



GEOLOGY & GEOPHYSICS NEWS

Chairman's Letter

Jay Ague (jay.ague@yale.edu)



It's my pleasure to once again welcome you to G&G's annual newsletter. Inside, you can read about the many adventures and accomplishments of current members of the department, alums, postdocs and former faculty, including research and teaching activities

spanning the globe from the Andes to Australia.

Best wishes to **Elisabeth Vrba**, who is retiring after a long and distinguished career. Elisabeth, a vertebrate paleontologist who came to Yale in 1986, was a pioneer in recognizing how environmental and climate changes could impact profoundly faunal replacement via rapid speciation and extinction. Her groundbreaking "turnover-pulse" hypothesis and recognition of the importance of exaptation (a term she coined with Stephan J. Gould) will influence the field for decades to come. Elisabeth's office became a legendary venue for stimulating classes and mentoring with its spectacular skulls and other specimens adorning the walls. She was the second director of the Yale Institute for Biospheric Studies (YIBS), the Director of the YIBS ECOSAVE Center, and served as Acting Chair of G&G. Elisabeth, one of the very first tenured women in the physical sciences at Yale, has been a wonderful role model and a true inspiration for the women faculty, students, and researchers in the department. Good luck, Elisabeth, as you forge your new life!

And we are delighted to welcome new faculty member **Anjan Bhullar** to G&G. Anjan is a vertebrate paleontologist who received his B.S. from Yale, his M.S. from U.T. Austin, and his Ph.D. from Harvard. He will join us next year as an Assistant Professor after he completes his postdoc at the University of Chicago. Anjan integrates evidence from genes, laboratory experiments on growth and development, and fossils to study transitions between major vertebrate groups. For

example, he has used evolutionary development in a remarkable way to demonstrate the origin of the bird skull through retention of the juvenile morphology of dinosaurs, and to show the evolutionary origin of the bird beak. Anjan's approach is fundamentally interdisciplinary and his expertise runs the gamut from field excavation, morphology, phylogeny, and evolutionary development. Welcome, Anjan!



Anjan Bhullar

We are also saddened to bid farewell to Dolf Seilacher, who passed away earlier this year. Dolf was one of the great paleontologists of our time and a true departmental icon. As most of you know, he made seminal contributions to our understanding of trace fossils, pattern formation and the factors controlling the forms of organisms, exceptional fossil preservation, Ediacaran fauna, and many other aspects of invertebrate paleontology and evolutionary theory. His uncanny observational skills, thoughtful mentoring, riveting stories, and legendary jokes (not necessarily good...) will be sorely missed. I will always remember Dolf on the 2nd floor balcony of KGL smoking a cigar while he envisioned ancient seas and all that lived in them.

G&G's educational programs continue to expand and diversify. Our graduate students have

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received well-deserved national and international recognition for their research. Recent Ph.D.'s and postdocs have gone on to prestigious positions around the globe. Our undergraduate program continues to grow and we now have over 40 majors! The Yale Climate and Energy Institute's (YCEI) "Energy Scholars" program now has more than 80 undergraduate participants across campus.

The field is where so many students fall in love with the geosciences. In this regard, I would like to express my deep gratitude on behalf of the department to undergraduate alum **Joe Greenberg '83 BS**. Joe recently established a new endowment for field studies in G&G! It will make

field excursions and learning experiences possible that we had only dreamed about in the past. Joe's generosity will provide countless new field opportunities for students to learn the wonders of our planet. I know it will make dreams come true. Thank you so much Joe!

So please take a moment to read and enjoy our newsletter. As always, we hope to hear from you and see you whenever you are in New Haven. When you visit KGL, you will notice some new infrastructure improvements, including much (MUCH!) needed renovations to the women's restrooms and the installation of a new parent's room for department members with young children. Please let us know about your activities so we can feature them in future newsletters, and good luck for 2015!

FACULTY RESEARCH

Tracking Earth's Oxygenation

Noah Planavsky (noah.planavsky@yale.edu)

The rise of oxygen over several billion years dramatically changed Earth's surface environments and ultimately paved the way for the emergence of complex life. However, our current picture of Earth's oxidation is still painted with only broad strokes. A central theme of my research is trying to piece together the history and effects of Earth's oxygenation over broad time scales.



Noah Planavsky

Earth's earliest atmosphere was essentially devoid of oxygen. What traces of oxygen there were probably came from photo dissociation of other atmospheric gases. Atmospheric oxygen levels on the pre-biotic Earth are estimated to have been a fraction of those of the modern—less than 10^{-10} present atmospheric levels (PAL). The switch to a well-oxygenated atmosphere like that of today—an atmosphere containing ~21% oxygen—is ultimately the result of the evolution of oxygenic photosynthesis (the biologically mediated conversion, through photolysis, of carbon dioxide and water to oxygen and sugars—the materials needed to sustain complex life). Oxygenic photosynthesis is the only process that releases significant amounts of oxygen to Earth's surface.



Graduate Student David Auerbach with Noah Planavsky and Postdoc Bleuenn Guéguen

This evolutionary singularity, arguably more so than any other event, shaped the chemical evolution of our planet.

In spite of the importance of oxygenic photosynthesis, the precise timing of this metabolic evolution is a matter of intense debate. Current estimates are scattered over a billion years of Earth history, ranging from prior to 3.7 billion years ago (Ga), the age of the oldest sedimentary rocks, to 2.4-2.3 Ga, coincident with the first step-wise (permanent) rise in atmospheric oxygen, which is often referred to as the "The Great Oxidation Event" or GOE. The permanent rise of atmospheric oxygen paved the way for the radiation of complex life, including eukaryotes. However, current estimates of oxygen levels during the billion and

FACULTY RESEARCH

half years leading up to the rise and diversification of eukaryotes after the GOE vary widely, with markedly contrasting implications for the role, if any, that oxygenation played in controlling the evolution and ecology of early complex life. It is clear that there are absolute oxygen requirements for animals: larger body sizes, increased mobility, and sophisticated ecologies such as predation, all have high metabolic oxygen demands. And the absolute oxygen requirements of different animal groups can be quantified. However, there are very few constraints on atmospheric oxygen levels in the billion and a half years leading up to the rise of animals and thus very little material to which physiological baselines can be compared. *Two of my research group's main goals are pinpointing when oxygenic photosynthesis evolved and determining the links between Earth's oxygenation and the rise of animal life.*

When did photosynthesis begin?

The pursuit of Earth's history of oxygenation has, historically, been a long and arduous one. However, I am hoping to move our understanding forward by tackling the history with a new set of geochemical tools. Most of my research focuses on novel geochemical proxies, foremost are the isotopes of chromium, molybdenum, and uranium. We have an ultra-trace metal clean room designed for this work and we are able to measure the isotopic variations in these systems using G&G's multi-collector, inductively-coupled, plasma mass spectrometer—a Neptune mass spectrometer.

The isotopic systems of chromium, molybdenum, and uranium are uniquely suited to track Earth's oxygenation, given that, for each of these elements, the largest fractionations occur during redox (reduction-oxidation) reactions. The simplest use of these systems is searching for large isotopic variations, which, as a signature of biological oxygen production, can be used to pinpoint the evolution of oxygenic photosynthesis. Post-doc **Xiangli Wang** has been using Cr and U isotopes to look for the oldest evidence of oxygenic photosynthesis. We

also recently published Mo isotope evidence for oxygenic photosynthesis 2.95 billion year ago, which is over half a billion years before the permanent accumulation of oxygen in the atmosphere. Undergraduate **Chris Brown ('15)** is currently working on rocks from northern Australia and South Africa deposited from 3.5 to 3.2 billion years ago.

Emergence of Animals

Further, redox reactions in the Cr, Mo, and U isotope systems are triggered at different levels of oxygen. This variable response to the presence of oxygen may help us determine the links between the rise in oxygen and physiological baselines for

animal evolution. Specifically, Cr requires significantly more free oxygen than the Mo and U isotope systems to turn on oxidative cycling and induce isotopic variability. Our

current hypothesis is that oxygen levels near the minimum oxygen threshold of simple animals are needed for oxidative Cr cycling. Further, we find a persistent signal for inhibited Cr oxidation—muted Cr isotope variability in marine strata—until around 750 million years ago, which is close to the current estimates for the emergence of the earliest animals. This record may provide some initial geochemical evidence for a direct link between oxygenation and animal emergence. PhD student **Dave Auerbach** is working on producing a terrestrial record to accompany our recently produced marine record. Post-doc **Bleuenn Guéguen** is currently working on better calibrating the oxygen levels needed to induce Cr isotope variability through experimental work.

Oxygenation and Deoxygenation of the Ocean

Although we have a general understanding of how atmospheric oxygen has fluctuated in Earth's recent past, we have a relatively poor understanding of how marine oxygen levels have varied. I am interesting in tracking recent marine oxygen variability, given that two of

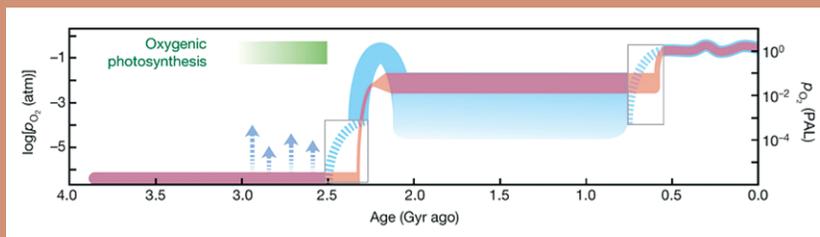
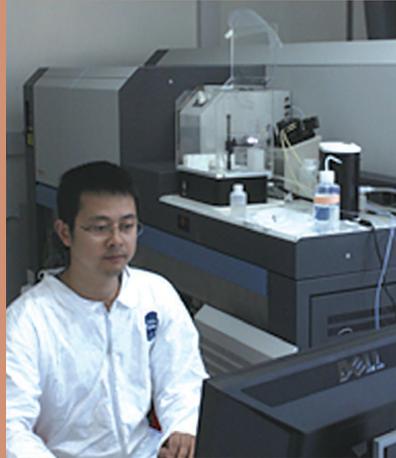


Figure 1. Schematic of Earth's atmospheric oxygen (O_2) content through time. The mauve curve shows the classical, unidirectional "stepwise" history of atmospheric O_2 ; the blue curve shows an emerging model derived from recent geochemical data from our lab and from other groups. Arrows denote possible late Archean high O_2 excursions. From (Lyons et al., 2014).

Oxygenation *continued from page 3*

the consequences of global climate change, ocean warming and increased stratification of the upper ocean, will likely lead to declines in dissolved O₂ in the ocean (ocean deoxygenation) over the next century. And the consequences of ocean deoxygenation are potentially extreme. The predicated oxygen losses will have a direct and detrimental impact on marine life, both within individual populations and across entire ecosystems and environments. Shifts in dissolved oxygen will alter the nutrient cycles that regulate primary productivity and control ecosystem structure. And in deleteriously impacting the abundance, biodiversity and ecological balance of marine communities, significant deoxygenation will likely cause correspondingly severe economic losses in fisheries. The basic principles of ocean deoxygenation are indisputable. However, there is considerable uncertainty in current



Postdoc Xianlgi Wang tuning the Neptune multi collector inductively coupled plasma mass spectrometer.

estimates of their magnitude—stemming in large part from our lack of understanding of how ocean oxygen levels have varied in the past. *A central goal of my research group is to provide a record of marine oxygen levels over the past 65 million years, focusing especially on intervals of rapid warming.*

To tackle how marine oxygen levels varied in Earth's recent history we are again relying on U and Cr 'novel' isotope systems. However, our approach to deciphering the record of the 'recent' geologic past is quite different to the way we use the systems to interpret Earth's early history. In this case, we construct a global isotopic mass balance for each element. The isotopic value of seawater is controlled by the marine redox landscape—the extent of oxic and anoxic areas in the ocean. This means that we can track shifts in the extent of anoxic conditions, by looking for shifts in the Cr and U isotope values. Utilizing this approach, we hope to gain a better understanding of the effects of rapid warming on marine oxygen levels.

IN MEMORIAM

Adolf Seilacher (1925–2014)

Dolf, as he preferred to be called, died April 26, 2014, in his native Germany. He spent 22 years as an Adjunct Professor



at Yale, from 1987 through 2009. Each year for 22 years, Dolf would arrive for a semester, teach one or two courses, and work with graduate students. He was an active, vital member of the Department of Geology and Geophysics. Dolf was an iconic member of the world's paleontology community, and in 1992 he was awarded the Crafoord Prize by the Swedish Royal Academy, the same organization that awards the Nobel Prizes. The Crafoord honors researchers in disciplines the Nobles do not recognize. Dolf's last publication, a book, was finished days before his death. Alan Gishlick G' 08, who worked with Dolf on the book, reported that: "Over the past four years, I worked



Alan Gishlick G' 08, Edith and Dolf Seilacher, Tübingen, March 2014.

with Dolf to help him complete his long germinating book on morphometrics. I was able to visit him this past March to complete the final pieces and the manuscript was sent to the publisher a few days before his death. It will be published this October by the CRC press imprint of Taylor and Francis."

G&G Professor Derek Briggs has written a marvelous tribute to Dolf in *Nature* which captures beautifully the essence of Dolf's scholarship and career. You can find the article here: <http://www.nature.com/nature/journal/v509/n7501/full/509428a.html>

IN MEMORIAM

Edward Thomas Ruppel (1925–2014)



Ed Ruppel G' 58, died at home in Twin Bridges Montana on June 27, 2014. Ed's life work focused on the geology of the mountain ranges of Montana and Idaho. Ed graduated from the University of Montana, Missoula, in 1948, from the University of Wyoming in 1950, and from Yale in 1958, for his PhD Thesis "Geology of the Basin Quadrangle, Montana."

After 30 years with the U.S. Geological Survey, working in Yellowstone National Park, east-central Idaho, and southwest Montana, Ed was appointed Montana State Geologist and Director of the Montana Bureau of Mines and Geology, from which positions he retired in 1991.

In addition to his many maps and other professional publications, Ed wrote two popular geologic guides: "The Gold Mines of the Virginia City Mining District, Madison County, Montana," and "Along The Great Divide: The Rocks and Their History Along the Continental Divide Trail between Montana and Idaho."

RETIREMENT

Elisabeth Vrba Retires, August 2014



Elisabeth Vrba came to Yale in 1986. She has been a trailblazer in every sense of the word. One of the first women to be tenured in the Physical Sciences at Yale, she was trained in Mathematics and Statistics at the University of Capetown and says that she always knew she was going to be some kind of scientist, but her career has evolved to be one of considerable breadth. One of her theories proposes that species that are considered "generalists" are more likely to survive a mass extinction event than "specialist" species because they are able to adapt and survive in the rapidly changing environment. Perhaps this helps explain the success of her own career, where through time and change she refused to be categorized, and where her boundary crossing work has spanned paleontology, ecology, geology and climates, and the environmental influences on human evolution.

Elisabeth asked questions such as: How do new species originate? How does new organismal form and function evolve? How do the evolutionary changes relate to climatic changes? Her famous turnover-pulse hypothesis, based on her work on antelopes, has informed debates about changes in biodiversity and the evolution of our own species.

Her research on the Pliocene fauna of Africa showed that long periods of stability followed by major environmental disruption resulted in rapid faunal replacement effected by both extinction and speciation. Changes to drier conditions provided an explanation for the diversification of hominids on the African savannas 2.5 to 3 million years ago, and has informed our understanding of the origin of *Homo*.

She constructed the turnover-pulse hypothesis to gauge the rate of survival and adaptations within species. Together, she and the late Stephen Gould coined the now widely used term "exaptation" for features that evolved for one function and were later adapted for another, a classic example of which is the evolution of feathers for insulation and their later use for flight. Indeed Stephen Jay Gould's magnum opus on *The Structure of Evolutionary Theory* is dedicated jointly to Elisabeth and Niles Eldredge in recognition and homage of Elisabeth's major research contribution on the role of physical environment in speciation.

RECENT AWARDS, HONORS & PROMOTIONS: FACULTY

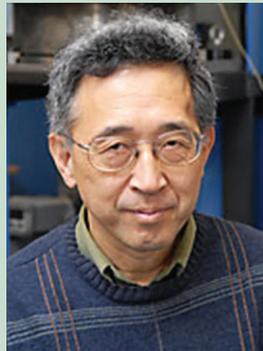


Dave Bercovici

Dave Bercovici (david.bercovici@yale.edu) has been asked to deliver a prestigious talk at the AGU Fall meeting in San Francisco, December 2014. Dave, who plans to speak about the origins of plate tectonics, will join a distinguished line of scientists who have delivered the AGU's Birch Lecture, part of a series known as the Bowie lectures.

The Birch lecture is the core talk in the AGU's Tectonophysics section.

Shun-ichiro Karato (shun-ichiro.karato@yale.edu) received the 2014 Augustus Love Medal from the EGU for outstanding wide-ranging contributions to geodynamics, epitomised by novel syntheses of theory with laboratory, geophysical and field data, and noted especially for pioneering studies of the anisotropy of Earth materials.



Shun Karato

Shun has also been elected as a Fellow of the Japan Geoscience Union.

Geophysical Research Letters selected Shun's paper *Importance of anelasticity in the interpretation of seismic tomography* as one of the 40 most influential papers published in GRL during its 40 year history.



Jun Korenaga

Jun Korenaga (jun.korenaga@yale.edu) has been awarded a 2014 Guggenheim Fellowship. Guggenheim Fellows are appointed on the basis of impressive achievement in the past and exceptional promise for future accomplishment. This is a tremendous honor for Jun.



Kanani Lee

Congratulations to **Kanani Lee** (kanani.lee@yale.edu) on her promotion to Associate Professor.

Trude Storelvmo (trude.storelvmo@yale.edu) and **Mary-Louise Timmermans**

(mary-louise.timmermans@yale.edu) have both received NSF CAREER awards for their research.

Trude will be working on: *The Role of Mineral Dust in Atmospheric Ice Formation, and its Impacts on Past, Present and Future Climate.*

Mary-Louise's project is: *Evolution and dynamics of the deep waters in the Arctic Ocean.* The Career program is one of the "National Science Foundation's most prestigious awards in support of junior faculty who exemplify the role of teacher-scholars through outstanding research, excellent education and the integration of education and research within the context of the mission of their organizations."



Mary-Louise Timmermans



Trude Storelvmo

RECENT AWARDS & HONORS: STUDENTS

Graduate Students



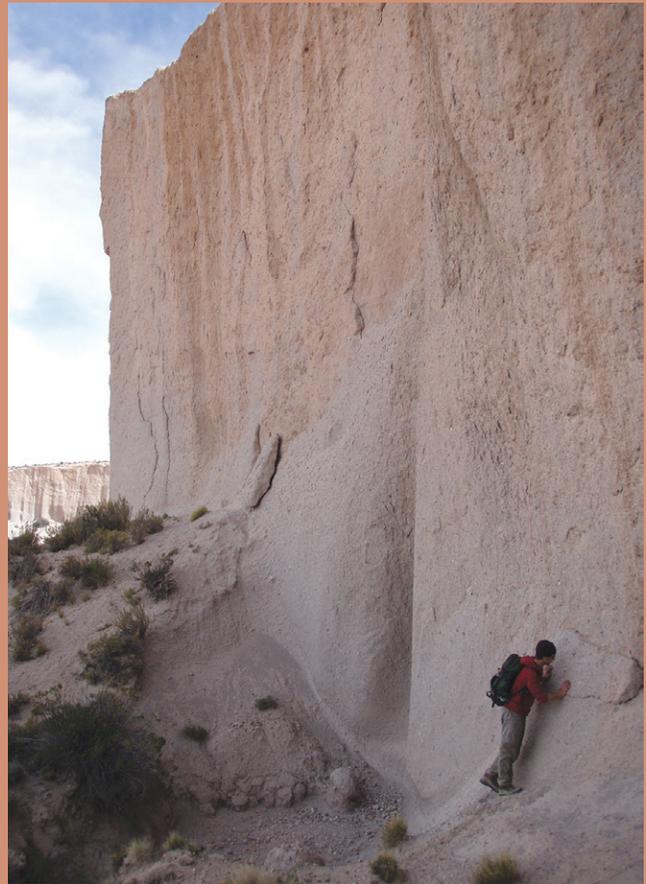
Ross Anderson

Ross Anderson (ross.anderson@yale.edu), a third-year graduate student, is the recipient of a NASA Earth and Space Science Fellowship in Planetary Science for his proposal: *The rise of eukaryotes: Environmental controls during the Neoproterozoic-Cambrian transition*. The fellowship, worth \$30,000

per year, is awarded by NASA's Science Mission Directorate Planetary Science Division with a purpose to "ensure the continued training of a highly qualified workforce in disciplines needed to achieve NASA's scientific goals". It is highly competitive and selection is a "real mark of distinction" — only 31 awards were made this year.

Ross was also selected as a 2014 Lewis and Clark Field Scholar in Astrobiology by the NASA Astrobiology Institute and the American Philosophical Society for his research: *Preservational controls on Neoproterozoic-Cambrian (1000-485 Ma) eukaryotic fossil diversity explored in the Zavkhan terrane of Southwestern Mongolia*. The Lewis and Clark Fund for Exploration and Field Research in Astrobiology promotes "the continued exploration of the world around us through a program of research grants in support of astrobiological field studies undertaken by graduate students, postdocs, and early-career scientists and scholars". Three such awards were made to two Yale graduate students (Ross and Eric Bellefroid) and a postdoc (Lidya Tarhan) they comprise three of only nine made in 2014!

In addition, Ross was the recipient of an ExxonMobil/Geological Society of America Student Geoscience Grant. He was also recognized with the Robert D. Hatcher Research Award for field based research, the GSA Geophysics Division Research Award, and the GSA Structural Geology and Tectonics Division Research Award.



David Auerbach examining a Miocene tuff in the Altiplano of Bolivia, at about 14,000 feet.

Dave Auerbach (david.auerbach@yale.edu), a third-year graduate student, received the Geological Society of America (GSA) Graduate Student Research Grant for his proposal: *Tracking the rise of the Patagonian Andes using a multi-proxy stable isotope approach*. In addition, David also received the R.E. McAdams Memorial Grant from the American Association of Petroleum Geologists (AAPG) for his proposal: *Using stable isotopes of precipitation to understand the evolution of the climate of Patagonia and the uplift of the Andes*; and the Society for Sedimentary Geology (SEPM) Foundation Award for his proposal: *Evolution of the Patagonian rain shadow as revealed by stable isotopes of leaf waxes and soil carbonates*.

RECENT AWARDS & HONORS: STUDENTS



Eric Bellefroid

Eric Bellefroid (eric.bellefroid@yale.edu) a second-year graduate student, was selected as a 2014 Lewis and Clark Field Scholar in Astrobiology by the NASA Astrobiology Institute and the American Philosophical Society for his research on: *Effects of tectonic change on the marine paleoenvironment and biogeochemical cycles during the Mesoproterozoic, Borden Basin, Northern Canada.*

The Lewis and Clark Fund for Exploration and Field Research in Astrobiology promotes “the continued exploration of the world around us through a program of research grants in support of astrobiological field studies undertaken by graduate students, postdocs, and early-career scientists and scholars”.



Robin Canavan at Loch Assynt in Scotland.

Robin Canavan (robin.canavan@yale.edu), a third-year graduate student, received a GSA Graduate Student Research Grant and a Peter W. Gester Memorial Grant from the American Association of Petroleum Geologists. The Title of her proposal was *The Record of Terrestrial Organic Matter in the Western Interior Seaway Across the Cenomanian-Turonian Ocean Anoxic Event*. She is looking at the preservation and types of terrestrial plant biomarkers in marine and coastal sediments across a period in the late Cretaceous associated with CO₂ sequestration, ocean anoxia and marine extinctions. The goal of the project is to see if there is an effect on terrestrial plant communities across

this event and better understand the distribution of terrestrial plant biomarkers both close to and farther away from their source.



Simon Darroch at Anticosti Island, Canada.

Simon Darroch G '14 (simon.darroch@yale.edu) received a GSA Student research grant. Simon investigated changing patterns of biogeography over the Ordovician-Silurian mass extinction; the funds provided by GSA paid for a trip to northeast Canada, where he studied brachiopod assemblages with the goal of deciphering how the distribution of species changed in response to extinction stress.



Daniel Field

Graduate student **Daniel Field** (daniel.field@yale.edu) won a prestigious “best student paper” prize at the annual Society for the Study of Integrated and Comparative Biology meeting in Austin TX. The award is named for Marvalee and Dave Wake, who also happened to be the judges for this year’s competition!

The title of the paper is: *Reanalysis of microRNAs reveals an archosaur rather than a lepidosaur affinity for turtles.*

Daniel was awarded the Cas Lindsey Prize for the best student paper in ethology, ecology or evolution at the annual meeting of the Canadian Society of Zoologists in Montréal. The talk was entitled *Emerging Consensus in Reptile Phylogeny.*

Daniel also received the W.D. Hamilton Award by the Society for the Study of Evolution. The award

RECENT AWARDS & HONORS: STUDENTS

recognizes the best student talk at the annual Evolution meeting; 28 finalists competed for the award from a pool of 250 applicants.



Shineng Hu



Ivy Tan

Graduate students **Shineng Hu** (shineng.hu@yale.edu) and **Ivy Tan** (ivy.tan@yale.edu) are recipients of NASA Earth and Space Science Fellowships in Earth Science. Ivy Tan works with Trude Storelvmo and Shineng Hu works with Alexey Fedorov. Ivy's project was titled *Improving Cloud Phase Predictions Through the Use of CALIOP Retrievals* while Shineng's was titled *The Impact of Westerly Wind Bursts and Ocean State on the Development and Diversity of El Niño Events: Insights from Satellite-Based Observations and Numerical Experiments*. The fellowships, worth \$30,000 per year, are awarded by NASA's Science Mission Directorate Earth Science Division with a purpose to "ensure the continued training of a highly qualified workforce in disciplines needed to achieve NASA's scientific goals". It is highly competitive and selection is a "real mark of distinction" — only 54 awards were made this year.



Emma Locatelli



Victoria McCoy

Emma Locatelli (emma.locatelli@yale.edu) a fourth-year graduate student and **Victoria McCoy** (victoria.mccoy@yale.edu) a fifth-year graduate student received "the best graduate

student talk" and "the best student poster presentation" respectively at the North American Paleontological Convention. The Convention took place in Gainesville, Florida, February 15-18, 2014. Emma's talk was titled *Experimental Taphonomy of Foraminifera*. Victoria's poster was titled *Distribution of fossiliferous concretions at Mazon Creek*.

Emma was also awarded the 2014 Winifred Goldring Award by the Association for Women Geoscientists. The award is named after Winifred Goldring, a pioneering woman paleontologist with a special interest in paleobotany, who became State Paleontologist of New York State in 1939 and the first female president of the Paleontological Society in 1949. It is awarded to an outstanding female student pursuing a degree in paleontology.



Woosok Moon with his daughter.

Woosok Moon G '14

(W.Moon@damtp) has been chosen as the AGU's 2014 Turcotte awardee in nonlinear geophysics. The Donald L. Turcotte Award is given annually to one honoree in recognition of outstanding dissertation research that contributes directly to nonlinear geophysics. The Turcotte awardee presents an

invited talk on his/her dissertation topic at the AGU Fall Meeting.



Holger Peterman

Holger Peterman (Holger.Peterman@yale.edu) a third-year graduate student, received a YIBS Doctoral Pilot Grant for a project titled: *Sexual dimorphism in growth rates of the teiid lizard *Aspidoscelis tigris* (Baird and Girard, 1852): Implications for assessment of growth and age in extinct squamates.*

RECENT AWARDS & HONORS: STUDENTS



Erin Wirth

Graduate student **Erin Wirth**, (erin.wirth@yale.edu) received an Outstanding Student Paper Award from the Tectonophysics section at the 2013 AGU Fall Meeting. The OSPA program recognizes the top 3-5% of student presenters at the conference. Erin's presentation was titled *Anisotropic properties of the mid-lithospheric discontinuity beneath central North America*.

Undergraduate Students



Sarah Ditchek

Sarah Dunn Ditchek '14, (sarahditchen@gmail.com) a G&G Atmosphere, Ocean, and Climate major, was recently awarded a National Defense Science and Engineering Graduate (NDSEG) Fellowship. This fall, Sarah will be pursuing a Ph.D in Atmospheric Science at the State University of New York at Albany.

where she will be working with Professor John Molinari and researching topics involving hurricane intensification and genesis.



Emily Farr

Congratulations to **Emily Farr '14** (emilyfarr92@gmail.com) on her Fulbright Fellowship. She writes: I will be studying from March 2015 – March 2016 at the University of Gastronomic Sciences in Pollenzo, Italy, which was founded by the international non-profit Slow Food. I will get a degree in Food Culture and

Communications, focusing on food systems and policies and the relationship between food and place.

Part of the degree is a study project, which I developed based on my interest in the connection between food systems and climate change,

particularly as it relates to the oceans. My proposal is to visit existing ocean farms and aquaculture operations along the coast of Piemonte and other regions of Italy to investigate their existing infrastructure and markets. I am interested in the potential of integrating kelp into small ocean farms because of its ability to sequester carbon and buffer ocean acidification, therefore providing an element of ecosystem restoration, as well as its potential as a food source and a biofuel. So I hope to explore potential markets for kelp in the region and to bring what I learn back to the US.



Parker Liataud sets world records on South Pole expedition.

G&G major **Parker Liataud '16** (parker.liataud@yale.edu) reached the South Pole by skis on December 24, 2013. He is the youngest person to reach both poles. Moreover, he also achieved the fastest Antarctic coast-to-pole trek, taking just over 18 days. His expedition, named "Willis Resilience" after its principal corporate sponsor, Willis Group Holdings, seeks to increase public awareness of climate change. Parker collected snow profiles from previously unsampled regions of the continent, ultimately to measure the spatial and temporal variability in isotopic ratios of hydrogen and oxygen through the past decades to centuries in those areas.

RECENT AWARDS & HONORS: ALUMNI



Robert Q. Oaks, Jr.

Robert Q. Oaks, Jr, G '65 (boboaks@comcast.net) is the recipient of the 2013 Lehi Hintze Award for Outstanding Contributions to the Geology of Utah given by the Utah Geological Association and the Utah Geological Survey. Bob was honored at the November 2013 UGA meeting, where he gave a talk about his work in Cache Valley titled "Delving into the geology of the Cache Valley area, north-central Utah and southeastern Idaho: an update and retrospective."



Neil Williams

Neil Williams G '76 (williamsgeoscience@grapevine.com.au) has been awarded the Haddon Forrester King Medal by the Australian Academy of Science for his original and sustained contributions to mineral exploration, including his leadership of Geoscience Australia and the achievements of the

agency during his tenure as CEO, from 1995 to 2010. Neil also served as President of the Society of Economic Geologists in 2008 and is currently the Thayer Lindsley Lecturer for the Society. Neil is an Honorary Professorial Fellow at the University of Wollongong in New South Wales, Australia.



Matt Jackson with his wife Anna Maria and their daughter Katla.

Matt Jackson '01 (matthewgerardjackson@gmail.com) was awarded the Geochemical Society's Clarke Medal. After he graduated from Yale, Matt spent nine months backpacking through Asia and Africa. He then moved to Iceland for one year on a Fulbright Grant, where he studied the Holocene eruptive history of the volcano Katla. Matt started graduate school in the MIT-WHOI Joint Program, where he studied the geochemistry of hotspot volcanoes with Stan Hart. After earning his PhD in 2008, Matt was a postdoc at the Department of Terrestrial Magnetism, Carnegie Institution of Washington, with Rick Carlson, Steve Shirey and Erik Hauri. Matt was an Assistant Professor at Boston University for several years, and is now an Associate Professor at the University of California, Santa Barbara. He lives in Santa Barbara with his wife, Anna Maria (who he met in Iceland), and their daughter, Katla.

The Clarke Medal is "presented annually at the V. M. Goldschmidt Conference to an early-career scientist for a single outstanding contribution to geochemistry or cosmochemistry, published either as a single paper or a series of papers on a single topic."

STUDENT NEWS

Seniors who graduated in the class of 2014

Max Andersen (Advisor: Mark Pagani)

“Paleotempestology: Exploring methods to develop tropical storm records in response to theoretical interactions between changing climates and hurricane intensity”

Max spent his summer teaching English and developing a curriculum on energy in Ningbo and Taizhou China.

Stella Cao (Advisor: Michael Oristaglio)

“Natural Gas Flare Reduction: Case Studies in Russia, Nigeria and the United States”

Starting this August Stella will be an energy analyst for PA consulting in Denver. She will contribute to projects covering energy policy, renewable and thermal generation, and industry acquisitions. Her work will include researching key inputs and creating models to quantitatively analyze projects.

Wendy DeWolf (Advisor: Mark Brandon)

“Investigating the glacial and topographic history of the Central Patagonian Andes using (U-Th)/He Thermochronology”

Wendy is working as a project engineer/assistant for Energy Management, Inc., an energy development firm in Boston most well known for the Cape Wind Project.

Sarah Ditchek (Advisor: William Boos)

“A Genesis Potential Index for Asian-Australian Monsoon Low Pressure Systems”

Sarah is currently a NDSEG Fellow at the University at Albany, SUNY working towards her Ph.D. in Atmospheric Science under the advisement of Professor John Molinari. She will be researching tropical cyclone genesis and intensification.

Abigail Eurich (Advisor: Zhengrong Wang)

“Evaluating the Boron Isotope-pH Proxy: the Role of Vital Effects on $\delta^{11}\text{B}$ of *Porites* Coral and Implications for Proxy Use”

Abigail is currently in the Deschutes National Forest near Bend, Oregon, working for Oregon State University and the Nature Conservancy on a landscape assessment of fire history in the area. They are working with a collaborative of over 100 stakeholders, all with different interests

in the forest and hopes for its future. They hope to find common ground and, using their research covering the past 300-400 years of the forest landscape, create a successful management plan for the future of the Deschutes National Forest.

Emily Farr (Advisor: Peter Raymond)

“Gas Transfer Velocities in Small Forested Ponds”

Emily is currently apprenticing at Big Picture Farm, which is a goat dairy/confectionary that makes goat-milk caramels and cheese, until October. In October she will return to New Haven to work with Thimble Island Oyster Company to do some work relating to ocean farms. Both are funded by Yale CIPE’s Gordon Grand fellowship.

Frieda Fein (Advisor: Ruth Blake)

“Temperature Dependence of Phosphate Content in *Thermus thermophiles*”

Frieda will be teaching high school math in Lesotho as a Peace Corps volunteer.

Beata Fiszer (Advisor: Mark Brandon)

“Modeling the Relationship between Stable Isotopes in Precipitation and Mountain Elevation”

Beata will be doing the Sitka Service Fellowship in Sitka for the year working with the Alaska Longline Fishermen’s Association. After that, she’ll be back at Yale FES to get a Master’s in Environmental Management.

William Gearty (Advisor: Jacques Gauthier)

“Resolving the Relationships of the Squamate Tree of Life: An Assessment of New Approaches and Problems”

William will be attending the Ph.D program in Paleobiology working with Jonathan Payne at the Stanford School of Earth Sciences.

Allegra Gordon (Advisor: Mary-Louise Timmermans)

“An analysis of Satellite skin temperatures in the Beaufort Sea Region in Conjunction with In-situ Air Temperature Measurements”

After studying climate change in the Arctic, Allegra decided to spend some time in the Maldives studying the potential impact of rising oceans. She’s taking a “gap summer” to realize her dream of an Endless Summer Surf Trip. She is currently in the Maldives, then heading to Sri Lanka and Indonesia. She plans to start working in October at a San Francisco based technology company.

STUDENT NEWS

Jenna Hessert (Advisor: David Evans)

“Paleomagnetic Baked-Contact Tests in the Mesoproterozoic Sinclair Region of Namibia”

Jenna worked as a geology intern at Occidental Petroleum for the summer. She will start her masters of geoscience at Texas Tech University in the fall.

Ryan Laemel (Advisor: Mark Brandon)

“Late Cenozoic Glacial Erosion and Relief Change of Cordón Los Ñadis and Fjord Steffen in the Patagonian Andes from apatite (U-Th)/He Thermochronometry and Age-Elevation Relationship Interpretation”

Ryan will be working as a Woodbridge Fellow at Yale’s Office of Sustainability.

Wells Thorne (Advisor: Derek Briggs)

“Paleoecology and Preservation of Faunal Assemblages in Phosphatic Nodules from the Pennsylvanian Midcontinent”

Robert Young (Advisor: Derek Briggs)

“Laboratory Testing of the Influence of Substrate on Decay Inhibition and Exceptional Preservation”

Robert will be working in Arlington, Virginia for Clark Energy Group, which retrofits buildings to make them more energy efficient.

PhD Degrees awarded in 2014

May

Peter Douglas

Advisor: Mark Pagani

“Plant-wax Isotopes in Neotropical Lake Sediments and Insights into the Ancient Maya Civilization”

Peter is a Postdoctoral Scholar in Geochemistry at Caltech working with John Eiler and Alex Sessions, where he’s studying the abundance and environmental significance of methane with multiple rare isotopes.

Bradford Foley

Advisor: David Bercovici

“Generation and Initiation of Plate Tectonics on Terrestrial Planets”

Brad is Carnegie Postdoctoral Fellow, Department of Terrestrial Magnetism, Carnegie Institution of Washington.

Woosok Moon

Advisor: John Wettlaufer

“Arctic Sea Ice: Trends, Stability and Variability”

Woosok is a Herchel-Smith Postdoctoral Fellow, Institute of Theoretical Geophysics, University of Cambridge.

Rachael Racicot

Advisor: Jacques Gauthier

“What goes on inside the heads of porpoises?”

Investigations of porpoise (Cetacea: Phocoenidae) skull anatomy using CT data”

Rachels is actively applying for postdoc positions.

Duayne Rieger

Advisor: Jeffrey Park

“Love to Rayleigh Conversions and Seismic Anisotropy in Cascadia”

Duayne is an Assistant Professor of Geology and Oceanography, Community College of Rhode Island.

Shikma Zaarur

Advisor: Hagit Affek

“Clumped isotope thermometry as a tool for reconstructing terrestrial environments: case studies from the Levant and East Africa”

Shikma is a Postdoctoral Associate, EAPS (Earth, Atmospheric and Planetary Sciences), Massachusetts Institute of Technology.

December

Simon Darroch

Advisor: Derek Briggs

“Diversity gradients in the fossil record — developing predictive models for biodiversity loss”

Simon received a Peter Buck postdoctoral fellowship at the Smithsonian Museum of Natural History. Following that, in September 2015, he’ll be joining the faculty at Vanderbilt University (department of Earth and Environmental Sciences) as an Assistant Professor in Paleobiology in September 2015.

STUDENT NEWS

Srinath Krishnan

Advisor: Mark Pagani

“Changes in the hydrological cycle during early Eocene hyperthermals”

Srinath has been appointed as a Yale Climate and Energy Institute postdoc. Regional climate estimates produced in this study will be tailored to drive infectious disease models, such as a lyme disease model, to evaluate potential changes in distribution and propagation of disease vectors with global warming.

Georgy Manucharyan

Advisor: Alexey Federov

“The Role of Upper-Ocean Mixing in Large-Scale Ocean and Climate Dynamics”

Georgy is a postdoctoral scholar in Physical Oceanography at Woods Hole Oceanographic Institution.

2014 Department of Geology & Geophysics Prize Recipients

UNDERGRADUATE PRIZES

HAMMER PRIZE • “for excellence in the oral presentation of the Senior Thesis”

Sarah Ditchek

Allegra Gordon

Emily Farr

BELKNAP PRIZE • “to a Senior for excellence in geological studies”

Wendy DeWolf

William Gearty

SAMUEL LEWIS PENFIELD PRIZE • “for proficiency in mineralogy”

Rain Tsong

PAT WILDE PRIZE • “for excellence in marine geology and oceanography”

Sarah Ditchek

Emily Farr

VON DAMM FELLOWSHIPS: endowed by the late Karen Von Damm '77, to support undergraduate field research and field trips.

Christian Brown

Tierney Larson

Tess Maggio

Jane Smyth

Christine Tsai

Matt Goldklang

Marjorie Hirs

Yusu Liu

Megan Mikenas

Philippa Stoddard

XinXin Xu

GRADUATE PRIZES

HAMMER PRIZE • “given to an outstanding geology graduate student.”

Colton Lynner

Ross Andersen

ELIAS LOOMIS PRIZE • “for excellence in studies of physics of the earth, usually manifested in outstanding effort on thesis research.”

Caroline Eakin

Shineng Hu

PHILLIP M. ORVILLE PRIZE • “in recognition of outstanding research and scholarship in the Earth Sciences”

Simon Darroch

Georgy Manucharyan

FORD PRIZE • “is given for excellence in mineralogical studies”

Peter Douglas

KARL K. TUREKIAN PRIZE • “is awarded for excellence in geochemical or cosmochemical studies.”

Yige Zhang

Shikma Zaarur

DANA CLUB BEARD-A-THON 2014

This spring, the department launched a “Beard-A-Thon” to raise funds for the Dana Club. Holger Peterman, Simon Darroch, and Joe Panzik paid homage to the historical roots of Yale Geology by growing beards in the styles of past notable department geologists. The students agreed to grow the beard of a certain scientist from the hallway or tea room portraits once a certain amount of money was raised. Thanks to the generosity of the faculty, staff, and students and a matching gift from G&G, we are pleased to say that we raised over \$1000 for the Dana Club. Hopefully you had a chance to see Holger Petermann sporting the stylish moustache of Dr. Edward S. Dana. Simon Darroch achieved the fetching sideburns of Colonel George Gibbs. Joe Panzik is in the process of growing the legendary beard of O. C. Marsh. Thanks once again to the three participants and everyone who donated on behalf of the Dana Club!



Holger Peterman



Joe Panzik



Simon Darroch

POSTDOC NEWS



Lidya Tarhan

Congratulations to postdoc **Lidya Tarhan** (lidya.tarhan@yale.edu) who was selected as a 2014 Lewis and Clark Field Scholars in Astrobiology by the NASA Astrobiology Institute and the American Philosophical Society for her research on: *The silicification of soft-bodied biotas: A model for exceptional 'Ediacara-style'*

preservation, Flinders Range, South Australia. The Lewis and Clark Fund for Exploration and Field Research in Astrobiology promotes "the continued exploration of the world around us through a program of research grants in support of astrobiological field studies undertaken by graduate students, postdocs, and early-career scientists and scholars". The awards made to Yale graduate students and postdocs comprise three of only nine made in 2014! Lidya is currently working with Derek Briggs.



Natalie Burls

Natalie Burls (natalie.burls@yale.edu) has accepted an Assistant Professor position at George Mason University beginning in January 2015. It is a joint position between GMU's Atmosphere Ocean and Earth Sciences department and the Center for Ocean-Land-Atmosphere Studies (COLA). Natalie is a postdoc working with Alexey Fedorov.



Cecilia Cadio

Cecilia Cadio (cecilia.cagio@yale.edu) has accepted a postdoctoral fellowship from the French space agency CNES (Centre National d'Etudes Spatiales). She will be in Montpellier in the South of France working on the *Deformation Partitioning and the Lithosphere Dynamics of Continental Orogens*. Cecilia is a postdoc working with Jun Korenaga.



Andong He

Andong He (andong.he@yale.edu) will be heading to the University of Hawaii at West Oahu to be an Assistant Professor in Mathematics. Andong was a postdoc in G&G working with John Wettlaufer.



Tingting Gu

Tingting Gu, a postdoc who was working with Kanani Lee is now a postdoc at HPSTAR, a synchrotron facility in Shanghai, China.



Helen King

Helen King (Helen.king@yale.edu) a Marie Curie International postdoctoral fellow working with Ruth Blake and Catherine Skinner, will be moving to the Netherlands for an Assistant Professor position in the Department of Earth Sciences at Utrecht University.



Rob Style

Rob Style, (rob.style@yale.edu) who was a Bateman Interdepartmental Post doc (working with John Wettlaufer and Eric Dufrense in the School of Engineering and Applied Science) will start this fall as a junior faculty member at the University of Oxford Mathematical Institute.

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Greg and Mike Blanpied, November 2013, after Greg completed his final review for the Boy Scout Eagle badge.

Mike Blanpied '83 (Michael. blanpied@gmail.com) writes: I received the BS from G&G in 1983. From Yale I proceeded to Brown University where I received a PhD in Geology and Geophysics in 1989 under Professor Terry Tullis, studying frictional sliding properties of rocks with application to earthquake nucleation. I joined the U.S. Geological Survey that year, studying earthquake processes and hazards for 14 years at the USGS campus in Menlo Park south of San Francisco. In 2003 I relocated to USGS headquarters in Reston, Virginia, and serve as Associate Coordinator of the USGS Earthquake Hazards Program. My son, Greg, is 18 years old and graduating from South Lakes High School this spring, and is looking forward to starting at Colorado University at Boulder this fall, where he plans to major in engineering.



Bruce Clark

Bruce Clark '63 (bruce.clark@gmail.com) has been elected Treasurer of the Geological Society of America for the next year, and will become a member of the Society's Executive Committee.

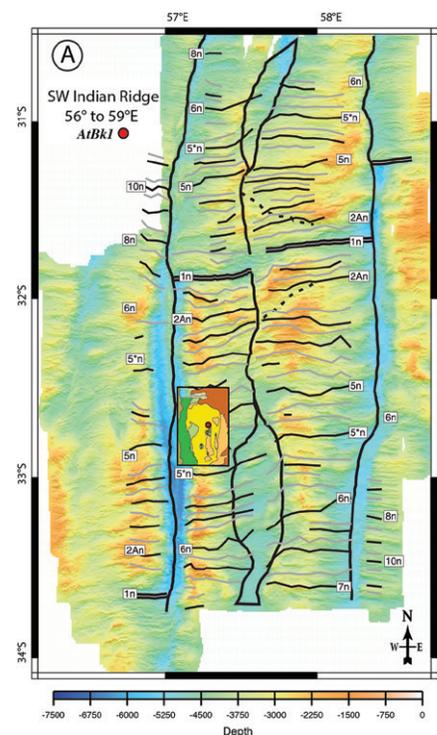


Henry Dick

Henry Dick G '78 (hdick@whoi.edu), writes: I am still at Woods Hole Oceanographic Institution in the Department of Geology and Geophysics. Currently working on mantle dynamics and the formation of oceanic core complexes at 16°30'N on the Mid-Atlantic Ridge and in a cooperative Chinese-American research project on the composition and evolution of the Southwest Indian Ridge. For the latter, I have been spending 6 weeks a year at Tongji University in Shanghai to work with my Chinese Colleagues. At the same time, my kids are all leaving, the next, daughter Helene having just graduated from Rice University, to which her younger sister Lydia is matriculating in the fall, and son Spencer testing the waters as a geology major at Ohio Wesleyan University.

The big news though, is that after 17 years of writing proposals and lobbying, the International

Ocean Drilling Program has finally approved SloMo, a two-phase drilling program to drill through lower ocean crust to Moho at Atlantis Bank in the Indian Ocean (57°35'E, 32°42'S). Phase 1 of the program will use two legs of the JOIDES Resolution (110 days at sea) to drill a deep penetration in the Atlantis Bank Oceanic Core Complex to three kilometers. The first Phase 1 drilling leg is scheduled for Austral summer 2014-2015 with objective of drilling down to 1500-m below seafloor. It will start in an exposed section of the base of the dike-gabbro transition on the wave-cut platform at the crest of Atlantis Bank (700-m water depth) in the rift mountains of the Southwest Indian Ridge. Pending a successful Leg 1, Leg 2 will return to the Indian Ocean



The Southwest Indian Ridge from 56° to 59°E, overlain by the geologic map of Atlantis Bank showing the position of the proposed SloMo drill site. Exposed peridotite-green, Gabbro-yellow, dike-gabbro transition-orange, lavas-brown.

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in two to three years to deepen the hole to 3-km. As the igneous crust-mantle boundary is exposed along the transform wall flanking the west side of Atlantis Bank, it is expected that this transition may occur at ~2.5 km below seafloor beneath the drill site. As the Moho has been directly measured at ~5.5 km below the drill site, we anticipate that Moho at this location is a serpentinization front – much as Harry Hess originally proposed. Phase II of SloMo will use the Chikyu, the Japanese riser drill ship, to deepen the hole to ~6-km through the seismic discontinuity. SloMo is designed to obtain the first full section of the lower ocean crust at a slow spreading ridge using a tectonic window to bypass the sheeted dikes and pillow lavas of the upper crust, which have proved to be difficult to drill due to hole stability. Now that scientific drilling has reached the dike-gabbro transition at Hole 1256D in the Pacific, SloMo is the next major step forward in a staged approach to a total penetration of the ocean crust in the Pacific. It will demonstrate that deep drilling in the lower ocean crust can be done successfully, and provide critical experience for engineering the total penetration of the ocean crust. SloMo if successful will not only be a major scientific success, but will provide the foundation for completing Project Mohole the ambitious attempt to drill through the Earth's crust through the Mohorovicic discontinuity first proposed by the American Miscellaneous Society some 60 years ago that fell far short of its objectives, but laid the foundation for scientific ocean drilling.



Anne Egger

Anne Egger '95 (annegger@Geology.cwu.edu) reports: I'm finishing my third year as an assistant professor at Central Washington University, where I have a joint appointment in Geological Sciences and Science Education. My move to Washington came after almost ten years at Stanford University, where I did my graduate work and also worked for seven years as the undergraduate program coordinator for the School of Earth Sciences. My current joint appointment reflects my research and teaching interests. In the geology department, I primarily teach structural geology and field courses and advise grad students. I have ongoing research in the northwestern Basin and Range mapping active faults that influence geothermal systems – that work has taken me from my roots in field mapping to geophysics, including using unmanned aerial systems to map magnetic anomalies (see the blog of that project here <http://www.usgs.gov/blogs/surprisevalley/2012/09/01/introduction-mapping-underground-faults-and-fractures-in-surprise-valley/>).

In Science Education, I teach courses for students majoring

in middle- and secondary-level science teaching, and try to incorporate more Earth science into their already packed curricula. I have ongoing work in development of materials for teaching geoscience, and am currently a co-PI on NSF's STEP Center for the geosciences, called InTeGrate (<http://serc.carleton.edu/intergrate>). InTeGrate supports integrated interdisciplinary learning about resource and environmental issues across the undergraduate curriculum to create a sustainable and just civilization. We call it a "save the world" project – it's meant to be transformative, and transformation necessarily involves an entire community, so please take a look and see how you can get involved.



Marta & Ian at Fox Glacier, Westland, New Zealand, January 2013.

Ian S. Evans G '66 (i.s.evans@durham.ac.uk), "Whatever Happened to Ian and Marta Evans?" Ian writes: Every time I read a Yale GG Newsletter, with welcome news of old friends and an update on developments in the Department, I resolve to report on our news. On the other hand, we have been at Durham University since 1970, so it is not difficult for anyone who wants to, to catch up with us! Anyway, here goes. I studied geomorphology and glacial geology from 1964 with Dick Flint and Linc Washburn, taking courses also from John

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Rodgers, Dick Sheldon and Chester Bliss (Statistics for Biologists). Marta (Luklinska) and I met only after her High Pressure group moved into Kline Geology Lab in 1965. We married in New Haven on leaving Yale with Master's degrees in 1966 and honeymooned on the 'Queen Mary', from New York to Southampton. Sea transport was necessary for our luggage of 7 trunks (a couple donated by Linc Washburn), largely containing many duplicates discarded in the merger of the Geology, Mineralogy and Peabody Libraries. The trunks were driven in a U-haul trailer to Pier 92 by my roommate Radomir Petrovic G '71, on the wettest day for years.

At Cambridge, Marta gained a PhD in radiochemistry, and I eventually (1974) obtained a Geography PhD, but only after two years as a Research Fellow in the Experimental Cartography Unit in Oxford and several years lecturing in Durham. I lectured on geomorphology, data analysis and various other aspects of geography from 1970 until my retirement in 2008, since when I continue to write, and to review about 16 papers a year (for 43 different journals so far – from Geology to GIS!). In 1965 and 1966 I drove west and started work on the glaciation of the southern Coast Mountains of British Columbia, which keep calling me back – for 13 summers so far and a long sabbatical at UBC in 1980. Publications have focussed especially on cirque morphometry, glacier distribution and the analysis of Digital Elevation Models by general geomorphometry. Notable contributions concern the asymmetry of local glaciation, the allometric development and

scale-specificity of landforms, and the use of derivatives of the land surface.

Retirement brought Honorary Memberships of the Japanese Geomorphological Union and the Quaternary Research Association. I have collaborated with geomorphologists in Romania, Slovakia and the Czech Republic, and in 2012 was made a Doctor Honoris Causa of the University of Suceava (Romania). This year I received a handsome Silver Medal from the University of Isfahan, and a Life Achievement Award from the International Society for Geomorphometry. I am a former Chair of the latter, and of the BGRG (now the British Society for Geomorphology).

Moving to Durham reduced Marta's opportunities and she moved into Biochemistry and Molecular Biology of plants. Her 30 years as a post-doc is a Durham record. Marta has 55 publications, and two patents that have yet to produce financial reward. Life as British academics has been interesting and intellectually if not financially, rewarding. We are a long way from the Yale alumni action in London, but are active in Trevelyan College (Durham) and the northeast branch of St Catharine's (Cambridge) alumni.

We were saddened to hear of the death of Karl Turekian, who (with mutual surprise) recognized Marta when they met on the streets of Paris in 1969. We are still in touch with Ian's room-mates at HGS: Radomir Petrovic (of Bartlesville, Oklahoma) and Larry Rychener G'66 (of Prunedale, Salinas, California) – both of whom had careers in the oil industry. Fortunately enjoying good health, Marta and I still enjoy mountain walking

and travel widely, trying to fill in gaps in our acquaintance with the World – most recently in New Zealand, China and the Alps, and earlier in Patagonia, Peru, Nepal, Spitsbergen, California and Ukraine. If I mention my acquaintance with Afghanistan to Americans, I hasten to add that it was in 1963 – for my Bachelor's dissertation.



George Devries Klein

George Devries Klein G '60

(gkkgeo@earthlink.net), retired to Guam in April, 2014. George writes: After a 54-year postdoctoral career in geology, I decided to retire (I turned 81 in January). My wife and I sold our house in Mid-March. We moved to Guam within a month or less. Yes, you read that correctly – Guam.

Let me share the reasons. First, as we are getting older the question came who could help look after us if necessary? My two sons from an earlier marriage are either out of the country or on the road anywhere from 70 to 90% of the time.

However, Suyon (my wife) has lots of family and relatives in Korea and they are all willing to help us if needed (They are already planning to visit us in Guam). When we went to Korea in 1995 after our remarriage to meet her family, the buffet lunch where I was introduced had 200 family members.

Guam is a three-to-four hour

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flight from Seoul, Korea, and is the westernmost outpost of the US Medical system. After a site visit last September, we made the decision to go. Medically, it is a bit difficult for civilian health care, but a new private hospital and medical center is being built and will open in five months. So, we remain optimistic about our future there.

In closing, naturally it is a hard to leave geology, the Houston geological community, the Houston area, and the US Mainland. In western parlance, I enjoyed the ride as a geologist and I feel blessed that you rode with me part or most the way. However, in life there is a time to come and a time to leave. My time to leave geology and the US mainland has come.



Deb Liptzin

Deb Liptzin '01 (dliptzin@yahoo.com) is entering her final year of pediatric pulmonology fellowship in Denver, Colorado. She is excited and fearful about finally searching for a “real” job!

Melissa Paly '82 and **MFS '87** (melissa@crosscurrentcommunications.com), runs CrossCurrent Communications (www.crosscurrentcommunications.com), a messaging, marketing, PR and media production company based in Portsmouth



Melissa Paly

NH. Melissa segued from a career in environmental management and hydrogeology at USEPA into environmental communications in early 1990s, and has been running her own business since 1993. Drawing on her environmental background and personal passions, many of the company's clients are non-profits, universities, agencies and businesses focused on issues related to energy, natural resource management and sustainability.

Melissa serves on the boards of the Kittery Land Trust, Maine Coast Heritage Trust, Maine Island Trail Association, and the Yale School of Forestry Alumni Board. She lives in Kittery Point Maine and has three children, the oldest of whom attends Colby College where she's contemplating a double major in environmental science and geology. What could be better?

Donald Rhoads, Professor, Department of G&G 1965–1986. (drhoads@aol.com) writes: I taught Paleoecology, Sedimentology, Marine Ecology, and an undergraduate course on Long Island Sound. Those 21 years in academia were very rewarding. However, I had always wanted to work in the interface between academic and applied science. Our Yale laboratory had

developed a remote sensing imaging system (Remots) for rapid mapping of sediments, biology, and chemical gradients on the seafloor. There was (and is) a great demand for this cost-effective technology in applied oceanography. Joseph Germano (PhD 83), Dr. Larry Boyer (a post-doc), and I started Marine Surveys, Inc. off campus to launch this new technology. This required that I take an early retirement



Donald and Christobel Rhoads with their 1952 Mercedes 300.

from Yale to spend full time on this new enterprise. In 1986, Science Applications International SAI (now SAIC) acquired our company and I moved to Woods Hole MA to open another SAI office.

The post Yale days have been equally exciting and rewarding. As Senior Scientist at SAIC, I continued my geological-biological research and received the first SAIC Excellence in Science and Technology Award in 1994 for “creating the multidisciplinary field of organism-sediment-fluid interactions”. Remots technology was a finalist in the 1995 Computerworld Smithsonian Award competition; one of 50 world finalists in a field of 450 nominations. I also obtained SAIC R & D funds to build a multispectral REMOTS system for in situ false color digital imaging of sediment chemistry.

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I obtained a patent for this technology in 1994. SAIC also funded my bioengineering project to develop an in situ Hall effect sensor for predicting future bottom water hypoxia by remotely measuring vertical migrations of magnetotactic bacteria in organically enriched sediments. This work was done with Dr. Sandor Mulsow of Boston University. We received a patent in 1993.

I was appointed Adjunct Professor of Geology at Boston Univ. while at SAIC and taught a summer course for several years at the Marine Biological Laboratory in Woods Hole. During my 16-year tenure at SAIC I did international projects in Canada, Ireland, France, Italy, Hong Kong, and Taiwan. Anticipating retirement (again) in 2000 I was honored by an international symposium in 1998 at the Belle Baruch Institute resulting in a "Festschrift". I still live in Falmouth MA with Christy (a surrogate mother to many G&G Yale graduate students). I enjoy working on my classic car collection.

Floyd F Sabins G '55, (ffsabins@roadrunner.com) writes: After leaving Yale I spent 37 years at Chevron's geologic research facility where I introduced remote sensing and digital image processing for oil and mineral exploration. Upon retirement I continued remote sensing research and exploration with my company, Remote Sensing Enterprises, Inc. (RSE). Beginning in 2010 the U. S. Department of Defense tasked RSE to identify mineral exploration targets in Afghanistan. We digitally processed and visually interpreted images acquired by

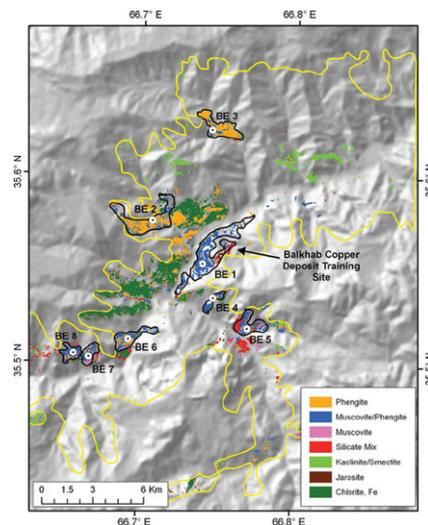


Figure 1 is a sample interpretation/target map derived from HyMap hyperspectral images of the Balkhab copper prospect and surrounding terrane in north-central Afghanistan. The deposit is hosted in volcanigenic massive sulfide rocks exposed in the gorge of the northeast-flowing Balkhab River. The digital data for 124 spectral bands were acquired by a NASA aircraft and provided courtesy of the U. S. Geological Survey Spectroscopy Laboratory. We used the known Balkhab copper prospect as a "training site" (BE 1) to define spectral signatures of the copper-bearing host rocks which are characterized the alteration minerals phengite and muscovite/phengite. We then identified 7 other outcrops with similar signatures and labeled them as Exploration Targets BE 2 to BE 8.

an array of satellite and airborne systems (Landsat TM, ASTER, Shuttle Radar Topographic Mission, HyMap Hyperspectral Scanner, WorldView 2). The systems and digital processing methods are described in my book, "Remote Sensing - Principles and Interpretation" 3rd Edition. Our 18 DoD Reports cover 21 sites and define several hundred exploration targets for gold, copper, chromite, lithium, and coal. The targets are shown on detailed maps with charts that list lat/long coordinates and brief descriptions. Afghanistan is known for its mineral potential that is largely undeveloped due to accessibility and terrorist activity. The arid climate and well-exposed bedrock are ideal for remote sensing, which avoids

the terrorist hazards to traditional field surveys.

The plan is for the U. S. Geological Survey to include the 18 RSE reports in a data package for the Afghan Geological Survey which will make the data available to the exploration community. The objective is to provide an inventory of exploration targets for follow-on evaluation. Because of uncertain conditions in Afghanistan we do not know when the data package will be available."

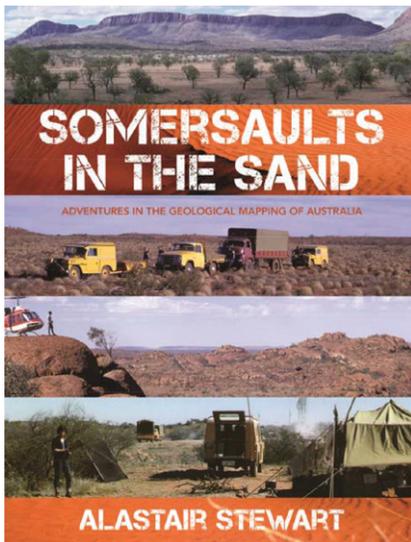


Jill Schneiderman at the famous geological unconformity at Siccar Point, Scotland.

Jill Schneiderman '81 (jill.schneiderman@gmail.com) write: I led a study trip for Vassar students for two weeks during spring break to Israel and the West Bank. We focussed on the Jordan River watershed and shared resources. The geology of the region was spectacular and I am hoping it might cultivate some new majors for our geology department at Vassar.

Alistair Stewart G '70 (astewart@pcug.org.au), reports: I left Yale in October 1970, returned to Australia, and rejoined the Bureau of Mineral Resources, which is equivalent to the USGS and now called Geoscience Australia. There I did regional geological mapping and structural geology in Proterozoic and Archean rocks of the outback until retiring in November 1999. The total area I mapped is about the size of South Carolina. After that I continued at GA on contract until mid-2013,

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initially as part of the group that compiled a new Geological Map of Australia in digital form, and then compiled a Provinces Database, being the outlines of Australia's 180 hard-rock provinces and basins showing their extent under cover (from aeromagnetism) and a summary of their geological data. In 2006 I began writing my geological memoirs, *Somersaults in the Sand: Adventures in the Geological Mapping of Australia*, which recounts the many curious, fascinating, sometimes dangerous, and occasionally tragic incidents that happened during those years of field work, including a one-sided grizzly encounter in Idaho in my summer's field work in 1966. The book is due for release in June 2014, and can be ordered through my website www.somersaultsinthesand.com.

John VandenBrooks G '07 (jvandenbrooks@midwestern.edu) writes: This January I started as a tenure-track Assistant Professor in Physiology at Midwestern University in Glendale, Arizona to help establish a brand new Veterinary School. After

finishing my PhD with Bob Berner and Elisabeth Vrba, I did a postdoc at Arizona State University and so my wife, Mandy, and I are happy to be able to stay in Arizona. For those of you who may remember them as small children, my son Ian turns 13 this summer and AJ is 9. I'm glad to say they were able to survive their years growing up in the Geology Department unscathed and both of them are doing well and continuing "The Experience" tradition by playing baseball, football, and basketball. We were saddened to hear of the passing of Dolf, Karl, and Leo. They were part of a great tradition and will be greatly missed.



Imaging amber fossils at Argonne National Labs.

I'm spending most of my research time still examining the effects of oxygen-levels on animal development and evolution. This has included exposing insects to hyperoxia leading to the development of larger than normal dragonflies and beetles, as well as working on creating cyborg insects. We have also been looking at the fossil record during times of varying atmospheric oxygen levels and utilizing the x-ray synchrotron at Argonne National labs to image insects preserved in fossilized amber to visualize their internal respiratory system as possible proxy for paleo-oxygen levels. Overall, things are good and I've been glad to be able to stay in touch with many of my co-conspirators from my years in KGL and I hope to see many of you in the future!



John Vidale

John Vidale '81 (seismoguy@mac.com), writes: I remain gainfully employed with the University of Washington, where I've been for nearly a decade after a decade at UCLA. Here, I watch the earthquakes and volcanoes in the Pacific Northwest, and research great earthquakes, slow earthquakes, and how to warn the public of incoming strong earthquake shaking.



Chelsea Willett hiking in Franconia Notch, New Hampshire.

Chelsea Willett '11 (chelsea.d.willett@gmail.com) writes: After working at an environmental consulting firm in Boston for three years, I'll be moving to California to start my graduate studies with Dr. David Shuster at UC Berkeley this fall. Over the summer, I'll be traveling to Asheville, NC with friends, and to Croatia with family. Before leaving New England, I was sure to get in some good hikes, including Franconia Notch in the White Mountains, NH. I hope to see many Yale folks at AGU this December!

Look for us at the annual meetings of AGU and GSA:

GSA

Yale/Harvard Joint Alumni Reception

Monday, October 20, 2014
 7:00 - 9:30 pm
 Fairmont Hotel Vancouver
 900 West Georgia Street
 Vancouver, British Columbia, Canada

AGU

Yale University Reception

Tuesday, December 16, 2014
 7:00 - 11:00 pm
 Jillians (at the Metreon)
 175 Fourth Street
 San Francisco, CA
<http://www.jillianssf.com/>



Alumni Please Note:
 We would especially like to hear from you. Please send your news to rebecca.pocock@yale.edu.

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