The Redbeds

The Annual Newsletter, Department of Earth and Planetary Sciences, Rutgers, The State University of NJ

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Welcome to the 2010 Redbeds

The Redbeds is the annual newsletter of the Department of Earth and Planetary Sciences (formerly Geological Sciences) with reports on research, students, awards, funding, and comings and goings. Sent to over 700 alumni, the Redbeds is our primary means of informing alumni, friends, and colleagues of our recent accomplishments. Please write to us and tell us of your activities! Visit our alumni website http://geology.rutgers.edu/alumni.shtml

Rutgers Role in Expedition 313 drilling of the New Jersey shallow shelf
Contributed by Gregory S. Mountain and Kenneth G. Miller

The New Jersey continental margin is a natural laboratory for tracking the history of global sea level during the post-Eocene "Icehouse world." After twenty years in the planning, three coreholes were drilled on the New Jersey shallow shelf 45-65 km miles east of Barnegat Light. Led by co-chiefs Greg Mountain (Rutgers) and Jean-Noel Proust (Université de Rennes), the Integrated Ocean Drilling Program Expedition 313 used a 3-legged jack-up platform to core and log late Paleogene-Neogene sequences at 3 locations (M27-M29 on adjacent map) in 35 m of water in May-July 2009. Despite the challenge of coring the sandy shallow NJ shelf, we collected 612 cores with 80% recovery totaling 1311 m in length. The deepest was 757 meters below seafloor; the oldest was upper Eocene. Wireline logs and a vertical seismic profile were run at each site. Space on the platform was too tight to split and process cores offshore, but 15 members of the Science Party rotated on/off, 4 at a time, to conduct through-liner descriptions, basic sedimentologic analyses of core catchers, and to work with European Science Organization (ESO) staff capturing time-sensitive measurements of whole-core properties, pore water chemistry, and microbiologic activity. Sediment samples from core catchers were sent ashore for preliminary age determinations, and all cores were shipped to the Bremen Core Repository (BCR) when the platform demobilized at Atlantic City, NJ.

All 28 members of the Science Party, including Rutgers scientists Greg Mountain (co-chief), Ken Miller (stratigraphic correlator), Jim Browning (sedimentologist), Pete Sugarman (sedimentologist), Don Monteverde (correlator), and Mimi Katz (microplaeontologist, formerly Rutgers, now RPI) met at the BCR November 6, 2009 and in 29 straight days (with superb help from the BCR and ESO staffs), all cores were split, described, photographed, measured for physical properties, sampled and returned to refrigerated storage. Core quality had been difficult to determine offshore; to our relief, when split and examined they revealed very good to excellent preservation. Measurements of natural gamma radiation (NGR), too time-consuming to do offshore, were done at the BCR prior to splitting to ensure unequivocal log-core correlation.

The objectives of the Expedition were first articulated in a proposal in 1989 by Miller and Mountain:
• Compare the age of base-level changes with the age of sea-level lowerings predicted by the δ¹⁸O glacio-eustatic proxy;
• Estimate the amplitudes, rates and mechanisms of sea-level change during the Paleogene-Neogene 'Icehouse World'; and
• Evaluate models that predict lithofacies successions, depositional environments and the arrangement of seismic reflections in response to sea-level change.
Preliminary results are promising and the strategy of drilling 3 sites into clinoform topsets, foresets and toesets paid off well. High-quality seismic profiles (like the one shown) enable us to trace depositional units along this paleo-depth transect and strengthen inter-site correlations that are also based on age and lithofacies. Our confidence in seismic correlations was made possible by downhole logs, multi-track measurements of unsplit cores, and physical properties of discrete samples that provided core-log-seismic ties with depth uncertainties typically ±7 m or less. We expect future study will narrow this range and firmly link facies successions to as many as 16 surfaces and/or sequence-bounding unconformities mapped in the regional seismic grid. Reliable zonations of multiple fossil groups plus Sr-isotopic ages measured on mollusks and foraminifera at Rutgers in Mark Feigenson’s lab reveal a nearly continuous composite record of ~1 myr sea-level cycles 22-12 Ma. As further validation of the 3-site transect strategy, we recovered regressive sediment bodies that are absent in onshore boreholes due to those updip locations. Lithofacies and benthic foram assemblages provide a rich source of information concerning depositional setting, and imply 60-100 m water depth changes within single transgressive-regressive cycles in topset beds. Shifts in climate on the adjacent coastal plain have led to distinct pollen markers preserved in all 3 sites and provide another correlation tool. Large variations in porewater salinity are clearly controlled by facies. Their sharp vertical gradients await explanation, and relationships to microbiologic communities have yet to be determined.

Our results so far exceed our expectations. We have:
- cored and logged more than a half dozen seismically recognized lower to middle Miocene sequence boundaries landward, at, or basinward of their clinoform rollovers;
- linked these seismic geometries to lithofacies and paleoenvironments; and
- established preliminary ages ±0.5 Myr from Oligocene to middle Miocene for these sequence boundaries by integrating calcareous nanofossil, planktonic foraminiferal, and dinocyst biostratigraphy with Sr-isotopic ages.

Onshore work will be intense over the next 18 months, keeping several laboratories churning out data. We will:
- improve age resolution of many boundaries to ±0.25 Myr, and enable backstripping analysis to determine the timing, rate and magnitude of eustatic variations for the entire early to middle Miocene and compare these findings with those derived from other global sea-level curves;
- develop a calibrated model of litho/seismic-facies distribution at siliciclastic margins under the influence of sea-level change that can be tested against other sequence stratigraphic models; and
- explore the impact of sea-level change on the shape and position of the shoreline and the transfer of nutrients and sediments from land to sea.

East Pacific Cruise
Contributed by Yair Rosenthal

Last March, Professor Yair Rosenthal participated in a coring cruise to the eastern equatorial Pacific. The aim of the cruise was to collect sediment cores from the Peru Margin and along the equatorial "cold tongue" east of the Galapagos Islands. The regions are two of the major upwelling systems of the world ocean, and our objective is to study their response to long-term changes in the El Niño-Southern Oscillation (ENSO) over the past 20,000 years as a gauge for potential changes in the future. The cruise aboard R/V Knorr was among the first to use a new giant piston core, which allows scientists to collect 50 meter long sediment cores (see picture). This is the same long coring system that Professor Greg Mountain helped to first deploy and which he described in a 2008 presentation to the Geology Museum Open House.
Cores and Beer in Bremen
Contributed by James Browning, Kenneth Miller, Peter Sugarman, and Don Monteverde

Next time you open a bottle of Becks beer take a look at where it’s brewed – Bremen, Germany. I’m not sure why there is a connection between beer and geology but others have noticed it (http://www.wired.com/wiredscience/2009/12/15943). So it is fitting that IODP expedition cores from the Atlantic Ocean end up in the Core Repository at the University of Bremen. The Bremen Core Repository is a beautiful and well-equipped facility that became home to the geoscientists of the IODP Expedition 313 science party from early November to early December 2009. Included in this international group were six with ties to Rutgers: Jim Browning, Ken Miller, Greg Mountain, Pete Sugarman, Don Monteverde, and Mimi Katz.

Expedition 313 cores were drilled April-July 2009 on the New Jersey shelf. Because space was tight on the L/B Kayd the cores were not split and preliminary analysis was confined to end caps and through-liner observations. In Bremen, the goal of the science party was to make preliminary scientific observations on the cores as they were split. We worked 11-12 hours a day, 7 days a week, for over a month. Each new day seemed like a reenactment of the movie Groundhog Day: we woke every day at the same time, ate the same (sumptuous) breakfast, rode the same tram every day, and performed our duties in and day out. At least the cores changed as we worked downsection from Sites M27, M28, and M29. We saw beautiful nearshore facies including hummocky cross stratification and sharp-based sands that accumulated on storm and river influenced shelves. We saw amazing basin-fill facies including various mass flow deposits and thin turbidities. Using the excellent Sr isotopic record combined with good biostratigraphic control we produced a preliminary chronology that met our objective of better than 1 myr resolution. We brought back over 2000 core samples for Sr-isotopes, lithology, and benthic foraminiferal studies. In all we left Bremen closer to our goals of assessing the rates, magnitudes, and effects of sea level change. Oh, and we drank a little beer.

Drilling at Fort Monmouth
Contributed by Kenneth Miller

In September 2009, Rutgers scientists and the USGS Eastern Mapping Team returned to Fort Monmouth to drill shallow coreholes targeting the Cretaceous/Paleogene boundary. This project is a continuation of one reported on in the 2009 Redbeds: Ken Miller, Dick Olsson, Jim Browning, and Pete Sugarman used NSF funding for a campaign of a auger coring of 7 sites, 14 holes in 10 days in fall 2008. Though Fort Monmouth was the first site drilled in 2008, sticky glauconite sands (see picture) resulted in ambiguous recovery at the FM1 site. Two of the three sites drilled in 2009 (FM3 and FM4) recovered fossiliferous Danian sediments and the Cretaceous/Paleogene (K/P) boundary.

Selen Esmeray, a Ph.D. student working with Dick Olsson and Ken Miller, is analyzing the hole for planktonic foraminifera. Hendra Wayhudi, a graduate student in our department in a collaborative program with ExxonMobil is working with Gail Ashley, Ken Miller, and Jim Browning on analyzing the cores for lithology, microprobe (in Jerry Delaney’s lab), and XRD analyses. We have exciting new results from Ir analyses generated in Rob Sherrell and Paul Field’s lab at Rutgers. Our results show that Iridium (Ir) anomalies in New Jersey are linked directly to the mass extinction of marine plankton at the K/P boundary and to a clast layer resulting from a tsunami in the Atlantic. Stay tuned.
The Colorado Plateau Coring Project (CPCP) is an interdisciplinary, multi-institutional coring project designed to recover continuous core through mostly continental strata spanning ~100 million years of the Triassic and Jurassic. Its principal purpose is to tie the incredibly rich faunas, floras, and environmental record of this interval in this region to a rigorously developed timescale and thus to biotic, environmental, and tectonic events at a global-scale. The overall strategy involves 3 long cores (~1000 m) and 2 shorter cores (300-500 m) intended to recover the full expression of the critical early Mesozoic transitions in clear superposition. The cores would span from the base of the Moenkopi Formation (beginning of the Triassic, ~252 Ma) to the top of the Morrison Formation (end of the Jurassic, ~144 Ma) with sufficient overlap to splice the sections together without gaps and assess lateral facies variations, thickness changes, and stratigraphic completeness.

The initial phase of the CPCP that has just been approved for funding by NSF is a ~500 m core at Petrified Forest National Park (PFNP), one of the most famous and best studied successions of the continental Triassic in the world. A core is needed to place this spectacular record in a reliable quantitative and exportable time scale, which has proved impractical in outcrop. The PFNP core will recover virtually most of the Late Triassic Chinle and the entire underlying Early-Middle Triassic Moenkopi formations. The hole will be deviated 30° from vertical for core-bedding orientation intersections to be used as an azimuthal guide; additionally, the orientation of the core will be registered to the hole wall using whole-core-scans and compass-oriented acoustic and optical televiwer images and dipmeter surveys. Core orientation will facilitate the recovery of a high-resolution magnetic polarity stratigraphy for correlation to the fossil-rich outcrop sections. The polarity sequence will be calibrated by a series of high-precision U-Pb zircon dates obtained from discrete levels in the core, and provide critical data to fill the geochronologic gap in global time scales for the Late Triassic.

Despite excellent outcrop and a long and distinguished history of study, striking ambiguities exist in local correlation, the temporal duration and resolution of biotic events, global correlations, and the paleolatitudinal position of the region that prevent tests of major competing climatic, biotic, and tectonic hypotheses of global significance. For example, correlations of existing paleomagnetic polarity data for the Chinle with the Newark basin astronomically tuned geomagnetic polarity timescale are consistent with new U-Pb zircon dates from reworked volcanics in the Chinle, and suggest that 1) most or all of the Chinle is Norian and younger in age (< ~220 Ma); 2) the supposed Carnian-Norian boundary in the Chinle is actually a late middle Norian extinction that may coincide with the 215.5 Ma Manicouagan impact structure in Quebec; and 3) tetrapod faunas of tropical Pangea (i.e., Colorado Plateau) were radically different than those from contemporary higher latitudes despite the apparent geographic contiguity. Testing these ideas requires continuous coring to obtain an unambiguous reference sequence, which promises to fundamentally change the certainty and specificity of addressing questions relating the rich surface record from the Chinle and Moenkopi to Earth system processes.

This phase of the project involves 5 co-PIs: Paul Olsen, Lamont; Dennis Kent, Rutgers; Roland Mundil, Berkeley Geochronology Center; George Gehrels, Arizona; and Randy Irmis, Utah. The proposed funding duration of 24 months is intended to provide an Initial Report of basic stratigraphic, logging, magnetics, and geochronologic data for utilization by the scientific community for further research and integration with other studies.
Darwin Bicentennial Celebrated at Rutgers
Contributed by Marie-Pierre Aubry

"The Theory of evolution is arguably the greatest idea the human mind has ever had, and its proponent, Charles Darwin, is among the most influential scientists who ever lived. He changed the way humans view their place in nature. His explanation of the evolutionary process occurring through natural selection forms the basis of modern-day biological sciences, including the applied disciplines of agriculture, medicine, and, most recently, biotechnology" (Tim M. Berra, Professor Emeritus of Evolution, Ecology and Organismal Biology, Ohio State University, 2009).

Could there be a more eloquent way to introduce Charles Darwin and to characterize the importance of the theory he fathered? Certainly the idea of evolution was in the air when Darwin grew up, but Darwin offered a mechanism and multiple lines of research have only confirmed it, over and over. While the contribution of the theory of "Descent by Natural Selection" (as Darwin called it) to the scientific world – and thereby to the welfare of societies – is fully acknowledged, that which it had on the human psyche is far from being fully appreciated. But think about it: Galileo Galilei had definitely shaken the geocentric view of the universe; James Hutton had discovered deep time; and Georges Cuvier had established the fact of species extinction. Now Darwin was dislocating the Aristotelian scale of Nature, in which successive creations (from the simplest organisms to humans) represented the steps of a ladder towards perfection, a system that the great poet and naturalist Goethe still embraced (in modified form) at the beginning of the 19th Century. With Darwin, humanity became rooted in the Animal Kingdom, in the Tree of Life, and the ideas of adaptation and complexity replaced that of progress.

Rutgers University joined with many other universities in the celebration of the Darwin Bicentennial, and also of the 150th anniversary of the publication of the "Origin" (24 November 1859). Activities were spread throughout the year, with dedicated symposia in departments as diverse as those of Biochemistry and Microbiology, Genetics, History, Economics, exhibits organized by the Rutgers University Libraries and the Jane Voorhis Zimmerli Art Museum, and talks by a broad array of guest speakers.

The Department of Earth and Planetary Sciences led the celebration and by combining it with the Rutgers Geology event drew a large audience. Four talks were delivered at the Museum Open House (31 January 2009): "Mammoth Genomics" by Stephan Schuster (Penn State) who discussed genetic diversity among the woolly mammoth; "Dinosaurs of Antarctica" by William Hammer (Augustana College) who emphasized the tremendous difficulties associated with fossil hunting in this frigid world; "Drilling the Cretaceous/Paleogene extinctions in New Jersey" by Ken Miller who reviewed a decade of drilling across the Cretaceous/Paleogene boundary in New Jersey and assessed the significance of the recent report of Pinna in apparently living position in local Paleocene strata; and "Darwin’s Legacy to Humanity – The Unity of Life" in which I clarified Berra’s statement that Darwin changed "the way humans view their place in nature," and explained how our own skeleton is a composite of evolutionary events spread over 520 millions years of biological history.

The Office of Undergraduate Education of Rutgers University was strongly involved in the celebration of the bicentennial. It sponsored two events with our department. One was a talk by Judge John Jones who, on 16 November 2009, analyzed the relationship between science and religion. Judge Jones presided over the Dover Case in Pennsylvania, resolving it in a manner that (under the present Constitution) would efficiently protect our society of the errant path of religious fundamentalism. Students participated actively in the discussion, and it was rewarding that several of our undergraduate majors and minors in Geology and Graduate students took part in the dialogue. The celebration of the bicentennial came to a close with another initiative of the Office of Undergraduate Education, which involved Rutgers Upward Bound Program, in an event entitled "A Journey Through Deep Time." Held at the Geology Museum, this event was innovative in the sense that twelve undergraduate students from my course (460-305, Evolution and Geological Time) demonstrated to twenty four 9th and 10th graders from various High Schools in the New Brunswick area how a few evolutionary novelties account for the high diversity seen among living vertebrates. Graduate student Dave Bord effectively assisted me in this inspiring event.

National Science Foundation’s GeoVision Report
Contributed by Gail Ashley

NSF’s GeoVision Report: Unraveling Earth’s Complexities was released in October. The report is a long-range strategy document for the NSF Directorate for Geosciences (GEO) representing Earth, Ocean & Atmosphere programs. Gail Ashley and Guy Brasseur (NCAR) chaired the committee of 17. The report recommends research directions in the Geosciences for the next decade. The "vision" is written both for members of Congress emphasizing the importance of geosciences in solving energy and environmental problems and the need for education to ensure a science literate population. The document will be used as a guide for the NSF itself as programs are initiated and funded. It is hoped that the fundamental research envisioned will transform the geosciences and will lead it to play a more visible and public role in society. Pdf copies can be downloaded from NSF at http://www.nsf.gov/geo/acgeo/geovision/nsf_ageo_vision_10_2009.pdf
Geoarchaeology in the Theban Mountain
Contributed by Marie-Pierre Aubry

Nothing could be more fascinating for an 11-year old than to learn in the classroom of past civilizations. To my young eyes, the Funerary Temple of Queen Hatshepsut (Fig. 1) on the west bank of the Nile River at Thebes was the Eighth Wonder of the Ancient World: ensconced in the majestic cliffs behind it, it sparked dreams of endless magic. A destination for the wealthy few until two decades ago, it has become for many the attractive day trip that offers a quick glance of the genius of the architects and sculptors of the 18th Dynasty (New Kingdom) of Pharaonic Egypt. Pharaohs and priests had established power in Thebes then, and for almost 500 years (18th to 20th dynasty; ~1539–1075 BCE), they would leave in the deserts and along the Nile Valley monuments of their artistic and technical glory. The Theban Mountain with its extensive complex of tombs and mortuary temples holds special attraction, and massive waves of (thousands) of tourists now regularly invade places that were meant to remain sealed for eternity. They leave behind traces of their passages— carbon dioxide, water vapor, warmth, aerosols—all of which threaten the mural paintings and architectural stability by enhancing the nefarious effect of geological deficiencies—swelling shales, jointed limestones, faulted and slipped blocks—and climatic vagaries—flash floods that have filled the unsealed tombs with debris. With the endorsement of the Supreme Council of the Antiquities in Egypt, the collaboration of the Department of Geology of the University of Assiut, and funding by the National Geographic Society to William Berggren and myself, the Theban International GeoArcheological Project (TIGA) aims at establishing the first geological map of the West Bank while determining the monuments that are most threatened by their geological setting. This will inform archeologists on the best remedies for the protection and management of the artistic wealth of the Pharaonic necropolis. With colleagues from Mons Polytechnics (Belgium), the British and French Geological Surveys (BGS and BRGM, respectively), and with English consultants, we have discovered an unexpected geological complexity at the edge of a plateau that, seen from the Temple of Karnak raised on the east bank of the Nile, offers the appearance of layer cake stratigraphy. Never described in detail in previous works, the massive (>400 m thick) lower Eocene Thebes Limestone exhibits diverse lithologies. It is well known that most tombs were excavated in the lower part of the Thebes, some being located in the slump blocks lying at the base of the Theban cliff. However, we have discovered that tombs were also dug in much younger levels, and we have demonstrated that several generations of slumps are present, indicating that contrary to previous interpretations slumping was not related to a single climatic or tectonic event, but occurred in several episodes triggered possibly by very different causes. Lithologic marker beds enable bed-by-bed correlation of the slumped blocks with the stratigraphic succession in the plateau. This in turn allows us to determine precisely the position of each tomb or other monument in the stratigraphic succession. After completion of the geological map (end of 2010), TIGA will be devoted to exploring with the local archeologists the geology within the tombs themselves, some extending 100 m deep underground.

Human Origins Research in East Africa
Contributed by Gail Ashley

On-going research at Olduvai Gorge, Tanzania by Gail Ashley and colleagues, is focused on attempting to reconstruct the physical environment that existed during the time primates became bipedal and used stone tools. Research focus is on the geological record of freshwater resources (rivers? springs? lake?) in the arid regions of East Africa. Results of this research may also provide crucial answers on why humans migrated out of Africa as early as nearly 2 million years ago. The current research project is part of an interdisciplinary program with archaeologists from the University of Wisconsin and Madrid, Spain. Incoming student, Emily Beverly, will join the team in summer 2010.
Methane in Hudson Canyon: A Double-Edged Sword
Contributed by Peter Rona

Rutgers Institute of Marine and Coastal Sciences in partnership with the NOAA Northeast Fisheries Science Center, Stony Brook University and the NOAA National Institute for Science and Technology used a state-of-the-art robotic vehicle and water sampling on our latest research expedition (August 2009) with the NOAA Vessel Henry Bigelow.

We discovered pits ranging in size up to half a mile in diameter and 100 feet deep venting methane from the floor of Hudson Submarine Canyon. Hudson Canyon is an underwater extension of the Hudson River which was last cut about 10,000 years ago during the last glacial age when sea level was 120 meters lower than present. At that time the Hudson River discharged turbid water loaded with sediment directly from the seaward edge of the present continental shelf, which eroded the canyon. Hudson is the largest submarine canyon off the eastern United States and has walls that attain relief almost as high as the walls of the Grand Canyon. The methane that we found venting from the seafloor in the head of Hudson Canyon is part of a global phenomenon at sediment covered continental margins and in Arctic tundra. The methane is produced primarily by microbial decay of organic matter and is trapped in ice as gas hydrates in sediments that underlie the seafloor. One estimate considers that more than half the organic carbon on Earth is trapped in gas hydrates, more than in conventional oil and gas. This finding makes methane a double-edged sword: 1) methane is a potential energy resource that can augment conventional oil and gas; and 2) methane is a potent greenhouse gas that contributes to climate warming.

With reference to methane as a potential energy resource, multinational oil companies and energy-related government agencies are experimenting to determine whether methane can be economically recovered. It is disseminated in gas hydrates in contrast to conventional oil and gas which can be recovered by drilling as it is concentrated in reservoirs deep in marine sediments. Methane is a wild card in global warming with major questions of how much that vents from the seafloor is assimilated by microbes and how much reaches the atmosphere to contribute to global warming. While these are topics of ongoing research, we conjecture that the methane that we found venting from the floor of Hudson Canyon appears to fertilize the canyon at least partially explaining why the canyon is a fishing hot spot and contributes to sustaining commercial fish stocks on the adjacent continental shelf. We thank NOAA (National Oceanic and Atmospheric Administration) for support.
Tracking the Earliest Toolmakers
Contributed by Craig Feibel

East Africa has long been the focus of investigations into the origins of humans, their culture, and the changing environmental context that wrought them. The Turkana Basin of northern Kenya is one of the richest troves of such evidence, and geological study of the Neogene deposits from which fossils and stone tools derive is a key component of this work. Rutgers geologist Craig Feibel has worked in Turkana for nearly thirty years, investigating the stratigraphy, sedimentary environments and geoarchaeology of its world-renowned sites. Last summer was no different. The Rutgers geology team of Feibel, graduate student Jon Lacarrubba, geologist Julian Ogondo from Kenya’s National Museums, and Marlijn Noback, a graduate student at the Free University of Amsterdam made the three-day trek north from Nairobi in July. The first phase of this season involved collaboration with a group of French archaeologists excavating some of the world’s oldest stone tools. The geological investigations included long treks mapping geological features, detailed microstratigraphic sections of the excavations themselves, and extensive sampling. The Turkana sequence is unusual in the abundance of volcanic ash layers, useful for both dating and geochemical correlation, and these become a focus for collecting. In addition, the team sampled deep-lake claystones, in order to investigate effects of near-surface diagenesis on chemical and biological proxies used in environmental reconstruction. This work was part of the run-up to a major coring operation, targeting a continuous lacustrine record of more than half a million years. Drilling is scheduled to commence in 2011, and will provide key environmental data for understanding evolution of the African rift, the savanna biome, and context of early humans.

Volcano People at Rutgers
Contributed by Michael Carr

For the volcano group, the most exciting experience of the year happened to Pablo Ruiz. He was busy doing field work at Poás volcano in Costa Rica, essentially at the epicenter of the Cinchona Earthquake (M 6.1), which occurred at 1:21:34 pm local time on January 8, 2009. Fortunately, Pablo was not hurt but that was the end of fieldwork for a while because the roads were destroyed. His rental vehicle, though undamaged, was isolated by multiple collapses and burials of the main road. On the brighter side, the multitude of landslides and the huge mass of soil and rock now being swept away by the rivers showed that formulation of one aspect of his thesis; calculating a realistic erosion rate, was all wrong. Rather than uniform annual erosion there are pulses caused by earthquakes. The regional earthquake recurrence interval is about 30-50 years, so Pablo was lucky to gain this insight.

Other highlights were the completion of two Ph.D. degrees: Fara Lindsay finished in time to begin a postdoctoral appointment in extraterrestrial geochemistry with Greg Herzog, Carl Swisher and Brent Turrin. Esteban Gazel finished his dissertation and earned a prestigious Lamont-Doherty postdoctoral fellowship. He will be working with Terry Plank and writing even more papers. Most of his dissertation is now published and just the last chapter remains under review. Ian Saginor, who finished in 2008, got his teaching career off to a dynamic start by bringing his class (and his Dean) to Costa Rica to participate in a RU-University of Costa Rica (UCR)-Keystone College (Ian) field trip. Esteban has now instigated three of these fantastic field trips. We hope to continue them! Our group also hosted two UCR students during July-August. Christian Delgado and Andrés Ulloa brought many samples from the Talamanca range in Costa Rica and used RU analytical facilities to obtain excellent data for their senior mapping project. At last we brought some Costa Rican students to RU! Wish that we had money to do this on a regular basis!

Mike Carr and Vadim Levin created the first international Byrne seminar, a special seminar to show RU freshmen what research is all about. In Geology, research means going to the field and we will go to Costa Rica to show them geology and use their man and woman power to do research.
A new Uranium-Series Dating Mass Spectrometry lab housed in EPS is nearing completion as the new year starts. Our department recently renovated 550 square feet of space adjacent to the Stable Isotope Lab thanks to generous funding provided by the School of Arts and Sciences. The expanded lab (more than 800 sq ft) now adds two Multicollector Inductively Coupled Mass Spectrometers (the Plasma 54’s) and two gas source mass spectrometers (the PRISM II and PRISM III). One Plasma 54 instrument was transferred from the former lab of Richard Fairbanks (Distinguished Visiting Professor) and Richard Mortlock (Research Associate) at the Lamont-Doherty Earth Observatory of Columbia University. The second Plasma 54 was operating previously in the Department of Terrestrial Magnetism at the Carnegie Institute (Washington D.C.) but was decommissioned to make space for a newly acquired instrument. The new instrumentation will be used to continue the U-Series fossil coral dating programs (sea level and radiocarbon calibration) directed by Fairbanks, Wright, and Mortlock.

The U-Series facility paid immediate dividends, helping to secure two NSF awards. The Plasma 54’s will also support additional research programs in both EPS and Chemistry Departments (e.g. lead, strontium, lithium isotopes). It was no small feat to physically move the large geometry Plasma 54’s as this necessitated removal of a second floor window in order to bring the instruments into the new lab (see photo).

The addition of two PRISM stable isotope mass spectrometers enables the staff to dedicate instruments to specific types of measurements. We now have instruments dedicated to the measurement of oxygen and carbon isotopes in carbonates, waters, and organic sample materials. The increased capacity results in increased sample throughput combined with improved precision, two results that are usually mutually exclusive. In the past year the staff has pushed sample size limits in carbonates, making more than 1000 high-quality stable isotope measurements on single foraminifera (~10µgm). Researchers from the Stable Isotope Facility currently collaborate with scientists from Columbia University, Bedford Institute of Oceanography, Williams College, Tohoku University (Japan), Loyola University, Appalachian State, University of Oregon, Rensselaer Polytechnic Institute, and Texas A&M.

**EPS Acquires New Seismological Instrumentation**

Contributed by Vadim Levin and Martha Withjack

In early summer, 2009, the EPS acquired a number of new seismological instruments. With $16K in funds provided by the SAS for instruction and computing, the department purchased a brand new industry-standard 16-channel seismograph (Geometrics ES3000), with attendant sensors, cables and loads of software. The instrument is designed for shallow subsurface exploration using refraction and reflection methods, and is primarily intended as a teaching tool in Introductory Geophysics classes. This 21st century piece of equipment replaces an old BISON system that has a look and feel of the Apollo-XII lander. A very attractive aspect of the new seismograph is the separation of the data acquisition electronics and the control system (currently housed in a Dell laptop).

Going forward we will be able to keep pace with evolving computing abilities with simple computer upgrades. The instrument saw its first use during the Fall semester in our Introductory Geophysics course, when it was used for a class exercise to investigate the meadow next to the Millstone river in Somerset County, New Jersey (for details go to: http://geology.rutgers.edu/~vadim/Geo412/Fall09/FT1PICKS/index.html).

Vadim Levin and Martha Withjack submitted a proposal for Academic Excellence Funding, and were awarded $30K to purchase two portable broadband seismographs (Nanometrics Trillium 120 sec sensors and Taurus recorders) that are used for recording earthquake signals. Data from such instruments are used in studies of large scale (10s to 1000s of km) Earth structure. Hundreds of instruments of this type are presently deployed across the US by the EarthScope project - a comprehensive study of the North American continent (http://www.earthscope.org). Our new instruments (including a similar set bought last year with Levin's start up funds) will position the EPS department as a contributor to that national effort, and will hopefully help attract research funds in the process.
On July 1, the Geology Museum expanded its outreach and service to the Rutgers Community by becoming part of the Rutgers Office of Undergraduate Education. Joint Directorship of the museum will be shared by Dr. Kathleen Scott, Assistant Vice President for Instructional Support and Outreach, and Dr. Carl Swisher, the new Chair of the Department of Earth and Planetary Sciences (EPS) who took over from Dr. Ken Miller, the department chair and director of the Geology Museum for the past nine years.

Kathy Scott is Director of the Math and Science Learning Center, Rutgers Science Explorer outreach program and Professor of Cell Biology and Neuroscience and has been a member of the graduate faculty in Geological Sciences for over 20 years. Dr. Scott earned her doctorate at Yale University, and has served on the Rutgers faculty since 1978. Her research focus is in vertebrate paleontology and anatomy. She is principal investigator of the Rutgers NSF-funded Graduate Teaching Fellows program, "Building a Learning Community in Mathematics and Science through Educational Partnerships," as well as the RU-STEP Program, a grant designed to increase underrepresented groups entering and succeeding in the STEM disciplines.

Carl Swisher is Professor and Chair of the Department of Earth and Planetary Sciences, part of Rutgers School of Arts and Sciences (SAS; see his Chair’s address, below). Dr. Swisher earned his Ph.D. at University of California, Berkeley, and joined Rutgers in 2001. He has worked at improving and expanding introductory courses in EPS and currently still teaches EPS Physical Geology to undergraduates at Rutgers. For the past six years, before taking over as chair as the department, Dr. Swisher served as the department's Vice Chair & Graduate Program Director. His research focus is in the area of geochronology, where he has published on a wide array of topics from human evolution to the extinction of the dinosaurs.

The new partnership for the museum will combine efforts, expand the education and outreach focus, permit development and implementation of more varied and dynamic exhibits and programs, and leverage funding opportunities during these difficult economic times. The Geology Museum has served as a center for public education and outreach in the Rutgers community for over a century, and these changes will build on that history, provide new opportunities and move the museum in exciting new directions.

These changes accompany the retirement of William "Bill" Selden, who served as curator of the Geology Museum for 33 years, who kept the museum open, improved its exhibits and worked tirelessly to expand the impact of the Museum's Annual Open House, Newsletter and membership of the "Friends of the Museum." Bill's budget over the years was minimal and we hope that the new joint effort between the Office of Undergraduate Education and Department of Earth and Planetary Sciences will greatly improve the Geology Museum's long-term success.

The new partnership also brings together the Museum and two other leading Rutgers outreach programs, the Math and Science Learning Center and the Rutgers Science Explorer, a mobile science laboratory that visits local middle schools. Joining the Museum staff will be Associate Directors Lauren Neitzke-Adamo and Aly Busse, who will coordinate the day-to-day and outreach operations of the museum. Ms. Neitzke-Adamo is in the final phases of completing her Ph.D. at Rutgers in Earth and Planetary Sciences. In addition to her responsibilities at the Museum, Lauren will be teaching sections of Earth and Planetary Sciences introductory courses such as Planet Earth and Dinosaurs on the College Avenue Campus. Aly Busse will be coordinating the Museum's outreach programs in addition to serving as coordinator for the Rutgers Science Explorer.

In addition to the new management staff, the Museum is now employing 15 undergraduates for this year. This dramatic increase in staffing has enabled the Museum to extend its operating hours. The Museum will now be open 9-5 Monday through Thursday, 9-4 on Friday and 10-2 on Saturday.

Dr. Scott commented on her new role: "I really enjoy bringing the excitement of science to students, both our own undergraduates, and K-12 students across the state. As a paleontologist and anatomist, I am especially excited by the different opportunities for programs and exhibits that can be offered through the Museum, with its rich history and collections. I look forward to working with Carl Swisher, Lauren Neitzke-Adamo, Aly Busse, and faculty, staff and students across the university to develop new programs and directions for the Museum."
For those of you that may not be aware, this past summer I took over as Chair of the Department of Earth and Planetary Sciences from Ken Miller. Ken, who after serving us all tremendously well for the past nine years, had decided to rotate off, to devote more time to the offshore New Jersey Drilling Project which was in full “bore” in 2009. Ken agreed to stay on as vice-chair and graduate program director to help with the transition, sharing his nine years of experience on the job. Another major change in the department in 2009, was the return of Mike Carr, who for the past nine years had served off and on as SAS’ Dean of Mathematical and Physical Sciences. We welcome Mike’s fulltime return to the Department.

For the past six years, I served as the department vice-chair and graduate program director, and have enjoyed the excitement as well as witnessed the growth pangs as the department grew and doubled in size. The department now consists of 23 Ph.D. tenure–tenure track faculty, 4 active emeriti faculty, 4 Ph.D. research faculty/staff, plus 3 Ph.D. adjuncts in residence. The faculty is quite diverse and includes 3 NAS members, and shared faculty with the Institute of Marine and Coastal Sciences, Environmental Sciences, and Anthropology. During 2009, over 40 EPS research papers were published in top tier journals, numerous kudos and awards were received, and a number of important research grants were awarded. Recognition highlights for 2009, include Dennis Kent, who was the recipient of the 2009 William Gilbert Award, presented by AGU’s Geomagnetism and Paleomagnetism Section for recognition to outstanding research and service to the field; and, Nathan Yee, who received the Houterman Medal, on behalf of the European Association for Geochemistry, awarded for excellence in research by a scholar under 33 years of age.

The department’s graduate program also grew in numbers and diversity in 2009. Over the past couple of years the program has jumped from 18 to 30 students. Astounding for a geological department of our size, almost 2/3 of the students are women, and ½ come from outside the U.S., representing China, Columbia, Costa Rica, India, Indonesia, Iran, Italy, Russia, Trinidad, Turkey, and Venezuela. Graduate student support was possible through fellowships from Rutgers Graduate School of New Brunswick, Department teaching assistantships, grant funded research assistantships, and oil industry support through ExxonMobil, TPAO, and PDVSA. The quality of our graduate students continues to improve and we regularly compete with the top programs in the country for the best students. Your contributions greatly helped us send many students to GSA and AGU to present papers (see various reports below) and to engage in laboratory and field studies. The cost of attending national meetings has skyrocketed and without your help travel to meetings would not be feasible. We feel that early exposure to colleagues in the field and experience in presenting scientific results is crucial to a solid education. In 2009, we awarded 3 Ph.D.s and 2 M.S. degrees, and as of this Fall, all have accepted jobs with industry or are now post-doctoral fellows. Our graduate students help put us on the map. Our Ph.D.’s are well represented in industry (ExxonMobil, Chevron) and academia (Michigan State, LDEO, Wisconsin, RPI, RU, Queens, Appalachian State, University of Iceland, Georgia State) amongst others.

Our undergraduate major remains small, and varies from about 25 to 30 students. Our minors in geology are steady, with about 45 currently declared. Our contribution to undergraduate education at Rutgers, far exceeds our size. We reached a milestone this past year by teaching 4,000 of the 20,000 undergraduates in the School of Arts and Sciences. Over 95% of these students are non-science majors, fulfilling their university science requirements. Our department is noted for its excellent teaching, with exemplary teaching rankings of greater than 4.2/5.0.

As you are most likely aware, Rutgers along with most universities is feeling the sting of the country’s economic woes, but thankfully, at least so far, Rutgers is faring better than most institutions. Although we were lean to begin with, an 11% budget cut for 2008, 5% this year (lessened to an influx of federal stimulus funds), and a projected 7.5% cut for 2010, we have had to tighten our belts. None-the-less, through contributions from you, through a number of new research grants and awards to faculty and staff, and additional directed university and SAS funding, the department has been able to make a number of improvements this year.

We were able to secure $180,000 from SAS for the construction of the new Richard Fairbank’s mass spectrometry facility. Richard Fairbanks, Jim Wright and Rick Mortlock will oversee this facility. The renovation tripled the size of the existing stable isotope lab and will house 4 mass spectrometers brought to Rutgers by Fairbanks and Mortlock from LDEO and the Carnegie Institute. The facility will not only increase research productivity, but will permit the department to expand into coral/U-series work...
championed by Fairbanks and Mortlock at LDEO before coming to Rutgers this past year. Two of these mass spectrometers are quite large and caused quite a commotion this past Fall as they were hoisted by crane through a window, being too large to fit in Wright Labs freight elevator!

Another major development this past Fall, was that after years of struggling with poor and rapidly deteriorating conditions of our Livingston warehouse space, the department was awarded $500k of stimulus related funds, directed through Rutgers/SAS. These monies are being used to renovate and expand the department’s Core Repository. Following the sudden collapse of a 10-foot section of roof last Spring, Rutgers has come through with a new roof for the repository just completed this December. This Spring, new windows and doors and major repairs on the exterior siding will be made. As part of this renovation, the Core Repository will expand from its present location in building 4108 into about 7000 sqft of space previously occupied by Physics. The $500k will be used for internal renovation of the Core Repository, slated to begin January, 2010. This renovation was a result of a long drawn out period of negotiations and we thank Deans Doug Greenberg, Kathryn Uhrich, Todd Bristol, Physics Chair Torgny Gustafsson, VP Tony Calcado and architect Chris Hack for making this happen. The renovated space will permit consolidation of EPS’ cores and provide well-lit storage and layout space for core analysis. Contributions from alumni, including a special donation from Alex Kulpecz, will go toward the purchase of research equipment needs and internal improvements for the Core Repository.

We were also able to update much of our computing infrastructure in 2009. SAS awarded the department with almost $30K this past year to improve geophysics computing, to provide software and computing enhancements to EPS’ new microprobe facility discussed in last years Redbeds, new computers for student use, and for a microscope imaging system for instructional use. Funds were also provided for new conference tables and chairs and for front office improvements.

We are also pleased to announce, that beginning this past summer, we have joined forces with Kathy Scott of the School of Education for day-to-day operation and development of the Geology Museum, which had been terribly understaffed and under budgeted for many years. Lauren Neitzke-Adamo, one of our finishing Ph.D. students joined the museum staff to help and will be working with us to further develop and enhance the museum. All of this came this past Spring as a result of budgetary cutbacks and the retirement of Bill Selden who was curator of the Geology Museum for the past 33 years. What first started out last Spring as a fear that Geology Museum would close to budgetary cutbacks, now appears that working jointly with the School of Education, the museum will be better staffed, and will be able to make badly needed improvements as well.

Our long-term space issues remain unresolved. This past summer, we were able to alleviate a bit of our immediate space issue due to our continued growth by gaining seven new offices for graduate students in adjacent Doolittle Annex, located next to our Green Building across from Wright Labs. A new building for the department remains elusive. We are awaiting news of a potential $55M university match for a new building contingent on awarding of a $15M proposal to NIST this past summer by EPS and shared faculty and colleagues at IMCS. While this option is in progress, we continue to explore possibilities of expanding into space occupies by Chemistry in Wright Labs as part of their quest for a new Chemistry building.

To keep you up to date on what is happening in the department, we have revised the home page of our website, posting current department events, colloquia and seminars, EPS highlights, newly published research by EPS faculty, staff and students as well as awards and kudos. If you have not had a chance to visit us recently, check us out at http://geology.rutgers.edu/. I try to personally update news and events almost daily, so don’t forget to bookmark us. We will be adding additional features in the months ahead and there are still many unfinished pages and links, so bear with us and stay tuned.

Lastly, we would love to hear from you. If you have news to share or would just like to drop us a note by e-mail or post, please do so. If you have address changes or would like to be put on our e-mail list please return via post or e-mail your contact information. I have added a short form below for your convenience. We have initiated an alumni page (http://geology.rutgers.edu/alumni.shtml), currently with a brief history of the department as well as links to past Redbeds Newsletter. We will be adding a section for alumni posts if you would like to send us a note, text or pic, you would like to share with other alumni, and are in the process of setting up a facebook page that will be linked to the website.

If you have weathered the economic downturn, and are able to help, please consider making a contribution to the department. I have outlined below a few department funds that primarily go to help undergraduate and graduate research, travel, field studies, and to acknowledge excellence in student academics and research. Any contributions, small or large are appreciated.

Please feel free to contact me personally by e-mail at cswish@rci.rutgers.edu or call me at 732-445-2044 if I can be of any help or you have any questions.
EPS in the News: Kudos, Grants, and Awards
EPS faculty, staff, and student authors in red
Contributed by Carl C. Swisher III

Craig Feibel’s research on spatial patterning revealing hominin behavioral modernity at Gesher Benot Ya’aqov, Israel (Science v. 326, p. 1677-1680) was featured in an NY Times article by John Wilford, on Dec. 21, 2009: Excavation Sites Show Distinct Living Areas Early in Stone Age.

George McGhee was awarded a 3-month summer visiting fellowship for 2010 from the Board of the Konrad Lorenz Institute for Evolution and Cognition Research (Austria), to work on Predictability and the Evolutionary Process.

William Berggren received the first Outstanding Geoscientific Alumnus Award at this year’s Society of Exploration Geophysicists Meeting at the University of Houston. The award was part of a special Gala held October 24, 2009, to help "preserve the field experience" for geology and geophysics students across the U.S.

Paul Falkowski’s article in Science, Controls on Diatom Biogeography in the Ocean, that indicates "biodiversity and macroevolutionary patterns at the microbial level fundamentally differ from those of macroscopic animals and plants" was featured in a write-up in Science Perspectives by David Patterson Seeing the Big Picture on Microbe Distribution.

Yair Rosenthal’s article (Oppo, D.W., Rosenthal, Y. and Linsley, B.K.) 2,000-year-long temperature and hydrology reconstructions from the Indo-Pacific warm pool was featured in Nature, 27 August, 2009.

Peter Rona was featured in the NY Times, Science Times section on Tuesday, August 25, 2009, Diving Deep for a Living Fossil.

Dennis Kent was the recipient of the 2009 Geomagnetism and Paleomagnetism Section's William Gilbert Award. The President of the Geomagnetism and Paleomagnetism Section of AGU writes that this award "...acknowledges [Dennis Kent's] many contributions to the GP community and to our science. As a section, we owe you a great deal for elevating and promoting our discipline within geosciences, and we are pleased to honor you as a celebrated and active member of the GP community." The award was presented at the GP reception and business meeting of Fall AGU.

Richard Fairbanks, Jim Wright and Richard Mortlock were awarded an NSF grant for $497,513 to study the Barbados Sea Level and Radiocarbon Calibration Records.

Gail Ashley was selected to direct SAS’ Junior Faculty Workshop for 2009/10.

Yair Rosenthal was named by editors of the AGU journal Paleoceanography, as one of the 2008 "Editors' Citations for Excellence in Refereeing" (see EOS, v. 90 , p. 243).

The ExxonMobil Workshop on Integrated Bio-, Chemo-, and Sequence Stratigraphy was held August 18 to 21, 2009, at Rutgers University Inn. The workshop was hosted by EPS faculty Ken Miller, Marie-Pierre Aubry, Bill Berggren, Richard Olsson, Jim Wright, Jim Browning, EPS graduate students Ashley Harris and David Bord. Others included Pete McLaughlin (Delaware State Survey) and Mimi Katz (RPI). About 25 ExxonMobil scientists in addition to EPS faculty and graduate students attended. A welcome reception was held in the Geology Museum and banquet dinner at the Frog and the Peach.

David Bord was awarded an NSF K-12 Fellowship for 2009-10. David is now the 3rd EPS grad student over the past 3 years, following Ian Saginor and Lauren Neitzke, awarded this fellowship with Kathy Scott's education group.


Rutgers Media highlighted Yair Rosenthal and Sindia Sosdian on their 17 July, 2009 article in Science Deep-Sea Temperature and Ice Volume Changes Across the Pliocene-Pleistocene Climate Transitions.

George McGhee gave an invited presentation (August, 2009), Beyond Darwin: Analyzing both Existent and Nonexistent Biological Form in Evolution at a conference at Oxford University, England, on Darwin and Evolution in this 150th year since the publication of On the Origin of Species.

Paul Falkowski, Nathan Yee, and Vikas Nanda were awarded an NSF (Division of Molecular and Cellular Biosciences) grant for $300K to study The Prebiotic Evolution of Redox Chemistry on Earth.

Gail Ashley was selected one of the traveling 2009-2010 North American AAPG Distinguished Lecturers. Her presentations will include The Paleoclimatic Framework of Human Evolution and The Sedimentary Record of Human Evolution. (see http://www.aapg.org/education/dist_lect/domestic.cfm).

Greg Mountain and Ken Miller reported (July 14, 2009) that Site 29 was successfully cored to 757 m below sea floor, completing a successful coring campaign aboard the L/B Kayd off the New Jersey Shore. For news story and video in the Philly go to Digging for Answers, and video on Slate TV Drilling for Clues About Global Warming.

Graduate student Kelsey Bitting, was listed as a GSA 2009 Outstanding Mention for "a grant proposal of exceptionally high merit in conception and presentation", Optically-stimulated luminescence dating of a widespread Holocene unconformity within Delaware River Valley alluvial deposits, reported in GSA Today, v. 19, p. 18. Later, that same day she Kelsey received a Graduate School of New Brunswick special study award ($750). That's a good day!
George McGhee was featured in *The Geometry of Evolution*. (http://www.youtube.com/watch?v=JqtTgT5Y1d).

EPS business manager, Johnny Zabala has completed Rutgers’ HR Academic Personnel Certificate program.

EPS Graduate student Morgan Schaller was awarded an SEPM student research award.

Graduate student Sara Mana received a Pre-dissertation Award of $2,000 from the Graduate School NB for fieldwork in Tanzania.

The Geological Society of America made graduate student awards to Kelsey Bitting, in the amount of $1770, for her optically stimulated luminescence (OSL) dating project and to Morgan Schaller, in the amount of $3540, for isotopic studies on the Newark Supergroup.

Nathan Yee hosted a workshop on "Ground Water Chemistry" for the International Water Issues Forum on Wednesday, March 25th at the Rutgers Student Center.

Alex Nikulin and Ben Marshall (undergrad major) were both awarded $850 for attending a bi-annual meeting of the EarthScope (www.earthscope.org). The money covered significant fractions of the costs of their travel to Idaho, May 2009. Alex and Ben presented a poster on the work they are doing together, investigating crustal structure of the Cascades in Oregon and Washington.

Peter Rona and Karen Bemis received an NSF grant Collaborative Research (Rutgers with Applied Physics Lab-University of Washington): Acoustic Instrumentation for Imaging and Quantifying Hydrothermal Flow in NEPTUNE Canada Regional Cabled Observatory at Main Endeavour Field, Juan de Fuca Ridge.

Martha Withjack and Roy Schlische were awarded an NSF grant from EAR, of $205,400 for support of The Influence of Pre-existing Zones of Weakness on the 3D Geometry and Evolution of Extensional Faults and Folds.

Nathan Yee received the Houtermans Medal! “On behalf of the European Association for Geochemistry, I am honored to inform you that you have been selected as the Houtermans’ medalist for the year 2009. Congratulations for this well deserved honor.” The Houtermans’ Medal is awarded annually by the EAG to a scientist no more than 35 years of age who has made exceptional contributions to Geochemistry. It is named in honor of Friedrich Georg Houtermans, a Dutch-Austrian-German physicist. This significant honor is based on a critical assessment of the scope and impact of scientific contributions; the selection process is highly competitive and many outstanding candidates are considered. For more info go to http://news.rutgers.edu/medrel/rutgers-professor-aw-20090218.

Paul Falkowski and Matt Johnson (a post-doc in Paul’s lab) were awarded an NSF grant for their proposal entitled Understanding how global warming will select for zooxanthellae phenotypes.

Paul Falkowski gave the 10th annual Roger Revelle Commemorative Lecture for the National Academy of Sciences.

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**Graduate Degrees and Advancements to Candidacy**

Contributed by Carl C. Swisher III

Michael Durcanin presented and successfully defended his M.S. thesis *Influence of synrift salt on rift basin development: Applications to the Orpheus basin, offshore Eastern Canada*, on August 26, 2009. Mike is off to Dallas, where he has accepted a position with Nexen Petroleum.

Esteban Gazel, on July 15, 2009, presented and successfully defended his Ph.D. dissertation *Interaction of the Galapagos plume with the southern Central American Volcanic Front* (Advisor, Mike Carr). Esteban has accepted a post-doc position at LDEO.


Fara Lindsay, on June 22, 2009, presented and successfully defended her Ph.D. dissertation, on *Geochemistry of lavas from southeastern Nicaragua and of mantle xenoliths from Cerro Mercedes, Costa Rica*. Fara has accepted a post-doc position at Rutgers working with Greg Herzog, Carl Swisher and Brent Turrin.

Ika Sulistyanigrum presented and successfully defended her MS thesis *Seismic Sequence Stratigraphy during the Cretaceous through the Early Paleogene in the northern Scotian Basin (Laurentian Subbasin), offshore, Nova Scotia* on October 5th, 2009.

... and

Pablo Ruiz presented and successfully defend his Ph.D. dissertation proposal entitled *Reconstruction of the Paleo and Neo stages of Poás volcano, Costa Rica*: Competing processes of growth and destruction. My understanding from members of his qualifying committee is that his qualifying exam went well and that we will petition the graduate school for his advancement to candidacy.
Rusty Gilbert reports: “I have been working for Chevron’s Business Development group the last 2-3 years assigned to the Middle East. I’m based out of San Ramon, CA but report to our Bahrain office. My assignment is being a technical team lead for an undisclosed area in the Middle East. I have been doing subsurface reservoir characterization work involving carbonate and siliciclastic reservoirs as well as the structural interpretation using mostly 2D seismic. I’ve also led additional technical support staff from Chevron’s Energy Technology Co. to assist in these projects, including the modeling effort. For 2010 I’m not sure if this assignment, as initially designed, will continue so I may be moving on to something different. I’m glad to see numerous recent graduates from Rutgers working in Chevron’s Houston and other offices. They appear to be doing very well and making significant contributions to our subsurface evaluations.”

A. Darryl James reports: “Moved on to Rutgers University after high school in Sayreville, NJ supporting myself through six years of college by living at home and commuting, having a small state scholarship, and playing guitar in a rock band on weekends. At Rutgers, I studied geology and joined Rutgers ROTC. By volunteering for the Army flight program, I received my private and commercial pilots license at college courtesy of the Army. When I graduated in ‘65, I was commissioned a Second Lieutenant and the Army gave me a two-year deferment to go to graduate school. At Fort Knox, I graduated from Armor Officers Basic and became a tank platoon leader. Three months later, I entered primary helicopter flight school at Ft. Wolters, Texas. Advanced helicopter training continued at Ft. Rucker Alabama, where a daughter, Tiffany, was born. In September 68, I began a year’s service in Vietnam flying a Loach…a dream to fly…fast, maneuverable, well armored, and survivable. I flew a variety of missions, which included convoy cover, scouting and aerial observation. Unscathed in combat, I suffered a trauma of a different kind in Vietnam. Just prior to completing my yearlong tour, my wife left me for another guy. The proverbial “Dear John” got me home from Vietnam a week and a half earlier than scheduled. After Vietnam, I returned to Fort Knox and served on the conceptual planning team. I contacted the Army about applying to become a Scientist/Astronaut in the Apollo Program. The Army, trying to get into the astronaut business, sought out company-grade officers who were rotary-wing-qualified with a master’s degree in science (especially geology). They were desperate enough to contact me. I said, “Sure.” To Branch filled out an application and became a 10-minute celebrity on post. A few months passed and Branch never could provide a definitive status on my application. One week prior to being discharged, they indicated my application was still being processed and recommended I stay in voluntarily. I balked at that suggestion because two months prior, Exxon had offered me a job as a petroleum geologist in New Orleans. I accepted Exxon’s offer and was honorably discharged as a Captain in June 1970. After three years in New Orleans, Exxon transferred me to Midland, Texas, and later to Stavanger, Norway. Returning to Midland, Exxon recommended that I apply to the Exxon Professional Geologist program. That year at Southland’s office, I met a beautiful Texas Tech sophomore working during her Christmas vacation in our geologic file room. My luck had changed big time! When she graduated three years later, I married that sweetheart. Her name is Lynn and we have been married 28 years. Southland promoted me to Exploration Manager. Meridian Oil acquired Southland in a hostile takeover and promoted me in the process to Regional VP Exploration. In ’90, Meridian (now Burlington Resources) offered me a transfer to Houston. I bailed and took an offered “golden parachute”…my family wanted to stay in Midland. I have been an independent geologist/engineering petroleum consultant since. Lynn has a BA and MBA from Texas Tech and worked as a petroleum accountant for many years. Several years ago, she went into banking,” which I tell her she entered the “dark side.” She currently works part time as a financial consultant in oil and gas mezzanine financing at Western Nat’l Bank. Love to cook, entertain, read and write (have published professional articles on sandstone fluvial systems, geological oil field studies and flying in Vietnam. (Have three unpublished novels…need a literary agent!).”

Wayne Hutchinson and Christy Bell report: “With the Redbeds in mind, I thought just drop you a quick note about myself (MS - Geology 1981) and Christy Bell (BS - Geology 1976). Seems like a long time ago that Christy and I met in Peter Wolfe's Glaciology class in 1975, but obviously the subject matter of the course didn't put a "chill" in our relationship because we're still together 34 years later. We moved to Wisconsin in 1991 and Christy was a full-time Mom as our daughter (Whitney) and son (Colin) made it through elementary school. Christy became interested in teaching through several Instructional Aide jobs within our school district and then returned to school at UW - Milwaukee to earn her Education Degree and Teacher Certification. She's been a long-term or daily substitute in several secondary schools in our area and has taught Chemistry and Earth Science at Alverno College for the past 2 years. Some of her student's answers about ionic and covalent bonding on a recent assessment were particularly amusing (and for a teacher, distressing at the same time). Since leaving the New Jersey Geological Survey (NJGS) in 1991, I've been a hydrogeologist with a few environmental consulting firms in Wisconsin. Since 2000, I've been with Delta Consultants as a Senior Specialist (Hydrogeology). I've been the lead hydrogeologist on several remedial investigations to define and recover petroleum from fractured-rock aquifers. I've modeled groundwater flow, mass transport, and product recovery at several sites throughout the country to define pumpage rates, plume movement, and recovery expectations. Over the past 5 years I've used a 3D visualization model to develop Conceptual Site Models and explore relationships between geology, groundwater flow and contamination. Finally, it may have been Christy's influence that piqued my interest in environmental forensic chemistry, which I've used for differentiating product types, age-dating and plume extents. The science gene must be strong with Christy and me because our daughter Whitney is a junior at the University of Minnesota majoring in Zoology, while our son Colin is a senior at Kettle Moraine High School with interests in architecture and physics (oh yeah, soccer and snowboarding, too!). Sounds like the Department is doing well and we wish you all continued success and happiness in 2010.”

Matthew Sweet reports: A lot has happened in the last 5 or 6 years, as can be expected of life I suppose, but several positive points are worth discussing. I am still working in the environmental field, though I moved to a new company 2 years ago, GEI Consultants located in Montclair, NJ, and I am qualified as a “Professional Geologist” in the Commonwealth of Pennsylvania by passing the ASBOG exam. I am happy to report that GEI is very busy and has successfully cornered the NY market on Former Manufactured Gas Plant (MGP) remediation. Our clients include the major NYC utility suppliers and our projects have a robust backlog and the scope for geological investigation and engineered environmental remedial solutions is quite large. I have been an active participant in designing oil recovery wells and have overseen there successful development and production. Our workload continues to grow in the NY Metro area and the outlook for the next decade is very bright despite the current economic conditions. I consistently am working 50 to 60 hours per week, much to my chagrin. However, I continue to appreciate my education at Rutgers and especially my decision to study environmental forensic chemistry, which I've used for differentiating product types, age-dating and plume extents. The science gene must be strong with Christy and me because our daughter Whitney is a junior at the University of Minnesota majoring in Zoology, while our son Colin is a senior at Kettle Moraine High School with interests in architecture and physics (oh yeah, soccer and snowboarding, too!). Sounds like the Department is doing well and we wish you all continued success and happiness in 2010.”

Ethan Skinner reports: “I just wanted to let you know that I accepted a position as a Production Geologist with BHP Billiton last week. Thank you for all your help over the last few years. I accepted this opportunity because the GEI office in Wyoming was offering a new opportunity, and I will start my new job at the end of the month.” He and his wife, alumnae Nadine Lurie Skinner report that they have “three little ones at home (Noah, Caroline, and now Amelia)”.

kgm@rci.rutgers.edu
Zachary Coppa reports: “Just a little update on what I've been up to. I finished all my coursework at WSU and now am in the "fun" stage of making revisions on my thesis! The focus of my thesis is provenance and sedimentary petrology of the Bonneville Flood through the Snake River Canyon in Idaho and Washington. I should be complete sometime this Fall semester, hopefully before Halloween. The next step is starting to come along; I've been in contact and meeting with several profs at Temple, Penn State, Lehigh, and Univ. of Delaware for PhD programs. Along with this, I've been applying for a lot of jobs with several companies around the area and other jobs openings with the Army Corps of Engineers and the Department of Energy. Hopefully things work out, I should know where I'll be within the next few months.”

Eric Vowinkel reports: “Was going thru some papers today and came across the Redbeds Annual Newsletter. I recall that when I had shown the Alumni News to my wife after it came to our home in Metuchen in January that she was quite impressed by the passage. Thanks for placing the info into the section even though as you had stated that I was not a formal Geology major. I guess my 30+ credits in geology and my 30 years with the USGS surely gives me almost honorary status.”

Peter Graham reports: “School is going well at Colorado School of Mines. I am nearly through my course work and will be beginning my thesis work on the Quaternary evolution of the Onion Creek Salt Diapir, near Moab, UT. Over the summer I will be working for Apache Oil & Gas in Tulsa. I'm not sure when the next time I will be in NJ is but I will be sure to come by when I am in the area.”

Dan Ksepka reports: “It was very nice to visit the department again - it still feels like a second home. Hopefully less time will elapse before my next visit! I’ve included a brief summary of what I’ve been up to for Redbeds. If you’d like to reroute it my mailing address is at the bottom. I defended at Columbia in October 2007 and took a postdoc working on the Green River Formation fossil avifauna at NCSU (Dept. Marine, Earth and Atmospheric Sciences) in Julia Clarke's lab. When the Clarke lab moved to UT Austin, I stayed behind as research assistant professor and also took a research associate position at the NC Museum of Natural Science. Right now, my research is focused on the evolution of diving seabirds in the fossil record - a large part of this is combining data from the skeleton and DNA from living birds to get a complete picture of phylegetic relationships. I've been doing field work in the Pisco Basin of Peru with Julia and Peruvian collaborators since 2006. Now that I am set up in NC, I am trying to start up a program monitoring and collecting from Triassic quarries - these are roughly equivalent with the Stockton and Lockatong in NJ but have been very productive with body fossils. Our program is growing here - we have 5 paleontologists between the university and museum. If you have motivated undergraduates who are interested in pursuing graduate study in paleo, don't hesitate to point them towards our program.”

Bob Marguccio (RC’81) reports: In the past, Ken had asked me to send a note about where I’ve been over the years and I’ve procrastinated about as long as I can, so here goes. I’ve known Ken for over 30 years, as we are DU fraternity brothers. I graduated in 1981… a few years behind Ken. He thinks I harbor a grudge against him for his encouragement on selecting geology as a course of study at a time when the conventional geology jobs started to dry up, but it was clearly a major step in the start of a very satisfying professional career. Although Ken offered a little nudge in the right direction, the guy that got me hooked on majoring in geology was Steve Fox. Dick's department history captures the pertinent facts. Steve’s field trips in Paleontology and Stratigraphy were some of my first Rutgers classes that really resonated with me. The watering holes were just a bonus. Steve’s encouragement a year later kept me in school at a time that I thought I might not make it to graduation. To this day - I say I'm a practicing paleontologist and still visit many of the sites that Steve turned us on to such as Big Brook, New Egypt, Stroudsburg, Chesapeake Beach, and Calvert Cliffs. I have also done extensive work in the Cretaceous of Texas on formations like the Eagle Ford Shale. I find it hard to walk or drive by an exposed outcrop without stopping to look for a fossil. As a result of all these classroom and field experiences, when Rutgers calls asking for money, I usually designate the Steven K. Fox Student Fund, in his memory. Another Rutgers connection led to my first job. While swinging through Texas looking for work in the oil patch, RU grad John Accardi put me up for a few days and recommended that I interview with an environmental firm in Dallas. I soon became a geologist/environmental scientist for a national consulting firm just as the EPA and Superfund were opening the door to a major “new” market. Working on a series of EPA emergency response, site assessment and remediation contracts over the next 12 years led to some unique technical and leadership challenges, more than a few interesting field assignments and travel all over the U.S. I have also worked on DOE, Army, Air Force and Fortune 500 company cleanup sites. Fast forward another 16 years, I currently work as a director of corporate development (strategy and market analysis) for an engineering, construction and services company called Fluor Corporation. During my days at Fluor I have worked in the environmental business, as well as the government, microelectronics, maintenance, construction equipment, temporary services, chemicals, refining, life sciences and knowledge management businesses. My Rutgers educational experiences have served me well at each step along the way.

Carol (Vassallo) Snead, MSc 1987. Thesis was on Townsends Inlet, NJ. Carol is an environmental planner for a consulting firm (HDR) in Portland, OR. She is serves on the Board of Directors for the National Association of Environmental Professionals. Married and raising two children and when asked about her Rutgers experience….she said “I am so thankful to have that M.S. degree from Rutgers and all the fun field experience that went with it”.

Shawn J. Dilles, BA 1981 moved to University of Ottawa and was awarded M.Sc 1983. He is a senior executive working for the National Geospatial Intelligence Agency. When asked about his educational experience……he said “I learned so much at Rutgers, from you and others and at Ottawa with the late Brian Rust. I know that these experiences, in discipline, rigor, nurtured curiosity and the good old Puritan work ethic have made me a better person. Shawn has been a generous contributor to the Steven K. Fox Student Fund.

Virginia Gullick, BA 1985. received a MSc and Ph.D. at University of Arizona working with Vic Baker conducting research on Martian fluvial landforms. She has been a principal investigator at Search for Extraterrestrial Intelligence (SETI) since 1996. SETI is an exploratory science that seeks evidence of life in the universe by looking for some signature of its technology. She is adjunct Professor at New Mexico State University and is currently on the Mars Science Lab 2009 landing site selection steering group. Ginny is part of the HiRISE (High Resolution Imaging Science Experiment) team that directs the high resolution camera on the Mars Reconnaissance Orbiter,
How can you help?

There are a number of ways you can help the department. Your contributions, small or large, are used to help send students to summer field schools, help fund graduate students to attend and present their research at national conferences, and help fund various aspects of field and laboratory research. If possible, please consider a tax deductible contribution to our:

**Steven K. Fox Student Fund** was created in Steve’s behalf, to support undergraduate and graduate student field studies, laboratory research, as well as means to help offset costs of attending summer geology field schools and attending national meetings to present various aspects of their research. Steve was Professor in Geology, now Earth and Planetary Sciences, from 1948-1981. In his review of the history of the department, Dick Olsson wrote “Steve taught Paleontology and Stratigraphy continuously since joining Rutgers in 1948. His method of teaching was to expose students as often as and as much as possible to geology in the field. Fridays were field trip days. It became an accustomed sight in the morning to see Steve and his students boarding the field vans for a day in the field, and at night to see them return all enthusiastic from what they had seen that day. Later in his teaching career at Rutgers he became involved in the field geology course which took place around the Delaware Water Gap. Each year students were exposed to his expertise of the geology of this area. In recognition of his teaching skills, Steve was given in 1978 the Rutgers College award of distinction as a member of the Society of Outstanding Teachers.” We hold firm to the teaching values imparted by Steve and our faculty strive to maintain the fostering environment of the department that typified Steve's teaching and mentoring. Typically, we award five to ten $500 awards to .

**Vinton Gwinn Prize** award was established in memory of Vinton Gwinn (RC 56), a geologist who was killed while working field. Originally established for the best undergraduate student paper in Appalachian Geology, the award is now considered annually for outstanding undergraduates engaged in independent research. Each student receives a financial award from the Steven K. Fox fund and has their name added to the department’s Vinton Gwinn plaque with post awardees.

**Larry and Norma Gordon Field School Fund** is a relatively new fund, created through an endowment from Larry and Norman. The fund is designed “to provide scholarship to undergraduate students to attend a summer field camp” such as YBRA in Montana, a camp that many of our past students have attended. We envision that as the fund grows though additional contributions from friends and alumni, we hope to award multiple undergraduate field studies scholarships in behalf of the Gordons.

**The Geology Development Fund** is the mechanism for directing alumni contributions to the department, to help with a wide variety of student and faculty research, equipment purchases, instructional items and general department needs. These funds help with sponsored colloquia, travel costs of guest department speakers as well helping offset a wide variety of department research and instructional endeavor not typically covered by available university funds. Specific, directed contributions may be arranged if preferred.

**Directed or Large Gifts to the Department and/or University**

If you are interested in making a large gift or directed contribution to the department and / or university and would like more information, please contact me directly. We can discuss the many options available to you, the needs of the department and will work with you through the University Foundation to ensure that your contributions and wishes are best realized. Please contact the department at 732-445-2044 for more information or e-mail Dr. Carl Swisher directly at cswish@rci.rutgers.edu for more information as to how you can help.

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**Please take a minute to update the department’s mailing list**

Name: ___________________________________________ If Alumni, degree and year of degree: __________________________

Address: _______________________________________________________________

Telephone (optional):______________________________________________

e-mail address: ________________________________________________

Please send by mail to: Jovani Reaves at Earth and Planetary Sciences, Rutgers University, Wright-Rieman Labs, 610 Taylor Road, Piscataway, NJ 08854-8066, or e-mail directly to: joreaves@rci.rutgers.edu, by FAX at (732) 445-3374.
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Rutgers, the State University of New Jersey presents the forty-second annual

Rutgers Geology Museum Open House

SATURDAY, JANUARY 30, 2010
PRESENTATIONS IN SCOTT HALL ROOM 123

10:00 am to 11:00 am
Monitoring Our Ocean Planet: The Scarlet Knights Trans-Atlantic Challenge
Presented by Dr. Josh Kohut
Rutgers University Institute of Marine and Coastal Sciences

11:00 am to 12:00 pm
Paleoclimatic Framework of Human Evolution: Examples from Olduvai Gorge
Presented by Dr. Gail Ashley
Rutgers University Department of Earth and Planetary Sciences

2:00 pm to 3:00 pm
Madagascar’s Buried Treasure: Dinosaur and Other Vertebrate Fossils from the Land That Time Forgot
Presented by Dr. David Krause
Stony Brook University Department of Anatomical Sciences and Department of Geosciences

3:00 pm to 4:00 pm
Earthquake Detection for the Citizen Seismologist
Presented by Dr. Ian Saginor
Keystone College Division of Natural Sciences and Mathematics

Mineral Sale - Scott Hall Room 135 from 9:00 am to 4:00 pm

- Rock and mineral identification - Geology Museum from 11:30 am to 3:30 pm
- Make and take stations for kids (all ages) - Geology Museum from 11 am to 3 pm
  - Dinosaur Track Print
  - Fossil Necklace
  - 3-D Mastodon
- Hands-on activity sessions for kids (ages 8 and up) - Scott Hall Room 115
  - 11:00 am – 12:00 pm Mountains, Valleys and Maps: All About Topography
  - 2:00 pm – 3:00 pm Introduction to Mineral Identification
  - 3:00 pm – 4:00 pm Drilling into Science: A Petroleum Exploration

ALL EVENTS ARE FREE
NO REGISTRATION REQUIRED

Educators who attend Museum presentations can receive credit toward their professional development requirements. The Geology Museum is registered as a provider with the NJ Department of Education

For more information call the Museum at 732.932.7243 or email us at museum@rci.rutgers.edu. Check out our website at http://geologymuseum.rutgers.edu/