the dynamical equilibria of stars orbiting supermassive black holes in galactic nuclei.



Cohen, Ronald C., Associate Professor, Ph.D., 1991, UC Berkeley. Atmospheric chemistry and its role in climate change; development of technologies for detection of atmospheric trace chemicals; *in situ* measurements of radicals and their reservoirs from aircraft, balloon and ground-based platforms.



Cuffey, Kurt M., Professor, Ph.D., 1999, University of Washington. Glacier mechanics; paleoclimatology; environmental isotope geochemistry; river processes.



DePaolo, Donald J., Class of 1951 Professor of Geochemistry, Ph.D., 1978, California Institute of Technology. Isotope geochemistry and geochronology; igneous petrogenesis; age and structure of the continents; mantle geochemistry; isotope hydrology, isotopic tracers for environmental studies.



de Pater, Imke, Professor, Ph.D., 1980, University of Leiden. Radio and infrared observations of our Solar System. Examples include giant planet atmospheres and Jupiter's magnetosphere at radio wavelengths, and infrared imaging using Adaptive Optics techniques of, e.g. Uranus, Neptune, Io, Titan, and planetary rings.



Dietrich, William E., Professor, Ph.D., 1982, University of Washington, Seattle. Hillslope and fluvial geomorphology; mechanics of sediment transport; hydrology.



Dreger, Douglas S., Associate Professor, Ph.D., 1992, California Institute of Technology. Research interests include wave propagation, earthquake source physics, earthquake hazards, realtime seismology, and nuclear monitoring.



Fung, Inez Y., Professor, Sc.D., 1977, Massachusetts Institute of Technology. Climate change; global carbon cycle; geophysical fluid dynamics and large-scale numerical modeling; remote sensing of the Earth.



Helgeson, Harold C., Professor, Ph.D., 1962, Harvard University. Theoretical geochemistry; thermodynamics; chemical petrology of organic/inorganic systems; high-temperature solution chemistry; phase equilibria; kinetics; organic and biogeochemistry; mass transfer in biogeochemical processes.



Ingram, B. Lynn, Professor, Ph.D., 1992, Stanford University. Paleoclimate reconstruction; paleoceanography; marine, estuarine, and lacustrine geochemistry; geoarchaeology.



Jeanloz, Raymond, Professor, Ph.D., 1979, California Institute of Technology. Mineral physics; ultra-high-pressure experimental geophysics; constitution and evolution of planets; Earth and environmental policy; national and international security.



Kirchner, James, Professor, Ph.D., 1990, University of California, Berkeley. Environmental earth sciences; watershed hydrology and geochemistry; weathering, erosion, and climate; analysis of environmental data; evolutionary ecology.



Manga, Michael, Professor, Ph.D., 1994, Harvard University. Geophysical and environmental fluid dynamics; planetary geodynamics; volcanology; hydrogeology.



Pride, Steven R., Adjunct Professor, Ph.D., 1991, Texas A&M. Crustal physics; seismic stimulation to mobilize pollutants and hydrocarbons in porous rocks; the physics of seismic attenuation; electrokinetic coupling phenomena; the theory of brittle fracture and stress-induced interacting damage.



Rector, Jamie, Professor, Ph.D., 1990, Stanford. Seismic techniques for characterizing reservoir properties and processes; seismic reflection imaging; borehole seismology; seismic wave propagation simulation; near-surface seismology with applications to environmental remediation and archaeology.



Renne, Paul R., Adjunct Professor, Ph.D., 1987, University of California, Berkeley. Geochronology; paleomagnetism; flood basalts; Earth-Moon impact chronology; Permian-Triassic boundary; hominid evolution; geologic time scale calibration.



Richards, Mark A., Professor, Ph.D., 1986, California Institute of Technology. Mantle convection and large-scale mantle structure; large-scale dynamics of terrestrial planets; history and dynamics of global plate motions; igneous processes in the mantle and deep crust; regional crustal deformation and earthquake hazards.

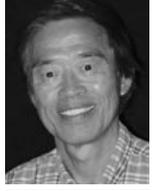


Romanowicz, Barbara A., Professor and Director, Berkeley Seismological Laboratory, Doctorat d'Etat, 1979, Université de Paris. Global seismology; Earth's deep structure and dynamics; waveform modeling and tomography; normal-mode theory; earthquake scaling laws and source processes.

Sloan, Doris, Adjunct Professor, Ph.D., 1981, University of California, Berkeley. Biostratigraphy; history of San Francisco Bay; introduced species in the Bay; regional geology.



Wang, Chi-yuen, Professor, Ph.D., 1964, Harvard University. Tectonophysics; heat and fluid transport in the Earth; hydrological processes during earthquakes; hydrological processes on Mars; crustal deformation in active tectonics.



Wenk, Hans-Rudolf, Professor and Chair, Ph.D., 1964, University of Zurich. Mineralogy, and structural geology; special interest in texture analysis and anisotropy development in naturally and experimentally deformed materials pertaining to the deep earth. X-ray, neutron and electron diffraction measurements complemented by modeling.



EMERITI

Bukowinski, Mark S.T., Professor Emeritus, Ph.D., 1975, University of California, Los Angeles. Physics and chemistry of planetary interiors; mineralogy; high pressure mineral physics; planetary structure and evolution.



Carmichael, Ian S.E., Professor Emeritus, Ph.D., 1960, University of London. Igneous petrology; analytical chemistry of volcanic rocks; electron-microprobe analysis of minerals; experimental studies of silicate melts; geologic evolution of western Mexico and of the western Basin and Range.



Curtis, Garniss H., Professor Emeritus, Ph.D., 1951, University of California, Berkeley; founder and chairman of Board, Berkeley Geochronology Center. Geochronology and volcanology, autobrecciation of lava and eruptive processes; Potassium/Argon and Ar40/Ar39 dating; geologic timescale; calibration of Tertiary Mammal Stage ages, calibration of hominoid-hominid evolution. E-mail: gcurtis@uclink4.berkeley.edu



Johnson, Lane R., Professor Emeritus, Ph.D., 1966, California Institute of Technology. Seismology and physics of the Earth's interior and wave propagation; seismic source theory; applied geophysics.



Jones, David L., Professor Emeritus, Ph.D., 1956, Stanford University. Cordilleran, Alaskan, and circum-Pacific tectonics; suspect terranes and continental growth; radiolarian biostratigraphy; tectonics of the San Andreas fault system.



Morrison, H. Frank, Professor Emeritus, Ph.D., 1967, UC Berkeley. Applied geophysics: electrical and electromagnetic methods for mapping subsurface conductivity; marine magnetotellurics, cross-well electromagnetics for reservoir characterization, numerical modeling and inversion.



Weiss, Lionel E., Professor Emeritus, Ph.D./Sc.D., 1956, University of Edinburgh. Structural geology and petrology.



A JOURNEY THROUGH GEOPHYSICS

RICHARD M. ALLEN



A move to a new institution always provides new opportunities. For me, there was a very specific reason for coming to Cal: the Berkeley Digital Seismic Network. As a seismologist whose interests include realtime earthquake information, I found the prospect of participating in the continuing development of the network particularly

exciting. But this move, and the research that has developed since I arrived in the Department of Earth and Planetary Science in January 2005, is only the most recent chapter in my journey through geophysics, which the editors of the annual report asked me to share with you.

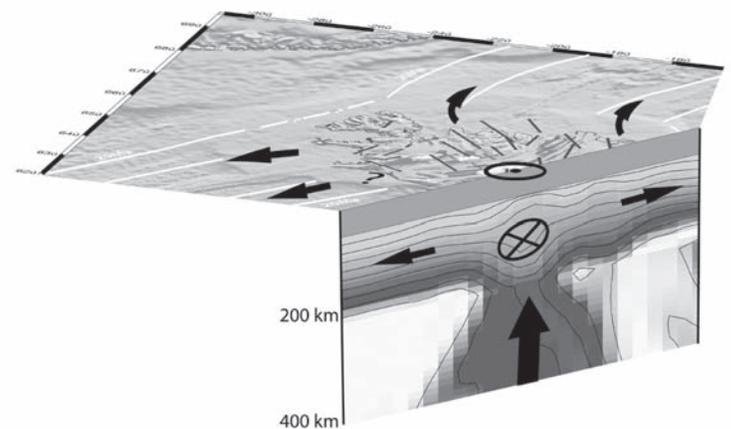
Unlike colleges in the U.S., UK institutions typically require students to declare their “majors” prior to arrival on campus. I entered Cambridge University fully expecting to become a physicist. The physics program at Cambridge, however, allowed students to explore multiple physical sciences in their first year and that was when I first discovered geophysics. My conversion was fairly quick and certainly complete. Fieldwork provided an important incentive. Geophysics students explored the Scottish Isles where they learned about plate tectonics. They traveled through Greece to observe active extensional tectonics and studied the regional seismicity to learn about the stresses responsible for the deformation. The concept of a dynamic Earth system with a past to explain and a future to predict was the unifying thread.

As we looked deeper into the Earth, Dan McKenzie introduced me to the motions of the Earth’s interior and showed what the convection of the Earth’s mantle should look like according to his tank experiments and numerical models. Later, I learned about seismic tomography, a tool that can be used to test geodynamic models. Seismic tomography is often compared to a CAT-scan, though differences are also significant. In a CAT-scan X-rays pass through the body at all possible angles and locations; in the Earth our view is blurred by the heterogeneous distribution of both earthquake sources of energy and the sensors used to detect them.

The down-welling component of mantle convection is the most clearly imaged; slabs of cold oceanic lithosphere are observed sliding down into the mantle through trenches. Images of this process are facilitated by the presence of earthquake sources in the slabs, and we are now able to trace the subducting lithosphere down to the core-mantle boundary in a few cases. The nature of the upwelling component of mantle convection remains less clear. When I learned of a project to image the upwelling region beneath Iceland I knew what I wanted to study for my Ph.D.

In 1996 I participated in the deployment of a seismic network across Iceland designed to image the structure of the hotspot from the surface down to several hundred kilometers depth. The hypothesis was that there is a mantle plume beneath Iceland that carries warm, buoyant material from deep in the mantle towards the surface. On arrival beneath the lithosphere, large volumes melt to feed the volcanoes of Iceland, generating a thick crust (up to 46 km) while the presence of this buoyant material in the upper mantle lifts the lithosphere above sea-level. This project brought me to the U.S. and Princeton University where my advisors were Guust Noel and Jason Morgan. Jason had proposed the plume hypothesis for hotspots in the early seventies, but the conclusive evidence for a plume – one observed *in situ* – was still lacking. Our goal was to image the mantle beneath Iceland to see what we would find.

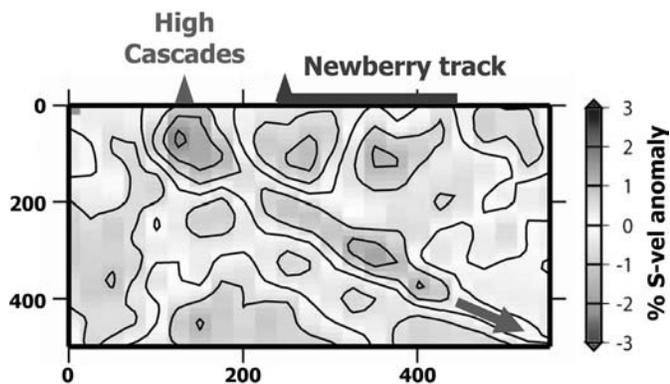
The vertical face of Figure 1 shows a cross-section through the tomographic model for Iceland. It depicts a



vertical column of low-velocity material (near-cylindrical in three dimensions) beneath the center of Iceland and

a horizontal layer of low-velocity material that extends beneath all of Iceland in the upper ~ 200 km. Our interpretation is that the low-velocities are due to warm mantle material, $\sim 200^\circ\text{C}$ warmer than the surrounding mantle, which is rising under its own buoyancy. Once the material impacts the lithosphere it is diverted sideways and spreads out beneath the North Atlantic. This flow was later mapped by one of my own graduate students, Mei Xue, at the University of Wisconsin-Madison. Flow in the mantle causes the preferential orientation of mineral grains. These orientations are observable because seismic waves travel at different speeds along the different axes of mineral crystals. By observing the orientations of the fast-axes, Mei constrained the flow pattern in the asthenosphere beneath Iceland, showing that the upwelling material is preferentially fed along the Mid-Atlantic Ridge as shown on the top face of Figure 1. The velocity anomaly and flow pattern beneath Iceland are consistent with an upwelling mantle plume as hypothesized back in the 1970s. The source depth of this plume remains unknown, but it must be greater than 400 km depth.

While the plume model explains some hotspots, it cannot explain all of them. The Newberry Volcano in Oregon is at the end of a hotspot track, a line of age-progressive volcanic domes extending from the Oregon-Nevada-Idaho border to the northwest. Its big sister, the Yellowstone hotspot track, starts in the same area but is directed to the northeast. While the Yellowstone track is parallel to plate motion and can therefore be explained by a stationary mantle source including a plume, the Newberry source must be migrating with respect to both the North American lithosphere and the mantle beneath. Mei, who migrated with me to UC Berkeley, is now investigating the nature of the Newberry source. A preliminary image of the mantle beneath Oregon and the Newberry track is presented in Figure 2. It shows a low



velocity anomaly beneath the currently active Newberry Volcano and also a high velocity strip diagonally across

the image, which is the Juan de Fuca slab diving down into the mantle. Previous efforts to locate the slab were unsuccessful, leading to speculation that this young and unusually aseismic slab had broken up. Instead, the Newberry source is clearly constrained by the slab, and Mei is currently in the process of improving image resolution in the upper 100 km to better constrain this relation.

My academic interest in earthquakes as point sources of energy that illuminate Earth structure was transformed by the experience of moving to California for the first time and seeing their more tangible effects. As a postdoc at Caltech I became inevitably fascinated by the earthquake rupture process and strong motion seismology. Seismologists have traditionally studied earthquakes after they occur, but modern communications and dense seismic networks allow us to study earthquakes in progress. Using observations from earthquakes in Southern California and around the world, my post-doctoral research showed that we can use the beginnings of earthquakes to estimate the peak ground shaking to follow. This observation poses two interesting questions, how does information about the final rupture area of a fault propagate from the point of initiation out to the edges of that area, and can we process the information quickly enough to warn people of the forthcoming ground shaking.

Becoming a member of Earth and Planetary Science and the Berkeley Seismological Laboratory has allowed me to put my Earthquake Alarm System, nicknamed ElarmS, to the test. Graduate student Gilead Wurman is currently working on improving our peak ground motion algorithms using data from the Berkeley Digital Seismic Network and the Northern California Seismic Network operated by our colleagues at the USGS. We are also starting the process of testing the methodology on the realtime systems of the Berkeley Seismological Laboratory to see how accurate and timely potential warnings could be. The warning times we estimate are a few seconds to a few tens of seconds, but this is enough time to isolate hazardous chemical systems, reroute power grids, slow trains, and stop motion-sensitive operations such as chip manufacture and eye surgery. They will also allow initiation of all the earthquake response activities before ground shaking severs communication systems.

UC Berkeley has a long history of innovative research and application of that research for the benefit of the society we live in. The faculty, staff and students in Earth and Planetary Science, and the large number of visitors attracted by the department, provide an exciting environment in which to explore our dynamic Earth system. I look forward to continuing my scientific journey here at Berkeley.

EXPLORING WITH MAGMA — BRUCE MARSH, PH.D. GEOLOGY, 1974

PROFESSOR, DEPARTMENT OF EARTH AND PLANETARY SCIENCE, JOHNS HOPKINS UNIVERSITY

Prior to attending Berkeley I was asked by my M.S. advisors what I would like to do for research. I responded: “I would like to find a body of magma, study it, and do experiments in it.” After some silence and looking askance at one other, came: “What else what you like to do?” I did a thesis on interpretation of aeromagnetic terrain effects, which was another of my interests. Arriving at Berkeley I found that Chuck Meyer was on sabbatical and I looked about for others to satisfy my research interests. Hal Helgeson graciously invited me to attend his pre-semester aqueous geochemistry workshop where I met an august group of international researchers and was introduced to the marvels of PathCalc computing. Hal



Bruce Marsh (L) and Taber Hersum in camp at Bull Pass, Antarctica

was pleased that I was able to achieve gold deposition in a quartz vein. It was fun, but I wanted magma. As the semester started I met Ian Carmichael. Over coffee I told him about my ideas on magma. He said: “Why not start with a volcano?” He gave me the proofs of his newest paper on the pressure effects on silica activity, I found some things to fix and he was pleased. I was hooked. Hal argued that PathCalc was the way to go. “It’s a jet engine, Ian’s method is a wheel barrow.” Untactfully, I volunteered: “Yes. But the jet engine is still in pieces on the ground and the wheel barrow is up and running with magma.” That summer I went to the Aleutians and explored and mapped volcanoes, which I soon realized was magmatic wreckage. Months later, riding down in the elevator to the Dept. Colloquium, John Verhoogen asked me what I was doing and I told him about the Aleutian volcanism. He said he had started his career with volcanoes, but now was working on core processes. I asked him if this was a natural academic progression to go progressively deeper in the Earth and with age work on more obscure problems. He removed his pipe and laughed.

And so it has also been with my career. I have migrated deeper, although hopefully not to more obscure problems, but to where magmas have lived, and, above all, to where the field relations are fast and clear. This has taken me to the McMurdo Dry Valleys of Antarctica, wherein lies perhaps the most extensive, intact, and best-exposed magmatic plumbing system on Earth. These are the Ferrar Dolerites so named by Robert Falcon Scott’s first expedition (1902-04) in quest of the South Pole. Although my first two field seasons (1993-94) centered on the nature of silicic segregations in the dolerites, I soon realized there was a much bigger and more fundamentally important magmatic issue at hand. Others had casually looked at the overall form of the dolerites, and Bernard Gunn and Warren Hamilton had given excellent geochemical overviews of the region, but the consensus at the time was that it was a complicated, heterogeneous, and messy system. The more I looked at it the more ordered and systematic I found it to be in every quarter.

The Ferrar-Dry Valleys magmatic system contains about 10^4 km^3 of 180 Ma dolerite distributed throughout a fir tree-like stack of four areally extensive 300-500-m-thick sills. From bottom to top the system varies chemically from primitive, mantle-like, to highly evolved, oceanic crust-like, rocks. The lowest sill contains a vast, massive tongue of orthopyroxene (opx) cumulate crystals, entrained during magma ascent, and emplaced with the sill itself. The areal distribution, sorting, and textures of these crystals intimately record the workings of the system. The bulk sill composition varies from 20% MgO in the tongue center to 7% in the leading tip and margins of the sill, which itself defines the compositional spectrum of the whole complex and is remarkably similar to the compositional spectrum of Hawaii. Relative sorting of large (1-50 mm) opx and small (~ 1 mm) plagioclase



Base camp in Bull Pass on the edge of Wright Valley, Antarctica

due to kinetic sieving during avalanching in the tongue has culminated in the formation of a small (600 m x 4 km), well-formed layered intrusion (the Dais Intrusion) consisting of alternating layers of orthopyroxenite, anorthosite and gabbro-norite, complete with apparent ripples and channel (4 x 20 m) fills. Upwards in the system the sills become progressively depleted in MgO and are temporally and spatially contiguous with continent-wide flood basalts. The size, extent, and number of sills display a time progression of emplacement similar to that of volcanic episodes, and the internal sill structures reveal a rhythm of injection similar to volcanic eruptions themselves. Had this magma been repeatedly injected into a single reservoir, it would have become a massive layered intrusion. But deliveries of individual magmatic aliquots into separate sills allow the construction and operation process of a magmatic system to be studied at all level of scales, large to small.

Having grown up inquisitive in the woods on the shore of Lake Superior, I found high adventure in exploring remote icescapes. And I found great childhood solace and a *raison d'être* in the pages of books by R.F. Scott, E.H. Shackleton, Robert Peary, Richard Byrd, and Vilhjalmur Stephansson. Reenacting their expeditions thrilled me and kindled in me the joyful spirit of mixing exploration and science. Groggily riding towards McMurdo at 3 AM from the Ross Ice Shelf landing strip on my first trip South, other newcomers onboard were full of questions about the various landforms. They wanted names, explanations, and history. Without thinking, I gave it all. Someone asked, how many times I had been here before. Not once, I realized. But as my deeply imprinted childhood sprinted forth I felt I was coming home. The Berkeley scene, faculty, fellow students, and especially Ian Carmichael, engendered and coddled this revolutionary quest. It has served me well.

OIL MIGRATION TO RUSSIA — ARIC CUNNINGHAM

B.A. GEOLOGY, 1981; M.A. GEOLOGY, 1984

DIRECTOR OF RESERVOIR MANAGEMENT, TNK-BP, MOSCOW, RUSSIA

My first career conversation was only two months after leaving Berkeley when I started working in San Francisco for Standard Oil of Ohio (SOHIO) as a petrophysicist. It went something like this: “We’re moving the office to Alaska. Everyone has two choices. One is to move to Alaska. The other is to resign”. That pretty much set the tone for a career in the oil industry where change has been the norm. I began work at the Prudhoe Bay oil field on the North Slope where I did wellsite geology (advising drilling rigs to drill to the right depth and location) and petrophysics (monitoring well logs. I did that for about a year and then moved to the main office in Anchorage where I worked for the next 5 years or so. The late ‘80’s however, was the start of the consolidation of the oil industry which lasted until only a few years ago. Flexibility, in terms of where you work but also what you do was a key to success. Since that time I have worked in a number of disciplines, including geology, reservoir engineering, and business development (with an MBA from Kings College, Aberdeen, Scotland) and in a number of different locations including Scotland (4 years) and Kuwait (4 years). Although the name of my company has changed several times, I have worked for the same company, now just called ‘bp,’ for 23 years.

My latest assignment is working with the TNK-BP joint venture in Moscow, Russia, as the Director of Reservoir Management. Russia is the latest hot spot for oil and gas development. There is plenty of oil in

the ground but it is difficult to extract economically and there is a constant struggle over retention of ownership rights with the Russian government. With the inflow of oil money, Moscow has turned into a nice place to live although it is now the most expensive city in the world. Things could get bad again for Russians if the price of oil drops, but one thing I’ve learned in my work is that there isn’t anywhere near as much oil sitting in the Middle East as reported, so that will ultimately keep prices stable in the longer term. I still consider Alaska my home. Anchorage turned out to be a pretty easy place to live. No traffic, great outdoor activity, and if you like to fish (like I learned to) it is a perfect home base. So I’m building a house there to return to ultimately. If I could afford a place back in Berkeley I would love to return for the atmosphere of the town, but for the foreseeable future I’ll stick with the cold climates of Alaska and Siberia.



Aric Cunningham in Red Square, Moscow

REMINISCENCES FROM FORMER STUDENTS

MEMORIES OF BACON HALL

R. GORDON GASTIL, B.S., Geology, 1950; Ph.D., Geology, 1954

Professor Emeritus, Department of Geological Sciences, San Diego State University

In the days before it was demolished, Bacon Hall had interesting tales to tell. One of these is called “The Hidden Room.” Next door to Professor Howell Williams’ office, some graduate students discovered that however you measured it, there was a sizable space—about four feet by ten feet—which could not be accounted for, between his office and the stairwell. This brought about determined scrutiny. Many plottings and measurements did not answer the question as to why such a space in a building should be walled off on all sides. The students vowed that years later, when the building was torn down, they would determine what was contained in the empty space. So far as I know, they never found out.

In the basement of Bacon Hall were the office and laboratory of Professor Adolph Pabst. Adolph attempted to rid Bacon Hall of smoke. The top of the building was a dome structure from which nothing could fly upward. So some thoughtful student designed a hydrogen balloon which would carry a small sign to where it could not be retrieved. The sign read “NO SMOKING.”

Garniss Curtis and Charles Gilbert gave me my start in field geology, and inspired me to go on. Professors Charles Gilbert and Frank Turner were on my dissertation committee. I studied field geology, sedimentary rock, structural geology, and metamorphic petrography with them. Charles Gilbert visited my field area, Diamond Butte Quadrangle in Arizona. They all related very well to their students and shared an interest in the rocks that their students were working on. But no one was more encouraging than John Verhoogen. Together, these professors—and others-- inspired my career in geology and teaching.



Gordon and Janet Gastil standing on pillow basalt from lava flow of 1897, Galapagos Islands, 2003.



Jozef and Elvio Sommerauer, 1968 in Baja

MEMORIES OF BAJA, 1968

JOZEF SIEKIEL-ZDZIENICKI, B.A., Geology, 1974

Carpenter; Gardener; County Planning Commissioner, Lane County, Oregon

We were at our campsite hundreds of miles down dirt roads, 30 kilometers from the nearest settlement (3 *casas*, houses), basking in the moonlight against a backdrop of granitic ridges, with Boojum trees like out of Edgar Alan Poe’s poetry eerily talking to us, students and professor discussing the day’s mapping treks and finds of Iceland Spar. Many slugs of red wine later with the silence overcoming all, I realize that this is why I studied geology; to be outdoors in the wild and climbing over the landscape looking for clues as to what happened eons ago. It didn’t matter whether I was in Baja, as in this case, or the White Mountains,

or the Kettleman Hills, or Marysville Buttes, or the eastern Sierra; whether with Garniss C., or Rudy W., or Ian C., or Charles G., or Clyde W., or Charles M., it was a great education for which I am forever grateful. Alas, I was a poor classroom student and never panned out.



Jozef, 2006



December 1966 Pick and Hammer Show in San Francisco. From left to right: Larry Brown as Bernard Evans, Eric Essene as Howel Williams, Steve Kirsch as Lionel Weiss, Jon Busbee as Frank Turner, Frank Brown as John Verhoogen, Al Smith as Ian Carmichael; watched by Priscilla Dudley. Photographer unknown.

MEMORIES OF MENTORING IN HIGHER EDUCATION: UC BERKELEY 1966

PRISCILLA C. GREW (Priscilla Dudley, Ph.D., Geology, 1967)

Professor of Geosciences and Director, University of Nebraska State Museum of Natural History

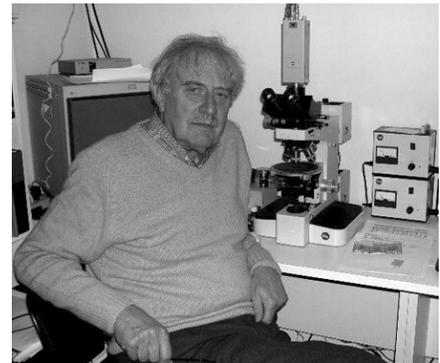
New peer mentoring systems are the latest fashion at top universities to retain women in science. UC Berkeley produced 25% of the geoscience doctorates granted to women in the U.S. in 1967, and I was one of those 4 women. Here you see an historic photo of my own peer mentors taking on our dauntingly distinguished international professors and cracking me up. I never would have made it without Eric “slap-it-on-the-diffractometer” Essene and Steve Kirsch, or Ed Ghent who walked into my office in 1964 and asked “When are you going to pick a thesis adviser? Why don’t you go talk to Fyfe?” Then there was the peer mentor who growled “It’s too late for petrography” in the final months as I peered down the microscope to avoid writing my thesis. Thanks, guys!

LOST AND FOUND: LUNAR PYROXENE

ENRIQUE TIDY, M.A. 1972

General Manager, TIDY & Co., Ltd., Geology Consultants,
Santiago, Chile

I used to spend a lot of time in the crystallography laboratory on the fourth floor in the Department of Geology where I did a lot of work as a research assistant with Dr. Subrata Ghose, who later went to the University of Washington in Seattle. Dr. Ghose was by that time a principal investigator with NASA and I used to run pyroxene single crystal diffraction exposures of moon pyroxenes in the precession camera. One day he received a very special sample, a single pyroxene crystal brought by the Luna 20 Soviet probe. It was, as I recall, a 0.2-mm reddish-brown crystal that was to be mounted at the tip of a glass fiber, glued with Canada balsam. The operation was done under a stereomicroscope that was in the laboratory on a ceramic tile-covered counter. I had done this many times, but with this very special sample I was warned by Dr. Ghose to be very careful. I completed the mounting of the crystal at the tip of the glass fiber but when I was going to install it on the precession camera holder, I noticed that the pyroxene crystal had disappeared from the tip of the glass fiber. On that precise moment Dr. Ghose walked into the lab room and he asked me how it was going. I said “I lost it” and he grabbed his head and said “My God!” and walked away. I felt in trouble. I found a small paintbrush in a drawer and used it as a mini broom to systematically collect all kind of dirt from each tile on the counter. One tile at a time I examined the material collected - strange things like fly wings and legs, eyelashes, perhaps dandruff. After a couple of hours I found the Luna 20 pyroxene. I re-mounted it successfully this time, put it on the precession camera and obtained a perfect diffractogram. Dr. Ghose was very happy.



IN MEMORIAM

RICHARD L. HAY 1926 - 2006



Richard L. Hay, professor of geology at Berkeley for 26 years (1957-1983), died on Feb 10, 2006 at his home in Tucson, Arizona. He was 79. He is survived by his wife of 32 years, Lynn, his son Randall of Indianapolis, his stepsons George and John, and three grandchildren.

Hay was born on April 29, 1926, in Goshen, Indiana, and earned his bachelor's and master's degrees from Northwestern University, in 1946 and 1948, and his Ph.D. from Princeton in 1952. In 1957 Hay came to Berkeley, joining the world's greatest concentration of top petrographers, Professors Howell Williams, Francis Turner, and Charles Gilbert, and becoming a top petrographer himself. This crucial skill, today alarmingly neglected, would underlie all his work in sedimentary geology and archeological geology. In 1983 he moved to the University of Illinois as Ralph E. Grim Professor of Geology. He retired from Illinois in 1997, and moved with Lynn to Tucson. His ashes are buried in Goshen, next to his parents's graves.

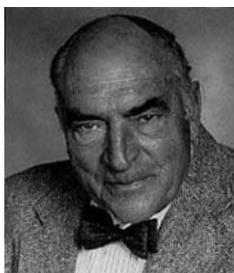
Hay, together with Prof. Garniss Curtis, received in 2001 The Leakey Prize, the most distinguished award in the field

of human origins. Hay's influence is pervasive through many fields of geology – sedimentology; weathering and diagenesis, especially zeolitic; the mineralogic, geologic and paleoclimatic record of arid environments; the petrology and alteration of ash, tephra, and volcanic sediments; and of course archeological geology. He is best known for providing the geological and paleoclimatic framework for two famous hominid-bearing sites in East Africa, Olduvai Gorge and Laetoli; and for documenting the huge replacement of Upper Precambrian-Cambrian-Ordovician rocks throughout the U.S. mid-continent by adularia. In his definitive *Geology of the Olduvai Gorge*, University of California Press, 1976, Hay worked out the stratigraphy, magnetostratigraphy (the "Olduvai" reversal was discovered there), chronology, sedimentology, and (via the zeolitic alteration of the sediments) the Pleistocene paleogeography of the area, showing the contemporaneity of two hominid species living in the Olduvai region at 1.8 Ma.

Hay's influence on students and peers was gentle but lasting. He made his scientific rigor and insight look casual. He knew what to tell students in the field and what to leave for them to work out. Many will remember his willingness to discuss ideas, evidence, and writing; the intellectual autonomy he gave students; and his modesty, dry sense of humor, and human caliber.

*Enrique Merino, '74
Professor Emeritus, Geological Sciences, Indiana University*

LUNA LEOPOLD 1915 - 2006



Professor Emeritus Luna Leopold died at his home in Berkeley on February 23, 2006. It is hard to grasp the breadth of Luna's influence. He did pioneering research, playing a crucial role in moving the field of geomorphology towards the quantitative field it has become. He made fundamental discoveries about

the nature of rivers, especially their remarkable regularity, and the self-scaled geometries that apply to all rivers whether they are in sand boxes or draining entire continents. He was a clear voice and advocate for ethics in science and a defender of the value of aesthetics as a reason to protect the natural world (even going so far as to propose a quantification of aesthetics). He made the U.S. Geological Survey a premier research institution in the field of hydrology, and in many ways helped create the field of hydrology. Hence the common reference to Luna being the "godfather of hydrology." He came to Berkeley in 1972 and held joint appointments in Landscape Architecture and Geology and Geophysics (now Earth and Planetary Science). Here he taught students the fundamentals of observations and the importance of fieldwork. Put simply,

Luna inspired. His passion about science and his joy about the natural world were felt by students. He strongly believed that simple, systematic observations of natural processes (and the keeping of good field notes) would reveal how nature worked, and were a powerful tool in the fight for the environment. His career proved that to be so. He taught undergraduates, graduate students, volunteers in environmental organizations, and professionals in field schools. He lectured and wrote books with great clarity and accessibility of concepts. In introductory classes he would emphasize what one could do with the most simple of resources, sometimes nothing more than a ruler, a watch, and an orange (to gauge the flow of a river). His books focused on enabling the inexperienced and attracting those unfamiliar into the fields of hydrology and geomorphology. At this he was highly successful. There has been no greater influence on the field of geomorphology in the past 50 years than Luna Leopold.

For those who wish to read Luna's papers, most are posted at The Virtual Luna Leopold Project: <http://eps.berkeley.edu/people/lunaleopold/>. This website has his CV, a list of his publications, and information on his long career. Details of the memorial service in December will be posted as soon as they are available.

*William Dietrich
Professor, EPS*

ALUMNI NOTES

Melvin J. Hill – 1941 B.A. Geology

Started work for Gulf Oil Corp. Sept. 10, 1941 and worked for Gulf or one of its subsidiaries for 44 years: Western Gulf Oil Co. 1941-1946; Gulf Research and Development Co. 1946-1953 (Director of the Geology and Geochemistry Div.); Gulf Oil Corp. 1953-1984. Positions held: Exploration Advisor; V.P. Exploration & Production; President, Gulf Oil Exploration Production Co.; Executive Vice President, Gulf Oil Corp. Retired May 31, 1984 coincident with merger of Gulf and Chevron Corp.

John S. Owens – 1941 M.A. Geology

Memories of Cal: T.A. under Taliaferro, Hines, and Williams; mapping on photos in Colusa County; Econ. Geol. Under Hulin; poison oak in the Berkeley Hills; fellow grad students in Bacon Hall: Blakemore, Cathcart, Norbistrath, Hilpert, Minton, Crittenden. Still in contact with J. Schlocker and with G.D. Robinson until his recent death in Victoria B.C. Worked for the M.A. Hanna Co. for 40 years, mostly in iron ore exploration and operations; some coal and misc. Have always missed the California climate - not many Cal graduates back here. Happy to continue getting the news! Will be 89 in Dec.

James K. Luce – 1948 B.A. Geology

I received a James Monroe McDonald Scholarship at UC. Following my graduation, I switched careers and went to medical school, graduating from Yale in 1952. I practiced family medicine for a few years and then took a residency and fellowship at UC San Francisco. I then spent 5 years as a faculty member at the University of Texas MO Anderson Hospital. I retired in 1994 as president and medical director at the Harrington Cancer Center in Amarillo, TX. I have never lost my love for geology and often wonder what would have happened if I stayed in that field of science.

H.C. Wells – 1949 B.A. Geology

Now a Prof. Emeritus. Started both Geology and Engineering degree programs at UNLV. I had classes from Gilbert, Turner, Curtis, Pabst, Taliaferro, Hulin, Wissner, Durnham, and Leverson. A hard-to-beat education in Earth Sciences.

Charles W. Welby - 1948 B.S., 1949 M.S. Econ. Geology

Bacon Hall was an interesting building and seemed in the mid-'40s an appropriate site for a Geology Department. My wife's stepfather, an architectural engineer and a 1906 graduate of Berkeley, once told me that when completed, its "strength" was tested by marching the ROTC members around the balcony. A trip to Libya last March and April with a Cal Bear Treks group afforded a chance to compare modern dunes and desert deposits with the sedimentary structures found in the Nubian Sands and to enlighten some Liberal Arts graduates on aspects of desert geomorphology.

Charles V. Booth – 1948 B.A.; 1950 M.A. Geology

After obtaining my M.A. degree, I worked for Shell Oil Co as an Exploration Geologist, first for 13 years up and down the West Coast, then 26 years in the offshore Gulf Coast, officed in New Orleans. My wife Virginia and I moved to Southern Oregon (Ashland) upon my retirement in 1989. I'm presently enrolled in So. Oregon University (SOU) taking Geology102. It's fun.

Miles Pepper – 1951 B.A. Geology

I am still active in gas exploration in the Sacramento Valley. I work from my office in my home, as I have done for the past 34 years. It is still very enjoyable to still find new gas deposits in the Valley with techniques, data, and application of much work that I've used over many years. My wife and I still find much time for travel in our later years in addition to my geological work.

Giles Maloof – 1953 B.A. Geophysics

Geophysics at Boise State includes both masters and doctoral programs. I continue teaching mathematics at Boise State.

Ernest Solomon – 1959 B.A. Geology

I tell people that I'm semi retired. That's an oxymoron. Most days I'm retired. Once in a while, I do some consulting for an engineering firm that needs to draw on my (half) vast experience as an engineering geologist.

William D. Romey – 1962 Ph.D. Geology

Just put out a new e-book: "A Geologist's Experience in Norway" by Bill Romey. See other books on Libri-Terrarum.com

Larry Lackey - 1963 B.A. Geology

Will retire Dec. 31, 2005. Formerly Director of Exploration, MK Resources Company. Worked on all seven continents while engaged in geological and mineral exploration. Look forward to working with thousands of photos collected over 50 years, snowmobiling in the winter and riding our three quarter horses in the summer.

Michele Aldrich – 1964 B.A. Geology

I am continuing to research and write on the history of geology and am active in the History of Geology Division of GSA.

Rex V. Allen – 1960 B.A. Geophysics**Mary O' Neill Allen** – 1966 M.A. Geophysics

We're both department graduates and we both spent our working careers at the USGS in Menlo Park.

Stephen A. Kirsch – 1968 Ph.D. Geology

I want to send greetings and regards to Garniss Curtis on the occasion of his attaining emeritus status.

Courtney Isselhardt - 1969 M.A. Geology

Sold our vineyard in Salem, OR. Moving back to CO.

Dave Campbell – 1969 Ph.D. Geology

Five years ago I retired from the USGS and my wife and I moved to an acreage near my brother's farm in Iowa. I now keep bees, grow garlic and other vegetables for the Iowa City Farmer's Market, and teach geophysics as an Adjunct Professor at the University of Iowa. For my USGS Emeritus project I'm doing electromagnetic soundings to help map bedrock aquifers in Eastern Iowa.

Alumni Notes—continued next page

Earl W. Hart – 1971 M.A. Geology

I retired at the end of 1994 after 40 years with the California Geological Survey. Then worked part-time as a retired annuitant and volunteer researcher. My final work on Ridge-Top Spreading in California was published as a CD-ROM in 2004 by CGS. Much to my surprise, AEG presented me with the Claire P. Holdridge award for this electronic publication in 2005.

Kenneth L. Howard – 1972 PhD Geology

In January, I accepted a position teaching geology at Wake Technical Community College. Currently, I have approximately 80 students in Physical Geology courses. Quite a change after all the years in the industry.

Horton Newsome, Ph.D. – 1975 B.A. Geology

I am a research professor and curator for the Institute of Meteoritics in the Department of Earth and Planetary Sciences at the University of New Mexico. My research involves impact craters and the surface properties of Mars. I am a co-investigator on the Mars Science Laboratory, the next Mars rover mission to be launched in 2009. I became interested in geochemistry during my days in Berkeley.

Pamela J. Irvine – 1977 M.S. Geology

I'm currently a senior engineering geologist, supervisor, in the Geologic Mapping Program at the California Geological Survey, Los Angeles Regional Office. I continue to be involved in mapping geology and landslides for use in planning and the seismic hazard zoning process and responding to natural disasters for the state. (Yes, 2005 was a busy year for me).

Wes Hildreth – 1977 Ph.D. Geology

Six months field mapping in 2005 made good progress toward completing detailed geologic maps of the Three Sisters (OR), Simcoe Volcanic Field (WA), and the basalts at Long Valley Caldera (CA). A high point was the Ianfest at Camp Davis (WY) in August.

Virginia Gillerman – 1982 Ph.D. Geology

Still living in Boise and working for Idaho Geological Survey. Note to current students who like cool rocks – mining and mineral exploration is on an upswing and earth scientists are needed to help.

Paul Belasky – 1983 B.A. Geology

I've recently been appointed to the board of the UC Berkeley IIEES (Institute of Slavic, East European, and Eurasian Studies). I am also about to start my sabbatical leave (from the Ohlone College) in Russia, where I will continue research on Permian paleobiogeography of the Pacific region and start an unusual project in history of geology called: "The Real Geopoetry: The Geological School of Modern Poetry at the Mining Institute, St. Petersburg, Russia". This study will include poems by Russian poet-geologists, which I have translated with help of UC Berkeley's graduate students in Russian literature.

Steve Cardiff – 1985 B.S. Geology

I enjoy working as a consulting petroleum engineer (M.S. USC) and geologist. I'm curious about any news on fellow '85 graduates. I would like my donation to go to the H. Todd Sutherland Memorial Scholarship. He was a really great guy.

David K. O'Brien, Ph.D., GISP – 1985 M.S. Geology

I have been living in Anchorage, Alaska, for the last 15 years. I have been working at the state health department since 1998 where I provide computer support for the Alaska Cancer Program and manage the database of all the cancer patients in the state. The goal of this healthcare program is to provide surveillance statistics on cancer incidence and mortality as a basis for state and federal

comprehensive cancer prevention and control programs. I have been the GIS Committee Chair for the North American Association of central cancer Registries for the last 2 years (see www.naacrr.org/gis). I also do database consulting for the oil industry where I maintain a GIS environmental database for south-central coastal Alaska that is used for oil spill responses. My wife Irene and I are very active as adult leaders in cub scout and boy scouts and both our sons are in scouting.

Nathan Wisner – 1987 B.A. Geology

I live in Denver area now, after "doing my penance" living without any topography in Chicago for 11 years. I work at the EPA regulating oil and gas activities in the Rockies. My wife of 11 years and I have 2 children, both under 2 yrs. old. I still love geology, with a passion for reading about it and making occasional jaunts into the mountains, kids allowing.

Stephen Svoboda – 1988 B.S. Geology

I teach science at Newbury Park High School in Thousand Oaks, CA. It's a second career and I enjoy it a lot. I was an environmental consultant for a long while prior to becoming a teacher. Part of the curriculum I teach is Basic Geology- and models, rock/mineral sets, maps etc. donated are much appreciated. I live in Ventura (recently took up surfing!) but visit UCB ESB once a year. Go Bears! I would love to hear from those who graduated in 1988.

Barbara Ransom – 1991 Ph.D. Geology

I am a Program Director in Marine Geology and Geophysics at The National Science Foundation. Life in DC is good and this is the "land of opportunity" for anyone with a Ph.D. in the sciences. Still working far too much, but enjoying the hell out of it! You know times are tough when your job is to go on shake-down cruises in Hawaii. Best wishes to my former (not old) classmates. Hey, how about a Santa Barbara's Day reunion of "the band" for the UCB Centennial AGU next year!

Theodore Bohn – 1994 M.A. Geophysics

Currently pursuing Ph.D. in Hydrology at the University of Washington, in the Dept. of Civil & Environmental Engineering. Dissertation topic: Eurasian Wetlands and the Global Carbon Cycle

Sofia Akber – 2003 Ph.D. Geophysics

I am now an Assistant Professor of Geophysics at the Scripps Institution of Oceanography at UCSD. My husband (Allen Knutson, Prof. in Math at UCSD) and I had a baby boy (Fionn Ivar Knutson) on Nov 5, 2005.

JOIN US FOR THE FOLLOWING EVENTS:

ANNUAL SANTA BARBARA'S DAY CELEBRATION

Saturday, Dec. 9 in the Haas Clubhouse, Strawberry Canyon, for the annual dinner and show put on by EPS graduate students.

2007 EPS COMMENCEMENT

Thursday, May 17, 3 p.m., Pauley Ballroom.

Watch the EPS website for details: eps.berkeley.edu

DEGREES AWARDED

FALL 2005 - SUMMER 2006

BACHELOR OF ARTS

ATMOSPHERIC SCIENCE

Alyssa Regine Atwood
 Brian Benjamin Cook
 Rhea Candace George
(Departmental Citation)

ENVIRONMENTAL EARTH SCIENCE

Gina Lorraine Pecht
 Eric Rippchen Pennella
 Neel Rohit Singh

GEOLOGY

Brett John Davidheiser-Kroll
 Michael Jeffrey Harris
 Adina Marie Honniball
 Michael McGehee
 Vincent John Romano



Commencement, May 2006

Back row, left to right: Alyssa Atwood, Neel Singh, Brett Davidheiser-Kroll, Brian Cook, Mike Harris, Christina Georghiou
Middle row: Stephanie Stoner, Kathleen Mai, Adina Honniball, John Romano, Courtney Hart
Front row: Rhea George, Gina Pecht, Eric Pennella, Kris MacLennan

GEOPHYSICS

Kris MacLennan
(Departmental Honors)
 Jacob Edward Siegel
 Marcel Staedter

MARINE SCIENCE

Christina Claire Georghiou
 Courtney Elizabeth Hart
 Stephanie Lynn Stoner
(Departmental Honors & AWG Outstanding Woman Student Award)

PLANETARY SCIENCE

Kaiyun Kathleen Mai

MASTER OF ARTS

Kate Elizabeth Barton

Junkee Rhie

Studies on Tiny and Huge Seismic Sources Using Long Period Surface Waves: from the Hum to 2004 Sumatra-Andaman Earthquake

MASTER OF SCIENCE

Meagan Mary Smith
 Alexey Shulgin
 Alexander Wong

Elowyn Marie Yager

Prediction of Sediment Transport in Steep, Rough Streams

DOCTOR OF PHILOSOPHY

Aimin Cao

Seismological Constraints on Inner Core Properties

Clara Sze-Yue Chan

The Geomicrobiology of Iron-Oxidizing Microbes

Joshua Moser Feinberg

The Mineralogic Origins of Magnetic Remanence in Silicate-Hosted Magnetite Inclusions

Ingrid Anne Johanson

Slip Characteristics of San Andreas Fault Transition Zone Segments

Phoebe Jiayue Lam

Marine Particulate Matter in the Twilight Zone: Insights on Iron Cycling and Remineralization of Particulate Organic Carbon in the Ocean

Jung-Eun Lee

Atmospheric Water: Perspectives from Isotopes and the NCAR Climate Model

Jenny Marie Pehl

Quantitative Rietveld Texture Analysis of Geological Materials



Commencement, May 2006

Back row, left to right: Taylor Perron, John Moreau, Mark Wenzel, Jeff Dick
Middle row: Ingrid Johanson, Junkee Rhie, Clara Chan, Kate Hoag, Sarah Aciego
Front row: Aimin Cao, Dennise Templeton, Phoebe Lam

Degrees awarded as of Summer 2006

DONATIONS TO THE DEPARTMENT

JULY 1, 2005 — JUNE 30, 2006

Earth & Planetary Science (unrestricted)

Robert W. Barker
Philip Behrman
Eleanor J. Bright
Francis H. Brown
Julie M. Donnelly-Nolan
Fidelity Investments Charitable Gift Fund
Alfred E. Janssen (in memory of Ed Helley)
Annie B. Kersting

Chair's Discretionary Fund

Michele Aldrich
Charles and Cynthia Bacon
Ray Brodersen
Maria E. Crosson
Virginia S. Gillerman
Earl W. Hart
Wes Hildreth
Melvin J. Hill
Pamela J. Irvine
Jeffery M. Johnston
Frank C.W. Kresse
Larry L. Lackey
James K. Luce
Gail A. Mahood
Giles W. Maloof
Walt W. McNab
John S. Owens
Louise Pellerin
Robert O. Prindle
Donald A. Seeburger
Roger L. Taylor
Paul J. Wallace

Earth & Planetary Science Upgrade Fund

Pamela J. Irvine
Wunan Lin
Giles W. Maloof

EPS Scholarship Fund

Mia Alexander
Andrey Aristov
Charles and Cynthia Bacon
Gregg Bluth
William J. Boyle
Sydney B. Dent
Mark G. Doerschlag
Wes Hildreth
Michael J. Holdaway
James Liston
Gail A. Mahood
William D. Romey

Matching Funds

Shell Oil Company, Exxon Mobil Foundation, Marathon Oil Company, ChevronTexaco Corporation, Fluor Foundation

Gifts

Chevron Oronite Company, Stillwater Sciences, Schwab Fund for Charitable Giving, Fidelity Investments Charitable Gift Funds, Marathon Oil Company

Donald A. Seeburger
Jacob M. Smit
Douglas B. Stimpson
Martin Trso
Charles W. Welby
Florence Wong

Earth Science Library Fund

Michele Aldrich
Donald W. Frames
Richard Hay
Wes Hildreth
Gail A. Mahood
Giles W. Maloof
Richard L. Nielsen
Robert O. Prindle

Speakers Program Fund

Charles and Cynthia Bacon
Paul Belasky
Giles W. Maloof

Ralph Newton Emergency Fund

Giles W. Maloof

Francis Turner Fellowship Fund

Borg Family Trust (Iris & Richard)
Elwood Brooks
William D. Romey
Othmar Tobisch

Harlan Todd Sutherland Memorial Scholarship

Susan Abrahamson
Steve Cardiff
Ernest Solomon

Charles Meyer Fellowship Fund

George R. Bole
Virginia S. Gillerman
Richard and Lynn Hay
Paul C. Henshaw
Kenneth L. Howard
John Hunt
Horton Newsom
Richard L. Nielsen
William D. Romey
Charles M. Shaw
Othmar Tobisch
William A. Wright

Don Tocher Memorial Fellowship Fund

Selena Billington
Willard J. Classen (in memory of B. Bolt)

James W. Dewey
Nicholas J. Gregor
James E. O'Donnell
Charles W. Welby
Willard J. Classen Jr. Trust

George D. Louderback Fund

Giles W. Maloof
Richard C. Mielenz
Alessandro Montanari
Willard J. Classen Jr.

Perry Byerly Fellowship Fund

Mia Alexander
Selena Billington
James Dewey
Nicholas J. Gregor
Giles W. Maloof
Richard Mielenz
James E. O'Donnell
Plumb Family Trust

Thomas McEvelly Fellowship Fund

Mary O'Neil Allen and Rex V. Allen
William Bakun
Selena Billington
Nicolas G. K. Boyd
David Campbell
James W. Dewey
John R. Filson
Julie A. Hood
Richard Lee
George W. T. Liao
Carl E. Mortensen
James E. O'Donnell
Donald A. Seeburger

Garniss Curtis Endowed Chair

Susan Abrahamson
Michele Aldrich
David Aubry
Stanley Cebull
Stephen A. Kirsch
Giles W. Maloof
Bruce Marsh
James M. Medanich
John P. Ohlmann
Miles Pepper
William C. Schetter

Field Geology & Digital Mapping

Charles V. Booth

DEPARTMENT FUNDS

SUPPORTED BY ALUMNI AND FRIENDS

Chair's Discretionary Fund

Established in 2002 to solicit funds for collegial activities in support of education and research as well as equipment and facilities upgrades. This fund supersedes and expands the scope of the previous "equipment upgrade fund."

Earth Science Fund:

Established in 1972 with two accounts, one for contributions by former undergraduates, and one for contributions by former graduate students. The undergraduate fund is used to cover food costs for Summer Camp, to make a monetary award to the winner of the Departmental Citation, and to cover other miscellaneous costs. The graduate fund is used for modest fellowships for graduate students, and other miscellaneous costs.

Speakers Program Fund:

Established in 1993 to help defray the costs of the weekly departmental Speaker's Program in which distinguished speakers from around the country are invited.

Earth Science Library Fund:

Established in 1994 to assist in the acquisition of journals for the Earth Sciences Library and Map Collection.



Francis J. Turner Fellowship Fund:

Established in 1986 to honor the memory of Professor Francis Turner with a graduate fellowship in geology. Recipient: Kathryn Fletcher.



Charles Meyer Fellowship Fund:

Established in 1980 to honor Professor Charles Meyer by awarding a graduate fellowship in the area of integrated field and laboratory studies of ore deposits.

Don Tocher Memorial Fellowship Fund:

Established in 1979 to honor the memory of Don Tocher with a graduate fellowship in seismology. Recipient: Junkee Rhie.



Perry Byerly Fellowship Fund:

Established in 1978 to honor the memory of Perry Byerly with a graduate fellowship in seismology.



Thomas McEvelly Fellowship Fund:

Established in 2002 in memory of Professor Thomas V. McEvelly to award a graduate fellowship in seismology.



Harlan Todd Sutherland Memorial Scholarship*:

Established in 1987 in memory of undergraduate student, Harlan Todd Sutherland, killed doing field research. Funds to support undergraduate or graduate student. Recipient: Scott Orton.

Louderback Fund:

Established in 1957 to honor the memory of George D. Louderback with fellowships in geology and paleontology. Recipient in EPS: Joel Rowland



Ralph Newton Emergency Fund*:

Established in 1994 in memory of Ralph Newton to provide emergency funds to graduate students.

Garniss H. Curtis Endowed Chair:

Established in 2004 in honor of Garniss' contributions to science and to UC Berkeley. Used at Chair's discretion on behalf of the Department.



*If you have a photo of Todd Sutherland or Ralph Newton please send it to us.



Esper S. Larsen, Jr. Research Fund:

Established in 1989. The proceeds of an endowment left to the University by Eva A. Larsen are used to support new research in the fields of geology, mineralogy and petrology. 2006 EPS recipients:

Richard Allen, *Tremor throughout Cascadia: Seismic Clues to Metamorphic Processes?*

Roland Bürgmann, *The Exhumation History of Salinia*

B. Lynn Ingram, *Proxy Records of the Pacific Decadal Oscillation using the Geochemistry of Geoduck Growth Bands: A Pilot Study*

H.-R. Wenk, *Comparative Study of Preferred Orientation in Hominid Femur Bones from Spain*



Ramsden Scholarships:

Established in 1994 to support undergraduates who have expressed an interest in preparing for careers in the geosciences. 2006 recipients:

Kris MacLennan, Research Fellowship for *An Investigation of Magnetic Anomalies at San Marcos Pueblo*

Jacob Siegel, Research Fellowship for *Repeating Micro-Earthquake Identification Methods*



Prof. Lawson's field class in 1892 with three women among the students



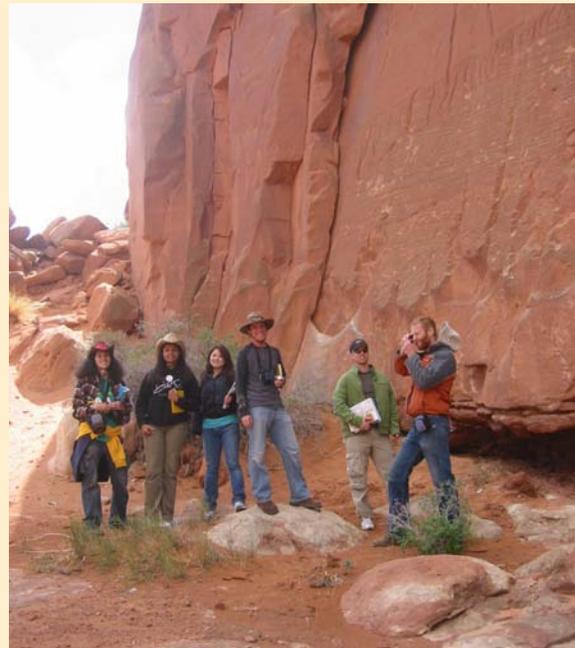
Jim Kirchner in Little Wildhorse Canyon in Utah.



George Brimball and students at Sibley Volcanic Regional Preserve



Paul Renne and Rudy Wenk in South Africa, January 2004.



Walter Alvarez' EPS 115 Field Trip to SE Utah, 9/06, at the Entrada sandstone, a Jurassic sand dune deposit in Arches National Park, (L to R) Kara Quan-Montgomery, Shreya Ramesh, Katherine Tran, Josh Graham, Devin Finn, and Charlie Paradis.



Barbara Romanovicz, Chair 2002-2006 at Commencement, May 2006.



James Rector's students, prospecting for gold south of the famous Esmeralda Vein, Aurora, Nevada, 2003