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GSA Medals & Awards

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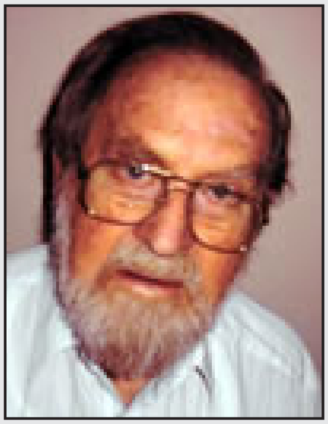
of the

Geological Society of America

5 November 2012
Charlotte, North Carolina, USA

RIP RAPP ARCHAEOLOGICAL GEOLOGY AWARD

Presented to
John W. Weymouth



John W. Weymouth
Professor Emeritus, University of Nebraska

Citation by Mark Lynott and Rinita Dalan

The 2012 recipient of the Rip Rapp Award in archaeological geology is John Weymouth. John completed his Ph.D. in Physics at the University of California-Berkeley in 1951. Throughout the 1960's, he explored the application of x-ray diffraction to archaeological ceramics. In the 1970s he shifted his research to the application of geophysical sensing techniques in archaeology. At that time, John was part of a small number of international scientists with training in physics that were working to develop instruments and methods that would help archaeologists locate subsurface features at archaeological sites.

John's pioneering work, to use magnetometers as a survey tool for subsurface mapping of archaeological features, was conducted throughout the United States and Europe and demonstrated the essential need for geophysical surveys in advance of archaeological excavations. His most notable early contributions were magnetometer survey at Sakakawea Village at Knife River Indian Villages in North Dakota, and Walth Bay site at Oahe Reservoir near Mobridge, South Dakota. These important studies introduced North American archaeologists to the potential of geophysics for improving archaeological research.

Much of John Weymouth's work has been in assistance to the National Park Service. He has conducted geophysical investigations on more than a dozen units of the National Park Service ranging from Fort Clatsop and Chaco Canyon to Abraham Lincoln's Home and Hopewell Culture National Historical Park. His research has included work at important sites on St. Catherine's Island, in South Carolina, Cahokia and Fort des Chartes in Illinois, Spiro, Deer Creek and Edwards in Oklahoma, and the Cowen site in Iowa. Dr. Weymouth has done important work on historic sites ranging from Fort William in North Dakota, Fort Atkinson in Nebraska, to Fort Davidson in Missouri and Fort Larned in Kansas. He has worked on historic Indian village sites, pioneer farmsteads, and the Rock Creek Station on the Oregon Trail. Although Dr. Weymouth began his research with a focus on magnetic surveys, he has also incorporated resistivity and ground penetrating radar into his arsenal of skills and continually refined these techniques, pioneering their use in wide range of prehistoric and historic contexts in North America, Europe and Japan.

Dr. Weymouth's most recent work has been the mapping of a major Ohio Hopewell earthwork with a cesium gradiometer. His work has demonstrated the importance of geophysics for re-mapping and relocating prehistoric earthwork sites that have been severely degraded by two centuries of agriculture. Dr. Weymouth's work has inspired the efforts of younger scholars to learn about the use of geophysics in archaeology and his efforts have transformed geophysical prospection in North America from a type of special analysis to an invaluable and standard component of contemporary archaeology. He has consulted with countless archaeologists and repeatedly demonstrated the important role of geophysical prospection in archaeological research.

In sum, Dr. Weymouth's ground-breaking work paved the road for geophysical applications in archaeology. His meticulous and prolific studies demonstrated the usefulness of these techniques for a wide range of prehistoric and historic sites and inspired others to follow in his wake. He served as a bridge between the geophysical community and archaeologists, establishing and encouraging connections with archaeological practitioners on a national, but also on an international, level. He served as both teacher and scholar in developing geophysical techniques for archaeological application, working closely with National Park Service staff, mentoring students at University of Nebraska-Lincoln and elsewhere, and collaborating with many archaeologists and geophysists. He taught archaeologically-oriented geophysical classes at UNL, participated in numerous archaeological field schools, and was also an instructor for annual National Park Service training courses in remote sensing; in all these ventures retaining a firm commitment to technical precision and expertise. He presented his findings at archaeological, geological, and geophysical conferences and through publications and technical reports produced an unparalleled body of work spanning four decades that researchers continue to learn from.

Response By John W. Weymouth

Being honored with the Rip Rapp Award by the GSA is like being given the cherry on top of the confection since I have so thoroughly enjoyed working with archaeologists on interesting sites. Back in the early 70's I was contentedly teaching Physics and doing research in materials science when archaeologists of my acquaintance at the University of Nebraska challenged me with some science problems in their discipline. Out of my reading, talking and thinking on these problems I developed a seminar course in "Science in Archaeology". With such a broad title we could study a wide range of applications. I did some research in x-ray diffraction of ceramics but it became clear that there was a need to develop tools and field expertise in evaluating sites being considered for excavation. The literature showed me that magnetic surveying of sites had been pioneered in Europe and should be able to be used in this country. There followed years of development of instruments and field work at various sites in this country and in Japan and Greece. Working with a wide variety of archaeologists and students has been very satisfying. It is especially gratifying that one of my PhD students is now a professor of Physics teaching and working in magnetic prospection in Greece on Crete.

I wish, particularly, to thank Drs. Rolf Mandel, Mark Lynott, Rinita Dalan and George Rapp for their input to this award and to thank in general the many others with whom I have had the privilege to work and agonize over data and equipment breakdowns. The award helps to emphasize the importance of applying geophysical methods to investigation of sites and to encouraging the wider use of such methods to extend sound site evaluation.

Thanks again to George Rapp for creating this award to encourage interdisciplinary efforts across the barriers that sometimes seem to isolate areas of research.

GILBERT H. CADY AWARD

Presented to
Leslie "Jingle" Ruppert

Leslie "Jingle" Ruppert
U.S. Geological Survey, Reston, VA

Citation by James C. Hower

Leslie "Jingle" Ruppert was born on 14 June 1953 in Washington, DC. Through her +30-year career at the U.S. Geological Survey, she has distinguished herself through her work in coal geochemistry and mineralogy, coal geology, coal resource evaluation, and coalbed methane.

Jingle got her BS and MS degrees from George Washington University in 1979 and 1987, respectively. Upon joining the U.S Geological Survey in August 1980, she worked closely with Ron Stanton and Blaine Cecil, among others, in studies of the Upper Freeport coal in western Pennsylvania. The series of papers in the *Journal of Sedimentary Petrology, International Journal of Coal Geology*, and *Energy & Fuels* provided a basis for such fundamental studies of a coal resource. Later studies dealt with aspects of the mineralogy and geochemistry of low-rank coals in the US Gulf Coast, Wyoming, and Kosovo and of peats in Kalamantan, Indonesia. The latter investigation also dealt with the differentiation of volcanic ash-fall and water-borne detrital minerals. She has studied As- and Pb-bearing pyrite and lanthanide-bearing phosphates from the Fire Clay coal bed, eastern Kentucky, and Ge- and B-rich coals from western Kentucky.

Jingle led the USGS's Northern and Central Appalachian Coal Regions Assessment Team, part of the overall effort to characterize both the quantity and quality of U.S. coal resources. The coal characterization efforts fully integrated knowledge of mined-out areas and coal quality issues in a comprehensive analysis of the resources. These innovative studies were published as USGS Professional Papers and were summarized in a 2002 paper in *International Journal of Coal Geology*.

Through her career, she has been a valued colleague to people both in and out of the USGS. Perhaps nowhere is this collaboration more evident than in Kentucky where she has a long history of cooperation in coal assessment and quality studies with the Kentucky Geological Survey and the Center for Applied Energy Research and in West Virginia where she has worked closely with the state geological survey on coal assessment and coalbed methane projects. With respect to coalbed methane and gas shale, she is collaborating with physicists from CSIRO, Australia, in the use of the Extended Q-Range Small-Angle Neutron Scattering Diffractometer (EQ-SANS) instrument at Oak Ridge National Lab (ORNL) to examine how pores in gas shales are connected. Jingle is also using the Ultra Small Angle Neutron Scattering (USANS) instrument at the National Institute of Standards and Technology (NIST) to identify the amount of internal volume of the shale that is accessible to methane.

Most recently, she compiled coal rank data from throughout the Appalachians from varied sources and, working with regional experts, developed Pennsylvanian thermal maturation maps to complement thermal maturation maps of Ordovician and Devonian strata. This effort is part of a larger study of the framework geology of fossil-fuel bearing strata in the Appalachians. She has also conducted studies of the fate of trace elements in coal combustion, including the use of mercury isotopes as a tracer of the origin of this environmentally-sensitive element in fuels and its ultimate destination in the environment. Other coal combustion studies include examination of trace elements in fly ash from the co-combustion of coal and biomass.

Jingle has generously given her time to professional societies, serving in leadership positions in the GSA Coal Geology Division, The Society for Organic Petrology, the International Pittsburgh Coal Conference, and the Geological Society of Washington (DC). She is a member of the editorial board of the International Journal of Coal Geology.

Response by Leslie F. Ruppert

I would like to thank the Coal Geology Division of GSA for this award. It's an honor I never expected to receive, so I am surprised and deeply appreciative. I also thank Jim Hower, my colleague and often co-author, for nominating me to join the illustrious company of Gilbert H. Cady award recipients.

Unlike many of my colleagues, I stumbled into a career in geology. As a philosophy major, I needed six science credits. My future husband suggested I should choose either rocks or stars: I picked rocks. With great trepidation, I signed up for Introductory Geology with Geza Telecki at GWU, and my future career suddenly came into view. Later, Roy Lindholm opened my eyes and my imagination to sedimentary geology and I thank him to this day.

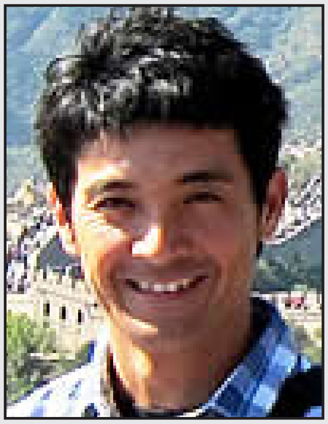
At USGS, I have benefitted from collaboration with many extraordinarily talented scientists, both inside and outside the Survey. In my first project, I was part of a team that included Blaine Cecil, Ron Stanton and Brenda Pierce. Later, I had the pleasure of working with Sue Tewalt (USGS) and State geological survey scientists on the Appalachian coal assessment.

There have been many memorable moments along the way, but in addition to those mentioned above, I've benefited from working with international colleagues. In 1989, my USGS colleague Tim Moore, moved to New Zealand. With the help of the early Internet, we completed a paper on Indonesian peats - online! No more "paper has not yet been received" excuses. The future of global collaboration had arrived.

Of the many people who helped me to become a better geologist, my greatest thanks goes to Ron Stanton, the 2002 posthumous recipient of this award. Ron guided my interests in sedimentary geology to focus on coal. He was tough but fair and his insatiable scientific curiosity set him apart as a mentor.

E.B. BURWELL, JR., AWARD

Presented to
Shinya Nakamura, Seiichi Gibo, Kazuhiko Egashira, and Sho Kimura



Shinya Nakamura
University of the Ryukyus
Okinawa, Japan

Citation by William H. Schulz

It is with great pleasure that we present the 2012 E.B. Burwell, Jr. Award to Shinya Nakamura, Seiichi Gibo, Kazuhiko Egashira, and Sho Kimura for *Platy layer silicate minerals for controlling residual strength in landslide soils of different origins and geology*.

Landslides are among the most hazardous of geological processes, annually causing thousands of casualties and billions of dollars in damages. Fortunately, many landslide hazards may be mitigated through engineering and construction or by temporal predictive models that forecast potentially hazardous landslide movement before it occurs. Development of proper and adequate mitigation strategies requires knowledge of landslide material shear strengths, and many landslides move far enough (generally tens of centimeters) that shear zones reach ultimate, or residual shear strength, or they move along previously sheared surfaces (e.g., sheared joints, fractures, bedding planes) that already had reached residual shear strength conditions. Measurement of residual strengths suitable for geotechnical assessments is difficult, expensive, and time consuming to perform, and results are often unclear and open to interpretation. For these reasons and more, geoscientists and engineers have long attempted to develop and refine relations between shear strength and various parameters that are much simpler to obtain, such as standard and cone penetration test results (i.e., SPT and CPT), Atterberg limits, and particle-size distributions. However, these relations provide large ranges of possible shear strengths so typically are not well-suited to landslide hazard mitigation.

Great minds in geotechnics, such as Terzaghi, Bishop, and Skempton, hypothesized that mineralogy largely controls residual shear strength. As described in this paper, Nakamura and colleagues measured residual strength of many landslide specimens using a torsional ring-shear apparatus, which provides the most accurate measures of residual strength. They also measured mineralogy of the specimens using X-ray diffraction and found that residual strength correlated well with the total content of layer silicate minerals prone to preferred orientations. The relations they developed provide excellent tools to accurately estimate residual strength from mineralogical composition, which is much simpler to obtain than direct measurements of shear strength. Hence, their paper significantly advances understanding of controls on shear-zone strength, and also advances the fields of soil mechanics and engineering geology, thereby perfectly meeting the intent of the E.B. Burwell, Jr. Award.

Response by Shinya Nakamura

Thank you, Bill, for your generous citation and nominating our paper for the 2012 E. B. Burwell, Jr. Award. It is a great honor for me and my co-authors to be the recipients of this award and we are grateful to the Environmental and Engineering Geology Division of the GSA for selecting the cited work that examines platy layer silicate mineral controls of residual shear strength of landslide soil. It is indeed a pleasant feeling to have contributed to the advancement of landslide science in general and have our work acknowledged for its merits. It is a moment of great joy for us to know that we share the same interests as far as Science is concerned, even though we are oceans apart.

Japan is a country that has learned to live with natural disasters. It is an inevitable way of life for us. We have certainly had our share of it over the years, which has caused great economic losses to the nation. Therefore, landslide science is greatly encouraged in Japan and, as a result, we have witnessed huge technological progress in landslide related research and industry. I embarked on landslide research when I was a graduate student, under the supervision of Professor Seiichi Gibo, who at that time, had established a landslide engineering laboratory at the University of the Ryukyus. I was fortunate to be associated with his work on shear strength of landslide soil. I developed a passion for this line of work and chose it as my career. Having been exposed to an array of previous literature by eminent researchers on the relations between shear strength and various parameters of soil, while working on my PhD, I was quite intrigued by the dearth of information about common parameters that could be applied to a wide range of landslide soils as an indicator of residual shear strength. It was at that time when I began to wonder if the layer silicate minerals could be a possible candidate for that purpose. We believe that platy layer silicate minerals hold the key to understanding the slide mechanisms of largely displaced landslides as well as slides involving pre-sheared surfaces that have reached residual conditions. Mineralogical analyses are quicker, compared to the extensive time involved in the measurement of actual residual shear strength in the laboratory. Well developed correlations between the platy layer silicate mineral content and residual shear strength, thus, would provide landslide engineers with quick, accurate data, thereby saving a great deal of resources.

Thanks once again to the GSA for this prestigious award. We are most humbled by the generosity that has been accorded to us. Receiving this award has encouraged us to continue researching in the fascinating world of landslide science to see what newer things we could find and share with you all.

CONTRIBUTIONS TO GEOINFORMATICS AWARD

Presented to
Linda C. Gundersen

Linda C. Gundersen
USGS, Reston

Citation By Kerstin A. Lehnert

I am honored to present the first Geoinformatics Division award for Outstanding Contributions in Geoinformatics to Linda C. Gundersen. In a career with the U.S. Geological Survey spanning 33 years, she has made numerous scientific contributions and served for 10 years as the Chief Scientist for Geology. The first half of her career focused on research in geochemistry and environmental geology including assessing the radon potential of the United States. The second half of her career is where geoinformatics comes in, when she became a manager and could influence the way data and information were managed and made accessible.

Linda's passion for geoinformatics began with data preservation. In 1996, as the USGS Minerals program manager, she made data preservation and integration of spatial data a priority, leading to the ability to do more integrated resource assessments and making large volumes of data publically available. In 2001 she supported the National Academy study *Geoscience Data and Collections*, which she promptly implemented, establishing a $1M Data Preservation Program at the USGS, partnered with the State Geological Surveys, that has brought millions of data and materials off the shelves and online.

As Chief Scientist for Geology in 2001, Linda worked with Hermann Zimmerman and Walt Snyder exploring ways USGS and NSF could partner on the emerging field of geoinformatics. She started attending and eventually co-hosting and co-organizing many USGS-NSF workshops as well as conferences and symposium at GSA and AGU devoted to geoinformatics. Her enthusiasm, support, and encouragement brought many in the geoscience community to become actively involved in geoinformatics.

I first met Linda when she served on the advisory board for EarthChem . When someone brings a good idea to Linda she tries to get it done. We told her how much we wanted USGS geochemistry in EarthChem and 6 months later the chemistry for over 400,000 USGS samples was entered into EarthChem!

Linda agreed in 2006 to help start the GSA Geoinformatics Division with Krishna Sinha and Randy Keller. To support the Division, and bolster the geoscience community's interest and knowledge in geoinformatics, she co-hosted three Geoinformatics Conferences held in 2006, 2007, and 2008. The conferences were designed to create a community of practice and provide a forum for scientists from industry, government, and academia to share their geoinformatics research. Funds from the conferences were used to support the GSA Geoinformatics Division.

Linda has worked on numerous national geoinformatics efforts. In 2007, she started the NSF and USGS funded USGIN (http://usgin.org/content/about-usgin) with Lee Allison. In 2009, She established the USGS Community for Data Integration (https://my.usgs.gov/confluence/display/cdi/Home) with Kevin Gallagher. The CDI includes many hundreds of members from USGS and the informatics community, working together to develop a cyberinfrastructure for the USGS and informatics tools for everyone. In 2011, she co-supported and helped organize the GeoData 1 Workshop in Denver with NSF, Peter Fox, and others that focused on data lifecycle and informatics tools. The workshop results were used in the initial concepts for EarthCube (http://earthcube.ning.com/). Most recently, Linda worked with Kevin Gallagher and Tim Kileen to make USGS a formal partner with NSF on EarthCube.

Response by Linda C. Gundersen

Thank you to the Geoinformatics Division of GSA for this award. There are many scientists contributing to the success of geoinformatics who equally deserve this award and it has been my great pleasure and honor to work with them and with the ever growing geoinformatics community for the past 12 years. I am particularly indebted to David Arctur, Lee Allison, Bob Detrick, Kevin Gallagher, Art Goldstein, Peter Fox, Randy Keller, Kerstin Lehnert, Deborah McGuinness, Krishna Sinha, Walt Snyder and Herman Zimmerman for their leadership, pioneering efforts, and continuing work on behalf of geoinformatics and the building of a cyberinfrastructure for the geosciences. We have come a long way, however we still have a substantial journey ahead of us to realize the incredible potential of geoinformatics to transform the way we do science. I strongly believe that the next generation of geoscientists won't hesitate for a second to incorporate informatics as an integral part of their day-to-day research environment. Yet today we are still struggling. In my work and in my role as a manager at the U.S. Geological Survey, I have been blessed with the ability to influence policy and program direction to incorporate geoinformatics into strategic planning, and been able to see the data management lifecycle become an accepted concept, and increasingly an accepted practice in both government and academia. We need to strongly support it becoming the standard practice for all scientists to conscientiously plan, collect, manage, and preserve the data they collect while ensuring the long term integrity and accessibility of that information through publication and placement in a public repository. We also need to continue developing the standards, concepts, tools, and semantics that allow computers and each other to understand and creatively explore our science.

I ask each of you to reach out to someone new and ask them to join this community. I also ask each of you to give some time to this Division. The GSA Geoinformatics Division could be a wonderful supporter of important emerging efforts such as EarthCube (http://earthcube.ning.com/) and become a forum for supporting advances in informatics tools and standards needed for the geosciences. We are in a powerful moment of transition to a future when we can truly have the earth at our fingertips. It is critical for us to sustain and increase our momentum, invest in geoinformatics education, incorporate it into our curriculum, urge and support students to enter the field, and work together to build a communal infrastructure that lets the power of our data shine and light the way for generations of geoscientists to come.

GEORGE P. WOOLLARD AWARD

Presented to
Robert B. Smith

Robert B. Smith
University of Utah

Citation by G. Randy Keller

It is a distinct honor and pleasure to give the citation for the presentation of the George P. Woollard Award to Professor Robert B. Smith of the University of Utah. I have known him for 40 years and have followed his research activities for many years because he is always pursuing something that is innovative, interesting, and involves employing geophysical techniques to address geological problems. Through his scholarly activities, he has long been a highly respected researcher, teacher, mentor, and member of the scientific community.

Bob's research career began when he was fresh out of high school and worked as a science technician in Yellowstone in 1956 and was sparked to go into geophysics by experiencing the 1959 M7.5 Hebgen Lake earthquake. He has conducted seismic and geophysical research globally, first serving as the U.S. Exchange Scientist with the British Antarctic Survey followed by conducting geophysical surveys throughout Europe, a career of collaborative university teaching and research focusing on studies of geophysics and geology of active extensional tectonic regimes, geodynamics of the Yellowstone hotspot and advocating integrated research on earthquake and volcano hazards for the emergency management agencies and the public on the Yellowstone-Wasatch-Teton area. Bob has always advocated and practiced collaborative and integrated research in geophysics and geology as the best means to solve earth's complex geologic puzzles.

Bob has conducted research on Yellowstone earthquakes and volcanoes since 1956 and is considered a leading expert on Yellowstone earthquakes, deformation and tectonics. Bob serves as the Principal Investigator and Director of the Yellowstone Seismograph and GPS Network and as the Coordinating Scientist of the Yellowstone Volcano Observatory. He provided the guidance and incentive of instrumenting Yellowstone with modern seismic and GPS instruments beginning in 1987 and planning and permitting the Yellowstone seismic and PBO magmatic GPS network.

Bob taught 44 years at the University of Utah, Department of Geology and Gseophysics and Computer Science, including teaching more than 50 undergraduate and graduate courses in geophysics, geology and computer science. He has also advised 68 graduate students.

Bob directed the University of Utah Seismograph network bringing the initial use of digital recording and data processing and then densifying and expanding the seismic network throughout the Wasatch Front and Yellowstone. He first recognized and named the Intermountain Seismic Belt as the coherent zone of earthquakes bounding the active Basin-Range to the west and the relatively stable Rocky Mountains and Colorado Plateau on the east. Moreover he produced the first earthquake catalogs of the Intermountain Region and conducted one of the earliest studies of focal mechanisms in the Basin-Range that demonstrated the dominant E-W extensional in this intraplate tectonic regime. He led the first effort to employ GPS to evaluate the contemporary deformation regime of the Wasatch fault and Yellowstone. These efforts demonstrate his philosophy of the integration of seismic and GPS data with geologic information to more fully and quantitatively understand the contemporary nature of active tectonism in intraplate settings.

Bob was a leader in the formation of the Incorporated Research Institutions in Seismology (IRIS), UNAVCO, and EarthScope further demonstrating his broad integrative interests in employing modern seismic and GPS methods for understanding lithospheric structure and evolution as well as active earthquake and volcano systems. This further demonstrates his commitment to collaborative collegial research between various earth science international disciplines.

In addition, Bob has served on multiple national science panels such as at the founding of the Southern California Earthquake Advisory Committee, and served on such national advisory functions as the Yucca Mountain seismic safety panel, seismic safety panels on the Idaho National Laboratory, the USGS Seismic Earthquake Studies Panel, and multiple NSF earth science advisory committees. He frequently is invited to provide his views on the development of earth science and general science before Congress for the coalition on National Science Funding.

Importantly Bob has developed strong collaborative ties with international institutions such as serving as a Visiting Professor in multiple terms at the Swiss Federal Institute of Technology and at Cambridge University and as the President of the Seismology Section of the American Geophysical Union where he promoted international cooperation in geoscience.

Several universities and societies have honored Bob, most recently in 2011 by receiving U.S. Department of Interior's and USGS highest award, the prestigious John Wesley Powell Award and Medal.

He publishes regularly in our leading international journals, including highly cited papers in GEOLOGY, GSA Today, the GSA Bulletin, and a GSA Memoir. His publications include important contributions in several areas that have been the focus of his research for a number of years. Specifically, I see most of his contributions as falling into four main areas: 1) seismic studies of the structure of the lithosphere using the integration of a broad range of geological and geophysical data; 2) developing new applications and techniques for the processing, analysis and applications of a broad range of seismic and GPS data; 3) integrated studies of earthquake and volcanic hazards, and 4) studies of earthquake phenomena and contemporary deformation with GPS data. Based on this foundation, he has been consistently innovative technically, thorough, and opportunistic in his research activities.

Bob was a consultant and was featured as the geophysicist in the BBC production "Supervolcano", and has been a participant in many other Yellowstone documentaries. The most recent was the 2012 Nova documentary, "World's Deadliest Volcanoes."

In summary, I have been active in GSA's Geophysics Division for many years, and I honestly cannot think of anyone who is more deserving of this award. During his time in the Air Force, he even worked personally with Professor Woollard calibrating gravity meters, establishing the North American gravity base station network, and interpreting gravity data for this region. Thus, what could be more fitting than Prof. Robert B. Smith receiving this prestigious award named for Professor Woollard.

Response by Robert B. Smith

Thank you Randy and to Larry Braile for the thoughtful remarks in my citation. They are sincerely appreciated.

First, I am grateful to the GSA Geophysics Division for the George P. Woollard Award. It means a great deal to me to be honored for my career in geophysics and geology especially for my productive association with many colleagues of the Society. The award is also special as I have been a GSA member for 50 years, a period in which I was able to investigate timely geologic problems with geophysics such as understanding the role of earthquakes and volcanoes in Yellowstone, hotspots and plumes, lithospheric tectonic processes, especially in the Interior West. Also I am fortunate to be amongst the previous honored recipients of the Woollard Award as I have known and worked with most of them, including Randy Keller, and the first Woollard Award recipient, George Thompson have been close colleagues throughout my career.

The George P. Woollard Award is also special to me because I had the opportunity to work personally with Dr. Woollard at the University of Wisconsin in the early 60s where I was working in the Air Force in developing global gravity surveys.

It was with Dr. Woollard's encouragement that I became involved in Antarctic research and exploration where I later served as the U.S. Exchange Scientist to the British Antarctic Survey in 1962-63 under Secretary Dean Rusk. This expedition was an extraordinary adventure for me, first to survive and secondly to conduct geophysical surveys in very remote places never before explored.

As Randy mentioned, my early career was shaped by experiencing first-hand the deadly M7.3 1959 Hebgen Lake Montana earthquake. Honestly it was this geologic event that turned me toward a career in earth science for which I have been richly rewarded.

Throughout my career I have endeavored to integrate geophysics and geology in basic earth science problems. This was accomplished through collaborative efforts of my many students, Post Docs and colleagues to whom I owe a great debt of gratitude. There are too many to name them all, but some include: Ralph Archuleta, Harley Benz, Larry Braile, Ron Bruhn, Bob Christiansen, Wu-Lung Chang, Diane Dozer, Jamie Farrell, Thomas Hanks, David Hill, Gene Humphreys, Stephan Husen, James Jackson, Michael Jordan, Tom Jordan, Randy Keller, Geoff King, Edi Kissling, Emile Klingele, Tony Lowry, Fred Massin, Chuck Meertens, Rick O'Connell, Tom Owens, Christine Puskas, Lee Siegel, Taka'aki Taira, Greg Waite and Colin Zelt.

With these colleagues my academic career spanned the globe. I appreciate the support I received at the Swiss Federal Institute of Technology where Stephan Muller encouraged me in our common interests of lithospheric seismic investigations. This led to the joint 1978-80 U.S., European Yellowstone-Snake River Plain crustal seismic experiments, a project that brought students and scientists from U.S. and European universities together forming lasting scientific collaborations.

Another important milestone of my career was when Larry Braile and I proposed to NSF to acquire portable seismographs for seismic sounding. However, NSF said it would be better for us to form a community group to develop a pool of shared instruments. This led to the formation of the PASSCAL IRIS facility that paralleled the formation of the Global Seismic Network for which we naturally joined together to form the very successful IRIS organization including now the USARRAY.

Then in the 80s came the development of space-based earth science by making contemporary crustal deformation measurements using GPS and InSAR. These tools have been applied very productively to understand active tectonics and volcanic processes of the U.S. Again as a science community of GPS users we went to NSF for support of a facility that established UNAVCO and the Plate Boundary Observatory where I served as an original member of the UNAVCO executive committee.

A memorable aspect in my career was a discussion with an NSF program director on forming an integrated earth science group working on active tectonics and continental evolution. In a presentation by Tom Jordan and I, we noted the unique property of North American geology, namely that it contained all of the elements of plate tectonics: subduction, transform faulting, extension and a hotspot. Moreover it was "accessible by land" and was a "natural geology laboratory". What we outlined was incorporated into the EarthScope program, an integrative geology and geophysics organization that provides a better understanding of the evolution and composition of the North America continent. I was honored to be the first chairperson of the EarthScope Science and Education Committee.

But we still wanted to know much more about earthquakes. Again I was privileged to work with scientists like K. Aki in participating with he and others to form the Southern California Earthquake Center and where I have worked closely for many years with Tom Jordan and Ralph Archuleta.

Throughout my endeavors, I particularly want to note that the career-long support by the University of Utah including my colleagues Frank Brown, Kip Solomon, Keith Koper, Relu Burlacu and Dave Drobeck has been greatly appreciative. I am very grateful to the university for encouragement of my academic efforts and providing resources for seeding my research ideas.

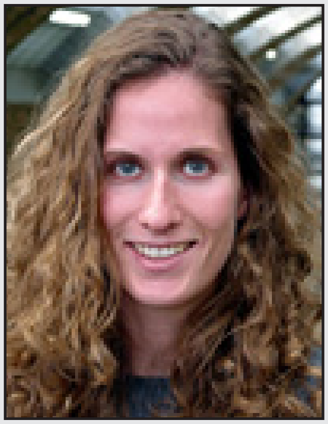
Finally, I sincerely thank my wife Jan and my family for their remarkable support and patience in accompanying me untirelously working around the globe. They have endured my lectures and learned quite a bit of earth science on the way.

And most importantly my career has been and continues to be FUN and exhilarating. I anticipate another 56 years of science and collaboration with you, my colleagues.

Thank you

BIGGS AWARD FOR EXCELLENCE IN EARTH SCIENCE TEACHING

Presented to
Kathleen D. Surpless



Kathleen D. Surpless
Trinity University in San Antonio

Citation By Diane R. Smith

I am pleased and privileged to be the citationist for the 2012 recipient of the Biggs Award for Excellence in Earth Science Education, my colleague Kathleen Surpless. Kathy received her Bachelor's degree from Amherst College and her Ph.D. from Stanford University. After finishing her Ph.D., she spent three years at Stanford as Lecturer and Undergraduate Program Coordinator, where she taught, advised, and developed research opportunities for undergraduates. Kathy was very effective in this position, especially in creating a culture of inclusion and community among the students. During her time at Stanford, the number of geosciences majors more than doubled. Kathy joined the faculty at Trinity University in 2004 as an assistant professor. Her experience and successes led my colleagues and me to believe that she had high potential to become an excellent teacher-scholar, potential that has been more than realized.

At Trinity, Kathy has taught a wide range of courses, ranging from freshman seminars and introductory geosciences courses, to mid- and upper-level courses in earth history, sedimentology, and stratigraphy, to a team-taught environmental studies summer field course in Colorado. At all levels, she employs inventive and effective teaching methods in the field, lab, and classroom. She has an uncanny ability to explain difficult concepts to a broad audience and engages her students with meaningful learning experiences. She challenges her students to learn and discover on their own, and builds their competence and confidence in doing science. A student in her sed/strat course said "this course taught me how to think like a geologist and talk like a sedimentologist." A participant in one of her field trips said that she "led each and every one of us to the "aha!" moment….no other field trip that I have been on drove the concepts home like this one did." Another student said that her "method of pushing students to discover for themselves is without a doubt the most effective teaching technique I have encountered." One of Kathy's research students said "it never ceased to amaze me the amount of responsibility she bestowed on us and the faith she put in our abilities."

In support of her research, Kathy has received funding from the Petroleum Research Fund and is the recipient of a prestigious NSF CAREER award. Kathy was awarded the 2009 Trinity University Junior Faculty Award for Distinguished Teaching and Research. Kathy views research as an integral part of an excellent undergraduate education. As an example, in her sed/strat course, students learn the material in the context of three class projects, which include collection of field and lab data, interpretation and analysis of the data, and presentation of both research papers and conference-style posters. In addition, Kathy has engaged 13 Trinity students with her research involving provenance studies of Cretaceous sedimentary rocks. Her students give presentations at GSA conferences and much of the work has been published in articles with the students as co-authors. All of Kathy's research students subsequently entered graduate school or have plans to do so in the near future.

Just like at Stanford, the number of geosciences majors at Trinity has more than doubled since Kathy joined our faculty. I call it the "Surpless Syndrome," which is a *good* thing to have! Kathy has played a critical role in getting our students excited about geology. She gets them started and keeps them engaged by teaching rigorous and challenging courses, providing research opportunities, and sharing sound advice about applying to graduate school and other post-graduation options.

Kathy, it has been a pleasure to observe you exceed the potential we saw in you eight years ago. Your achievements as a teacher-scholar are multiple, wide-ranging, and of the very highest quality. Congratulations on receiving this highly deserved award!

Response by Kathleen Degraaff Surpless

I am deeply honored to receive the Biggs Outstanding Educator Award. It seems extraordinary to be singled out for my teaching; I have always viewed my teaching as a collaborative effort in which I have depended heavily on my own teachers, mentors, colleagues, and, of course, my students. I certainly wouldn't be standing here without the help I've received from many, many others, and I'd like to acknowledge just a few of them today.

At Amherst College, I discovered geology late in my second year, and it was great teaching (including some truly excellent field experiences) that drew me in and kept me there. In fact, in the spirit of sharing and collaboration, I asked for and received Tekla Harms' Introductory Geology Final Project when I began teaching; I modified the project in a course I taught at Stanford, and we now use a version of it at Trinity. Tekla, Jack Cheney, and Peter Crowley modeled for me what I wanted to accomplish as a college professor – successfully weaving together teaching with research, and meaningfully involving undergraduate students in authentic, publishable research.

At Stanford, I was fortunate to be surrounded by fellow graduate students who shared my passion for teaching and were also eager to improve their abilities. Stanford's Center for Teaching and Learning and, in particular, Robyn Wright Dunbar helped make this happen for all of us. We learned pedagogy, developed our own courses, made the most of our TA opportunities and even designed courses to co-teach with Stanford faculty in the Stanford Continuing Studies Program – a true teaching apprenticeship. I was also lucky to have the support of Steve Graham, my thesis advisor, who continues to masterfully advise a large group of graduate students, and is another marvelous role model for me in my own mentoring of students and my development of my teaching and research at Trinity.

As I developed my courses, I relied heavily, as always, on others. I continue to scan the SERC webpage for new ideas and activities, I look back at ideas generated during *On The Cutting Edge* workshops I attended, I collect and aggregate notes, images, powerpoint slides, and lab and field activities from colleagues at Trinity and schools all over the country. I am grateful for all those informal discussions about teaching I've had with my Trinity colleagues, including and especially Diane Smith, as they have helped me work through a whole range of issues. I want to thank my husband Ben, a fellow Trinity Geoscience professor, who has been a phenomenal source of support, encouragement, and inspiration for me. And finally, I am grateful for the students I've been fortunate enough to teach – they have been and continue to be my collaborators as well, and they are better than anyone else at letting me know when things are going well and when they are not. So, thank you to my students, colleagues, advisors, mentors, and teachers for collaborating with me. Thank you for this wonderful recognition.

MARY C. RABBITT HISTORY AND PHILOSOPHY OF GEOLOGY AWARD

Presented to Gary D. Rosenberg

Gary D. Rosenberg
Indiana University-Purdue University (Iupui)

Citation by James C. Dawson

It is my great pleasure to present the 2012 Mary C. Rabbitt Award of

the Geological Society of America's History and Philosophy of Geology Division to Gary D. Rosenberg. I have known Gary for several years through our shared interests in the history and philosophy of geology and through the work of this Division. We connected quickly at one of these Division luncheons some years ago when we learned that we both did our higher education work at the same two universities at about the same time. However, we attended these institutions in reverse order with Gary earning his B.S. degree at the University of Wisconsin, Madison while I was at the University of California, Los Angeles (UCLA). Gary then went to UCLA for his Ph.D, while I went to the University of Wisconsin, Madison for my Ph.D. work. We did not meet until later and, we found that we had many friends and colleagues in common and that we had both been introduced to the history of geologic thought in Bob Dott's course at Wisconsin-Madison.

The Rabbitt Award is presented to an individual for exceptional scholarly contributions of fundamental importance to our understanding of the history of the geological sciences. Gary has exemplified these characteristics through his numerous publications on art and geology. His particular emphasis is on the Renaissance development of the anatomical analogies of landscape that facilitated the origin of the science of landscape. His unique approach to the integration of art history studies with the history and philosophy of the geological sciences was featured in a two-page article about Gary in the Chronicle of Higher Education, January 25, 2002 issue. Gary has been a regular presenter at our Division-sponsored sessions at GSA Annual Meetings and at the North Central Section Meetings since the late 1990's.

Perhaps the pinnacle of Gary's work was his organization of the Division's topical session at the 2006 GSA Annual Meeting in Philadelphia entitled 'From the Scientific Revolution to the Enlightenment: Emergence of Modern Geology and Evolutionary Thought from the 16th to the 18th Century'. Following this session Gary edited the presentations into GSA Memoir 203, an opus that has been well received by the international community as well as by the members of our Division. This volume is now a classic reference for those interested in pre-paradigm geology, its cultural context from the Renaissance through the Enlightenment, and its continued influence on modern geology.

As a Division committee member, it was my pleasure to work closely with Gary when he unexpectedly served as our Division Chair (2005), when a First Vice Chair decided not to advance to the chairship, and then continued on schedule as Division Chair (2006). As Chair, he was exceptionally energetic and well organized. As Chair, he worked with Vic Baker and others to lead the effort to add 'and Philosophy' to our Division name. Previously Gary had served the full range of Division Vice Chairships and committee positions. He is well known to us as one of our strongest supporters.

Gary is trained as a geologist and has published many papers on sea level change and growth periodicities in brachiopods and bivalve molluscs. He has also published on rhythmic dentinogenesis in rabbit and rat incisors. Indeed growth rhythms and periodicity have long fascinated Gary. Gary's post doctoral career has included work as a NATO Senior Fellow on growth rhythms and the history of the earth's rotation, work at the National Institutes of Health on the chronobiology of bone and teeth, a year as a geology faculty member at Michigan State University and finally, since 1979, a distinguished career in geology at Indiana University – Purdue University in Indianapolis.

Gary has recently retired to his home state of Wisconsin to continue his scholarly research and writing in the history and philosophy of geology and the Division Awards Committee believes that this is the time to honor Gary D. Rosenberg with the embossed certificate and the pewter Revere bowl that indicate that he is the 2012 Mary C. Rabbitt awardee. Congratulations, Gary.

Response by Gary D. Rosenberg

Thomas Kuhn wrote that young scientists or those new to a field are typically the ones who make the most significant contributions to it. In gratefully accepting this wonderful award, I note that I was neither in the '90's when I began to publish on the nexus of art history and history of geology. Apparently Kuhn did not consider that it takes some time for a fine wine to mature. I was grape juice nearly 50 years ago when I was an undergrad at the University of Wisconsin. Bob Dott's course on the history of geologic thought set me fermenting about Leonardo Da Vinci's role as founder of geology. I slowly aged into a full-bodied art historian though some might say that I'm just curmudgeon vinegar. I cannot deny it. I must admit some acidity was needed to etch through the steely barricades that some art historians erected against my assault on their territory.

It's the cultural context and historical changes in the conception of nature that have interested me. As Kuhn observed, changes in conception precipitate scientific revolutions. Just as rocks are texts from which we read Earth history, so art objects are texts from which we can read the cultural context in which scientific discoveries are made. In this case it's how the Renaissance revolution in the conception of spatial relationships pervaded Western culture and facilitated the science of landscape. I thank the writings of Samuel Edgerton for aiming me in the direction of this insight.

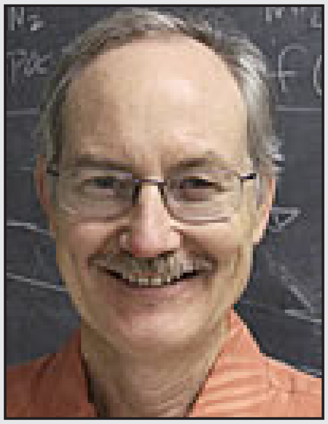
The theme of spatial relationships brings my interest in art history into a single focus with that of the geometry of metabolism and skeletal composition. Only recently did I realize I was trying to paint a picture of metabolic and compositional variations within organisms the way artists shade images of organisms they paint. As an early edition of Dott and Batten asserts, geology is the story of the chemical evolution of our planet. The geometry of life's physiology is integral to that story.

The revolution in conceptualization of spatial relationships not only gave birth to the evolutionary view of the structure of nature but also to scientists' place in the democratic social order. We as geologists have a special contribution to make in illuminating that perspective and I have only begun to call attention to our opportunity to do so.

In closing, I herewith toast those who have mentored my maturation. These include my "Steno friends," August Ziggelaar SJ, Troels Kardel, Jens Morten Hansen, Frank Sobiech, Elsebeth Thomsen, and Minik Rosing; members of the History and Philosophy of Geology Division GSA, Bill Brice, Sally Newcomb, Michele Aldrich, Ken Bork, Ken Aalto, Steve Rowland, and Vic Baker; my PhD advisor Clarence Hall and my late chairman at IUPUI, Arthur Mirsky. Special thanks to Jim Dawson who had the courage to nominate this curmudgeon for this auspicious award. The Mary C. Rabbitt Bequest facilitated my chairmanship in the History and Philosophy of Geology Division, GSA. I thank you all for celebrating an aging wine.

O.E. MEINZER AWARD

Presented to
David L. Parkhurst



David L. Parkhurst
U.S. Geological Survey, Denver

Citation By Pierre D. Glynn

I am honored to introduce David L. Parkhurst as the recipient of the 2012 O.E. Meinzer Award of the Hydrogeology Division of the Geological Society of America. This award is presented to David in recognition of his outstanding contributions to groundwater studies and geochemical modeling.

David's development and application of PHREEQE, NETPATH, PHREEQC, PHAST and related programs for geochemical modeling has changed the way that hydrologists and geochemists calculate, interpret, and predict geochemical reactions and subsurface reactive transport. David's mathematical, programming, and geochemical skills have produced software that is user-friendly, fast, robust, and widely accepted. As a result, geochemical calculations of exceptional theoretical and computational sophistication have now become standard techniques. In addition to his development of a wide diversity of geochemical codes, David Parkhurst has demonstrated the practical application of these highly sophisticated numerical tools in the hydrologic sciences.

David began his career at the U.S. Geological Survey (USGS) in 1969 when he was hired by Blair Jones as a student directly out of high school. David worked part time and during the summers at USGS Headquarters in Rosslyn, Virginia, and later in Reston, for Blair Jones and Niel Plummer, conducting research on many topics, including ion exchange, brines, and calcite dissolution kinetics (Plummer, Wigley and Parkhurst, 1978, American Journal of Science, v. 72). After completing his Bachelor of Arts in Mathematics from Davidson College in 1974, David briefly left the USGS in 1976 to work for the Federal Emergency Management Administration (FEMA) in Charlottesville, VA. Fortunately, David returned to the USGS in 1977 to work on the Potomac Estuary Project. This was a major gain for the USGS—and a loss for FEMA. This was when David began working on development of geochemical modeling software.

David wrote and published the geochemical code PHREEQE (Parkhurst, Thorstenson, and Plummer, 1980, U.S. Geological Survey Water-Resources Investigations Report 80-96) in 1980, a reaction-path model that enabled calculation of mineral equilibrium reactions, ion exchange reactions, and electron-balance calculation of redox reactions, as well as the simulation of solution mixing and simple irreversible reactions. PHREEQE was a highly innovative program at the time it was published. It was widely used for at least 15 years, and it also served as the basis for several other codes: including PHRQPITZ, a version of PHREEQE that incorporated the Pitzer equations to model high-ionic-strength brines (Plummer, Parkhurst, Fleming, and Dunkle, 1988, Water-Resources Investigations Report 88-4153), and PHREEQM (Appelo and Willemson, 1987, Journal of Hydrology, v. 94), another revolutionary code that allowed the simulation of 1D reactive transport.

David also wrote and published the inverse geochemical modeling code BALANCE (Parkhurst and others, 1982). Inverse geochemical modeling was a major conceptual breakthrough, in that it provided a mathematical technique that could help geochemists deduce the reactions responsible for the geochemical evolution of waters, including in environments undergoing oxidation-reduction reactions. The BALANCE code provided a foundation for the subsequent development of several other inverse modeling codes, notably the NETPATH codes published in 1991 and 1994 by Plummer, Prestemon, and Parkhurst. David recognized an essential limitation of the codes based on BALANCE, namely the fact that the calculations did not consider the uncertainties in chemical and isotopic measurements and in sample variability. David addressed this problem (Parkhurst, 1997, Water Resources Research, v. 33, no. 8) through an elegant derivation that allowed mole-balance models to be tested in such a way that every possible adjustment to the analytical measurement results within specified uncertainties was considered. He implemented this approach as one of the new capabilities of the general geochemical modeling code PHREEQC, a code based on PHREEQE but written entirely in the C programming language.

The range of gas/water/mineral/surface reactions that could be simulated In PHREEQC was greatly expanded beyond the capabilities that had been available in PHREEQE; additionally, the new code allowed both forward and inverse geochemical modeling. Subsequent work with C.A.J. Appelo led to publication of PHREEQC Version 2 (Parkhurst and Appelo, 1999, U.S. Geological Survey Water-Resources Investigations Report 99-4259). This version added capabilities to simulate dispersion (or diffusion) and stagnant zones in 1D-transport calculations; to model kinetic reactions with user-defined rate expressions; to model the formation or dissolution of ideal, multicomponent, or non-ideal, binary solid solutions; to model fixed-volume and fixed-pressure gas phases; to allow the number of surface or exchange sites to vary with the dissolution or precipitation of minerals or kinetic reactants; and to include isotope balances in inverse modeling calculations.

PHREEQC has continued to evolve since then. For example, it now includes a thermodynamic approach to isotopic fractionation processes that treats each isotope as a separate component (Thorstenson and Parkhurst, 2004, Geochimica et Cosmochimica Acta, v. 68). High-ionic strength activity coefficients and the Pitzer specific ion interaction approach have also been added, and the CDMUSIC (Charge Distribution-Multisite Ion Complexation) surface complexation model has been implemented.

While continuing to improve general geochemical modeling capabilities through his development of PHREEQC and associated codes, David recognized the need to couple forward geochemical modeling with groundwater flow and transport modeling. The 3D reactive-transport simulator PHAST (Parkhurst, Kipp, and Charlton, 2010, U.S. Geological Survey Techniques and Methods: 6–A35) was developed by David Parkhurst in collaboration with Ken Kipp, Peter Engesgaard, and Scott Charlton. PHAST combines the solute-transport simulator HST3D (Kipp, 1997, U.S. Geological Survey Water-Resources Investigations Report 97-4157) with PHREEQC. The simplicity of the model design and the ability to model flow, solute transport, and a full array of chemical reactions make PHAST a widely used 3D reactive-transport code that has very impressive and useful simulation capabilities.

These contributions are all remarkable by themselves. They have advanced the understanding of groundwater geochemistry and more generally the application of aqueous geochemistry around the world. It is important, however, to recognize that David's achievements also stem from his deep practical understanding of the application of his codes, and from his constant willingness to help scientists and resource managers with their research or application problems.

David's practical understanding of geochemistry and hydrogeology developed during his career. He was awarded participation in the USGS graduate school program which led to a Master's degree in Applied Hydrogeology from Stanford University in 1983, and exposed David to highly advanced analytical techniques for the characterization of mineral surfaces. In turn, this led to David's assignment from 1983 to 1989 to the Oklahoma Water Science Center where he was the lead geochemist on a USGS National Water-Quality Assessment pilot project investigating abandoned lead and zinc mines. This experience gave David firsthand knowledge of the need for practical tools in groundwater studies. He returned to the USGS National Research Program in Lakewood, Colorado, in 1989 to lead a research project in geochemical model development.

Through his career, David has applied his expertise to a wide diversity of problems and settings, such as for example, laboratory studies of calcite reaction kinetics, the distribution of arsenic in Oklahoma groundwaters, the transport of phosphate in Cape Cod sewage plume, and studies of Aquifer Storage and Recovery in South Carolina. David is also recognized for his commitment and leadership in teaching groundwater geochemistry and geochemical modeling in the USGS and around the world. Teaching gave David broad exposure to many different types of problems, case studies and applications of groundwater geochemistry. In return, many scientists have greatly benefited from David's courses, and even more often from his advice and expertise; there are few people as selfless as David in helping other scientists.

In summary, David Parkhurst's work on chemical and reaction-transport modeling, and on the theory of inverse geochemical modeling, has greatly advanced hydrogeology and many other areas of science. It is not possible today to work in the field of aqueous geochemistry without being aware of, and needing to use, the products of David's research. David's scientific expertise and his sense of service and practicality reflect well on the scientific tradition set by O.E. Meinzer.

Please join me in congratulating David L. Parkhurst, recipient of this year's O.E. Meinzer award, for his outstanding contributions to the science of hydrogeology.

Response by David L. Parkhurst

I am deeply honored to receive the O.E. Meinzer Award from the Hydrogeology Division of GSA. I know that the scientists and scientific environment that so shaped my career can be directly traced to the work of O.E. Meinzer, who established the groundwater discipline in the USGS. So I offer my thanks to Pierre for his kind words, the Hydrogeology Division and the Awards Committee, and my friends and colleagues inside and outside the USGS who have made this Award possible. I also take a moment to thank my mother, who is here today. I have received a fraction of her intelligence and a fraction of my father's persistence, which have served me well. I thank them and my wife Renee for all of their support.

I was fortunate to begin my career just as computers were coming into wide use. It was inevitable that the field of geochemistry would be transformed by the possibilities presented by computing, and I was able to participate in that transformation. Computer programming suited me perfectly. I loved that you can take just a few programming commands and build complicated programs that could calculate such things as the amount of salt that dissolves in water, the chemical composition of a limestone groundwater, the migration of radionuclides from disposal sites, or the reactions necessary to account for the chemistry of a groundwater sample. It is extremely satisfying that computer codes that I and my coworkers Tony Appelo and Ken Kipp have written, particularly PHREEQC and PHAST, have been used by researchers, students, government agencies, consultants, and industry throughout the world.

I have spent nearly my entire career with the USGS starting as a high school volunteer, who had only a little chemistry and math, but an ability and willingness to learn. And I had great teachers. At any time, I could ask Blair Jones about clay mineralogy, Niel Plummer about carbonate chemistry and kinetics, Don Thorstenson about sulfate reduction and redox processes, and I could rely on all three when it came to the emerging field of geochemical modeling. In addition, the USGS sent me to graduate school for a year and I learned surface chemistry from George Parks, mineralogy from Gordon Brown, and dipped into the world of high energy physics at the Stanford Synchrotron Radiation Laboratory to study zinc ions at the atomic scale. So I was fortunate to learn my trade from some of the best in their fields.

I also learned the practical side of geochemistry through several major studies. In the laboratory, I helped to run experiments on the kinetics of calcite dissolution. In the field, we investigated the flux of nutrients from sediments in the Potomac River, sampled mine and stream water from abandoned lead and zinc mines in Oklahoma, made regional groundwater assessment of the Roubidoux Aquifer, and worked on a pilot National Water Quality Assessment (NAWQA) study of natural and anthropogenic contaminants in the Central Oklahoma aquifer. This experience taught me the realities of field studies, the limitations of data, and the opportunities for geochemical modeling.

From very early in my career, I developed geochemical models. However, I think the motivation to continually improve the models derived from teaching geochemical modeling to other scientists. I have taught dozens of short courses over the last three decades in the USGS and at outside institutions. Teaching is the quickest way to learn what works for users of a computer program and what does not. I always wanted to focus on the geochemical principals, but too often the mechanics of modeling got in the way. I hated trying to explain to a struggling student why an index needed to be a 2 instead of a 1, or that the input was in the wrong order. I wanted modeling to be easy; it should be like "back-of-the-envelope" calculations, where you can easily see the ramifications of selected chemical reactions. Accordingly, we have worked to make the modeling process more intuitive, so that models are more a source of insight from modeling results and less a source of frustration with modeling mechanics. And here, I must acknowledge the work of Scott Charlton, who is responsible for the simplicity of the graphical user interfaces for PHREEQC and PHAST.

Over the years, I have tried to answer all of the inquiries I have received about geochemical modeling. I have sent thousands of emails to scientists, consultants, professors, and graduate students. In part it was because I wanted my models to be used, but it was also an effort to do my part in extending the groundwater science of the USGS as envisioned by O.E. Meinzer. I also recognize that I have worked to develop tools for studying problems, but, by communicating with other scientists, I can help begin the real work, which is to provide scientific solutions for the major environmental issues we face today, such as carbon capture and storage, radioactive waste disposal, mining for resources, aquifer storage recovery, and mitigation of groundwater contamination. So, if you have a geochemical modeling problem, especially you younger scientists, who will do the hard work on these issues in your careers, drop me an email and I will try to help.

It is a great honor to accept the Meinzer Award, and I thank you all.

ISRAEL C. RUSSELL AWARD

Presented to
Tim K. Lowenstein

Tim K. Lowenstein
SUNY at Binghamton

Citation By Kathleen C. Benison

It is a great honor and privilege for me to present the citation for the Israel Cook Russell Award for major contributions to the field of limnogeology to my teacher, friend, and colleague, Dr. Tim Lowenstein.

Tim is the international leader in the fields of chemical sedimentology and brine geochemistry, and for decades has developed and applied new concepts and techniques to chemical sediments to solve significant geological problems. It is fitting that Tim has earned an award commemorating Israel Russell because both are known for their studies of saline lakes in California.

Tim's research program has been driven by significant questions about the Earth that he answers with innovative approaches using brines and evaporites. His work has resulted in enhanced understanding of lithosphere-hydrosphere-atmosphere-biosphere interactions. Tim was among the first to apply comparative sedimentology to evaporites. He has pioneered the study of fluid inclusions in halite to interpret past environmental conditions. He has produced paleoclimate records from salt cores in California, the Andes, and China. He has quantified atmospheric CO_2 from the Eocene Green River Formation. Tim has addressed the controversial Messinian Salinity Crisis of the Mediterranean. He has traced seawater composition through geologic time. He has isolated, cultured, and identified microorganisms in brines and fluid inclusions in halite. Besides field sites on six continents, Tim has studied chemical sediments on Mars. At an age that technically makes Tim a mid-career scientist, he has published 3 papers in *Science*, 1 paper in *Nature*, and 8 papers in *Geology*. These significant publications are testimonials to the importance of his research to the wider scientific community. I eagerly look forward to Tim's future contributions to the field of geology.

Tim has a sustained record of serving the scientific community. He has been associate editor of *Journal of Sedimentary Research, Geochemical et Cosmochimica Acta*, and *Geology*. He has been a willing and thorough manuscript and proposal reviewer. Tim's distinguished lectureship for the Mineralogical Society of America and participation on NASA steering groups are examples of how he contributes his limnogeological expertise to the wider scientific community.

This citation would be lacking without mention of the profound positive influence that Tim has had on his students and collaborators. Tim 's outstanding teaching and mentoring have enabled his students to become leaders in academia, industry, and government. I consider myself very fortunate to be among the 11 Masters students, 9 PhD students, 3 post-docs, and 2 early-career visiting scholars to date who have worked with, and been inspired by Tim. Tim has had long-term and highly productive working relationships with many collaborators as well. I am certain that all of these students and collaborators value his great friendship as much as his scientific expertise.

It is with great joy that I ask that you join me in congratulating the Limnogeology Division's 2012 Israel Cook Russell awardee, Dr. Tim Lowenstein.

Response by Tim K. Lowenstein

My sincere thanks to the Limnogeology Division of the GSA for the Israel C. Russell Award and to Kathy Benison for her citation. It is a great honor to receive this award. I did not grow up on the shores of a lake, not even close. I became interested in lakes as a graduate student at Johns Hopkins where Lawrie Hardie used simple ideas like chemical divides to explain how natural waters in closed basins evolved into brines. At that time, a field trip to the closed basins of California and Nevada opened my eyes, particularly seeing that the zonation of saline minerals and brines in Saline Valley could be explained by chemical principles. Back then, surprisingly, chemical theories were ahead of our knowledge about what evaporites actually looked like, and their potential as paleoenvironmental and paleoclimatic indicators was largely untapped.

The 1990s saw development of techniques for chemical analysis of fluid inclusions, pioneered by geochemists at the University of Barcelona and at Binghamton by Mike Timofeeff. Now we could chemically analyze fossil waters in fluid inclusions and document secular variations in the chemistry of ancient seawater, first considered by Lawrie Hardie and Ron Spencer, and then elegantly modeled by Bob Demicco, using variable river and midocean ridge inflows, not unlike the mixed inflows found in closed basin lakes. The ocean is a large saline lake!

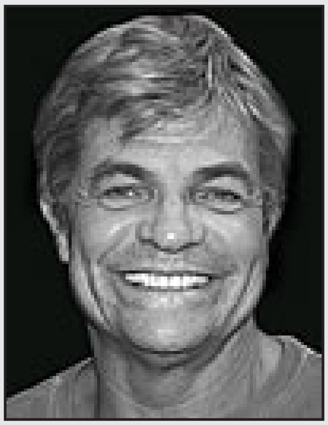
Fluid inclusions in saline minerals are also hosts for microbial life. The discovery of ancient microbial ecosystems trapped inside fluid inclusions in buried halite from Death Valley, along with DNA and living organisms, has been an astonishing surprise. These connections inspired collaborations with microbiologist Russell Vreeland, ecologist Matt Parker, and DNA specialist Koji Lum.

I have many people to thank for teaching me about lakes, modern and ancient, including Joe Smoot, Lawrie Hardie, Alan Carroll, Bob Demicco, Blair Jones, Hans Eugster, Larry Benson, Ron Spencer, Terry Jordan, Linda Godfrey, Paul Baker, Sheri Fritz, Rick Forester, Richard Ku, Shangde Luo, Robin Renaut, Bernie Owen, and Kathy Benison. I am grateful to Colgate professors Bruce Selleck, Rich April, and Jim McLelland for steering me into geology. I want to acknowledge the wonderful graduate students and postdocs I have had: Jianren Li, Chris Brown, Laura Howe, Andy Bobst, Matt Hein and Jonathan Kramer documented closed basin climate records; Enrique Casas, Kathy Schubel, and Lichun Ma studied modern evaporites and brine evolution; Dan Davis and Osama Attia worked on fluid inclusions; Mike Timofeeff, Sean Brennan, Cindy Satterfield, Nora Holt, and Natalie Spear documented ancient seawater chemistry; Brian Schubert, Kat Gragg, Yaicha Winters, Krithi Sankaranarayanan, and Sarah Feiner studied microorganism communities in evaporites; Elliot Jagniecki, John Murphy, and Deidre LaClair work on the Green River Formation; and Kathy Benison and Denise Waite studied burial diagenesis of carbonates.

This is where I will end, with enormous gratitude to Binghamton University and colleagues there, and my wife Sally, for providing the freedom and time to pursue my dreams, and to past and current students and collaborators who find joy in studying lakes.

DISTINGUISHED GEOLOGIC CAREER AWARD (MGPV DIVISION)

Presented to Jason B. Saleeby



Jason B. Saleeby
California Institute of Technology

Citation By George G. Gehrels

We are very pleased to announce that Dr. Jason B. Saleeby is the recipient of the 2012 Distinguished Geologic Career Award from the Mineralogy, Geochemistry, Petrology, & Volcanology Division of GSA.

This award is the perfect recognition of Dr. Saleeby's contributions because of the dual emphasis on geologic observations in the field and application of cutting edge analytical techniques in geochemistry, petrology, and related fields. And this is exactly what Jason is known for – the integration of field observations, from thin section to continent scale, with information from geophysics, petrology, geochronology, and thermochronology.

Dr. Saleeby is also remarkable for his ability to integrate information from both continental and marine settings. Perhaps you have been able to share this experience with Jason on a field trip in Owens Valley, when you learn that the topography across the eastern escarpment of the Sierra Nevada is very similar to the bathymetry across the Clipperton Fracture zone on the Pacific Ocean floor. And rather than granite boulders in alluvial fans, you camp among giant basaltic olistoliths and serpentinite mélange in submarine debris flows!

Also impressive are Dr. Saleeby's abilities to integrate information from

- surficial processes (for example linking the modern uplift and erosion of the Sierra Nevada with ongoing subsidence in the San Joaquin valley),
- upper crustal processes of deformation and melt emplacement (for example reconstructing the accretionary history of Sierran terranes),
- lower crustal processes of high-grade metamorphism and melt generation (for example Jason's work in the granulites and migmatites in the southern Sierra), and
- processes in the mantle such as eclogitization, delamination, and shallow subduction, which have revolutionized our understanding of Laramide-style tectonics around the world.

Indeed, few Earth Scientists have been able to glean as much information from rocks and structures in the field, and then apply a broad range of quantitative techniques to provide constraints on their ages and origins.

We would be remiss to not also recognize Dr. Saleeby's contributions to training students. Jason has mentored a continuous stream of graduate students since the late 1970's, first at Berkeley and then at Caltech, and many of these former students and post-docs are now in academic positions, conducting similar types of interdisciplinary research. Given that many of us have passed along this style of analysis to our graduate students, who in turn have trained their graduate students to be creative and imaginative researchers, just imagine the impact that Jason has on the tectonics research community!

In summary, we are pleased and honored to have Dr. Saleeby recognized as the recipient of the 2012 Distinguished Geologic Career Award from the Mineralogy, Geochemistry, Petrology, & Volcanology Division of GSA.

Response by Jason B. Saleeby

It is a great honor to receive the 2012 GSA Division of Mineralogy, Geochemistry, Petrology and Volcanology Distinguished Geologic Career Award. For this recognition, I am most grateful. Having dedicated much of my career to the integration of traditional geoscience sub-disciplines, gives this award special meaning for me. Field-based geological research is unique in the scientific endeavor, by virtue of the direct connections that can be made between tactile human experience and advanced scientific instrumentation and analysis. From the perspective of a child-like inquisitiveness of our natural environment, a life full of multi-disciplinary field-based research gives one the sense that our planet is the ultimate amusement park! New discoveries, and making new connections between observations and data sets fuels the psyche with youthful energy that drives one to hunger for more new findings and connections. It seems to be a chronic condition for me. One of my favorite sayings is from an early Bob Dylan song: "He not busy being born, is busy dying." Our science has changed dramatically over my career, but the basics of sound field observations still stand as the ultimate infrastructure of our greatest pursuits.

Technical advances through the course of my career have proceeded at seemingly head-spinning rates. As a geology undergraduate student in 1970 at Cal State, Northridge, the life changing advance that impacted me the most was the delivery and installation of our first Xerox machine. This was a huge step forward for a budding geology undergrad, wanting personal copies of published maps, diagrams and key papers. In graduate school at U.C. Santa Barbara, 1972 was the big year for the installation of a digital control and data acquisition system on George Tilton's thermal ionization mass spectrometer. This greatly impacted my Ph.D. thesis research. In the late 1980's heavy metal isotopic geochemistry was launched into the modern era by the emergence of high-precision multiple Faraday collector housings, and high sensitivity signal multipliers. As Y2K rolled through we found ourselves moving into the era of interrogating large populations of individual zircon grains for their ages, or even age zonation patterns, by the newly emerging isoprobe instruments. We may be approaching the point where our data acquisition is out running our ability to synthesize and interpret the data that we produce!

Being at the right place at the right time has been equivalent to a series of bifurcation points in my professional and personal evolution. When I arrived at U.C. Santa Barbara in 1972 George Tilton was just finishing the production of his lunar geochemistry laboratory, wherein he was open to having a small number of investigators work on terrestrial rocks. Thank you George! Jim Mattinson had just arrived as a junior faculty member following his post-doc at Carnegie Institute where he helped engineer new zircon dissolution and column extraction techniques. I was fortunate to be the first graduate student to apply those techniques in George's lab. Having recently attended the first GSA Penrose Conference on ophiolites, Cliff Hopson was just initiating his in-depth study of the Coast Range ophiolite, and I was fortunate to assist him in a number of his earlier field excursions and zircon geochronology sampling campaigns. Those experiences with Cliff are as valuable for me today as they were forty years ago! John Crowell had just been funded to initiate his basement and basin studies of the then newly recognized San Andreas transform system. His field trips and seminars primed me for the complexities of the southern California basement, which I still wrestle with. And, Dan Karig was in the midst ofhis seminal work and early papers on back arc basins and accretionary prisms. Dan's office was somewhat of a hangout spot for me and some fellow grad students, by virtue of all the excitement and new ideas that were packed into that space. I could not ask for more in terms of an exciting and intellectually ripe environment in which to pursue graduate studies.

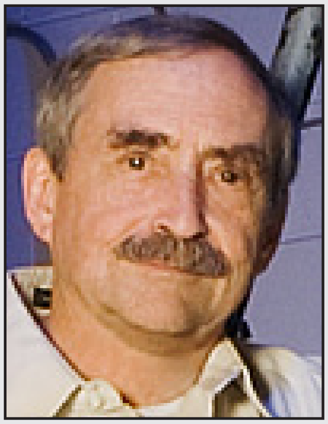
As an Assistant Professor at U.C. Berkeley I was exposed to looking at rocks and geochemical systems in an entirely new way by Ian Carmichael and Hal Helgeson. John Verhoogan encouraged and nurtured my interest in integrating geophysics with structural geology and petrology. Howell Williams stimulated my interest in the Great Valley subsurface, which has steadily grown over the decades since. While at Berkeley Jerry van Andel and Bob Ballard were at Stanford, and we had a series of meetings and discussions about Alvin dives into large transform fracture zones, as a result of my first series of papers published on the Kings-Kaweah ophiolite belt. As these discussions began to move towards the serious planning stages Lee Silver visited Berkeley to give a seminar, and out of our discussions began a series of communications with Lee and Barclay Kamb that rapidly transplanted me into the Caltech environment. At that point I recognized that I was at a critical bifurcation point, opting for a clean room and mass spectrometer over research off of an oceanographic vessel. My residence at Berkeley also gave me easy access to the U.S.G.S. in Menlo Park, facilitating important interactions with Clark Blake, Bob Coleman, Ron Kistler and Jim Moore. My short stay at Berkeley was a major intellectual growing up experience that prepared me for the Caltech environment.

Back to the importance of timing. When I arrived at Caltech Jerry Wasserburg's group had just launched the broad application of Neodymium isotopes to terrestrial problems in petrogenesis and geochronology. Jerry was most gracious in sharing techniques, and also running various strategic Nd-Sr samples for me, prior to the development of those techniques in my laboratory. Lee Silver was in his most active phases of multi-system isotopic mapping of the southern California region basement. This returned me to a number of first order questions that I was exposed to in seminars and field trips with John Crowell, and helped lead me to the long term "wrestling match" referred to above. A whole new way of viewing global tectonics emerged for me as I witnessed Don Anderson develop his eclogite mantle engine model. Now I am the old guy on the block at Caltech, surrounded by brilliant youngsters! I have much to be thankful for.

Like many of my GSA talks over the years, now that the introduction is done there is not much time left for the content, or in this case not much space left if this document is not to go too long for GSA editorial preferences. The essence of my professional experience lies in the mystery and grandiosity of planet Earth and its geological evolution. We are all fortunate to be in profession for which the pursuit of this great story is our primary charge. Added to this, many of us are asked to share our expertise and experiences with undergraduate and graduate students, and post- doctoral fellows. Sharing unselfishly with these young evolving minds is the best way to pay back the dept that we owe society for offering us such extraordinary professions. If asked to name my greatest student, I would have to name ten. This is about as good as it gets! So I close with a brief story concerning student interactions, and thoughts I have concerning the mission of the GSA MGPV Division. I sometimes relate to students the strong parallels between deep time geologic analysis and forensic scientific investigations. With recent technical advances and proliferations in instrumentation and data manipulation systems we have witnessed an attrition in basic field geology programs across the U.S. In regard to this trend I have begun to ask my students while sharing this view: given the best forensic lab that money could establish, how good are the results going to be for a given investigation if the crime scene investigators don't know what all to look for, or how to connect the dots of various leads as they arise? Should we concern ourselves with direct parallels in geologic analysis? The value placed in field-based multidisciplinary studies by the GSA MGPV Division is, in my opinion, a guiding light for the geoscience community in keeping our goals on track with the pursuit of geologic reality. Thank you MGPV Division for this, and for this very special award!

G. K. GILBERT AWARD

Presented to
Peter H. Schultz



Peter H. Schultz
Brown University

Citation by David A. Crawford

I first met Pete Schultz nearly 28 years ago when I was an undergraduate in his planetary geology class at Brown University. He was a new faculty member then but had already made fundamental contributions to planetary science. Before arriving at Brown he had authored or co-edited four books including a book based on his dissertation entitled "Moon Morphology" where he demonstrated his artistic and observational skills and applied both to the impact process. Since then he has contributed to our understanding of virtually every solid body in the solar system.

Soon after receiving his PhD, Pete worked with Don Gault on seismic modification of surface features due to large impacts, the beginning of a prosperous scientific collaboration. In a well-regarded paper, he and Don argued that because much of the ejecta from large impacts would be clouds of low-density, low-speed debris, their re-impact would spread across the surface, rather than be buried and re-mixed within secondary craters. Another paper with Don on "Atmospheric Effects on Martian Ejecta Emplacement" is an often cited seminal work. Continuing this work with his students, Pete has changed our picture of the crater-atmosphere interaction by categorizing it into regimes dependent on particle size, crater size and atmospheric density.

Pete has greatly expanded our understanding of oblique impacts. His laboratory studies have characterized the fate of the projectile, the evolution of ejecta and the contribution of frictional shear heating to melting. With students and colleagues, he has developed pioneering techniques to probe the high speed impact process using magnetics, piezoelectric gauges, spectroscopy, particle imaging velocimetry and numerical modeling calibrated by experiments.

In work with Paul Spudis, he helped extend our knowledge of the lunar volcanism time scale. They recognized that dark-haloed craters in the lunar highlands reveal subsurface mafic units and the degradation of small lunar features and crater statistics demonstrate that basaltic eruptions occurred as recently as 0.8 Ga.

In work with Marcelo Zárate and colleagues he led the effort to discover and characterize impact glass strewn fields within Argentine loess deposits. Results have been used to redefine the ages of sedimentary deposits, interpret the paleomagnetic record and re-assess the paleontological record.

Pete has received the Barringer Medal from the Meteoritical Society, the Distinguished Scientist Award from the Hypervelocity Impact Society and a medal of achievement from the National Academy of Sciences in Argentina. He is the science coordinator for the NASA-Ames Vertical Gun. As co-investigator on planetary missions Deep Impact, LCROSS and Stardust/NExT, he applies his knowledge of the impact process, backed by experiments, to mission design and interpretation. As director of both the Northeast Planetary Data Center and the NASA/Rhode Island Space Grant Consortium, he supports K-12 science education in Rhode Island.

Pete, your contributions to planetary science are more numerous than a short citation like this can convey. You are a deserving recipient of the G. K. Gilbert award because of your insight, creativity and contributions to planetary science, the field of impact cratering and the community. Congratulations and thank you!

Response by Peter H. Schultz

Since 3rd grade, I wanted to combine a love for art, astronomy, and geology. Sixty years later I'm receiving this award for being able to do just that, which seems a bit surreal. Although others may be more deserving, I'll accept this award on behalf of my students, colleagues, and my wife (my students call her St. Barb), who has put up with a workaholic for 50 years.

Funny how careers start. My path was like many…a certain teacher, a 3rd grade teacher (Miss Jackson) who had a passion for geology. Encouraged by my father (a biochemist) and mother (an artist), I marveled at the dioramas in the Field Museum (Chicago) and discovered my first trilobite in the coal pits of Illinois. While most kids sold lemonade, I tried selling plaster casts of my trilobite at 75 cents…not a big seller. But looking at the Moon through a telescope changed all that. My visceral response to actually seeing another world (not just a photograph) drew me into astronomy. That latent interest in fossils, though, attracted me to geology classes at Carleton College (Northfield, MN). Passionate teachers there rekindled my imagining Earth's past. After that, I always carried two geology texts while flying cross-country, just to understand what was passing below.

In the end, I entered graduate school in astronomy at the University of Texas, Austin.

During a chance encounter on an airplane, everything changed. I was reading about the upcoming Apollo mission, and the gentleman sitting next to me asked to look at the article. His name was J. Hoover Mackin. To my surprise, he was part of the upcoming Apollo mission and asked me to look through boxes of Lunar Orbiter photographs. Mackin challenged me about surface processes and taught me the difference between rational and empirical approaches. Through astronomy, I learned physical approaches; through geology, I recognized the importance of building a reservoir of next questions.

After Mackin's untimely death, both Bill Muehlberger and Harlan J. Smith (my formal advisor) encouraged my graduate studies. In my second year, Harlan sent me to a Gordon Research Conference (alone) where I met my future mentors and colleagues. One of them, Don Gault, showed movies of his hypervelocity impact experiments using the Ames Vertical Gun Range that seemed like kinetic dioramas: he watched craters form, not just their aftermath. Years later we would have a long and fruitful collaboration.

So what have I learned? First, remember the usefulness of useless information. Second, the smallest discoveries can have the biggest implications. Third, serendipity can be as important as a well-defined path. And fourth, talk to the person next to you. Planetary geology is my passion, new discoveries still keep me up at night…a curse may I wish for all my students.

I am humbled to be honored among other first-generation planetary explorers, in the company of mentors and colleagues. And I feel fortunate to be able to continue this journey with my past and current students, including a special colleague, Dave Crawford, as my citationist.

KIRK BRYAN AWARD

Presented to
Neal R. Iverson, Thomas S. Hooyer, Jason F. Thomason, Matthew A. Graesch, and Jacqueline R. Marciulionis (Née Shumway)

Neal R. Iverson
Iowa State University

Citation By Scott C. Lundstrom

The Kirk Bryan Award allows us to honor the authors of a recent publication that advances the science of geomorphology and Quaternary Geology. The 2012 award goes to Neal Iverson, Thomas Hooyer, Jason Thomason, Matt Graesch, and Jacqueline Shumway, for their paper, "The experimental basis for interpreting particle and magnetic fabrics of sheared till"—published in *Earth Surface Processes and Landforms* and invited as part of a special issue on "Reconstructing ice-sheet dynamics from subglacial sediments and landforms."

This paper is laudable in several ways, but for the sake of time, I will restrict my citation to two aspects: its importance to subglacial geomorphic processes in our evolving understanding of glaciation, and its illustration of the utility of experimental approaches to geomorphology.

Subglacial deformation of till can activate fast flow of glaciers and ice sheets and contribute to the formation of diverse landforms that develop at glacier beds. Yet, for obvious reasons, direct observations of the complex processes that occur there are very limited, and much of our knowledge is open to question. Thus, the development of new approaches to test models of bed deformation and related subglacial processes is a critical need.

The lead author, Neal Iverson, has been at the forefront of efforts to fill that need with measurements beneath modern glaciers, studies of the sediments and landforms of past ice sheets, and laboratory experiments. A central part of this work has been the construction and application of large custom ring-shear devices in which various materials, including till, are sheared. In the paper being honored, the authors demonstrated the relationship between till shear deformation and the development of till fabric based on preferred particle orientations. Traditional measurements of pebble and sand-grain fabrics and of silt fabrics based on anisotropy of magnetic susceptibility were, for the first time, calibrated to many known states of strain. These results, particularly those based on magnetic anisotropy, provided a quantitative and reproducible framework for inferring patterns and magnitudes of till deformation from the geologic record. Some longstanding models for interpreting field observations, such as models of particle rotation based on viscous fluid flow, were proven incorrect as applied to till and a robust foundation was created for determining how ice sheets move on till beds and affect sediment fabric.

Why study this problem experimentally? I cannot do better answering this question than to read from the final paragraph of the paper being honored:

"Actual subglacial environments are, of course, more complicated than those of our experiments, but that is precisely why experiments are valuable: at the roots of complex geologic phenomena are simple truths that can be obscured in the geologic record but must be understood before claiming basic understanding of that record. These simple truths can be illuminated through experimentation. Unless field workers seeking to interpret fabrics of basal tills reject this well-established philosophy of reductionist science, they need to either let experimentally-derived conclusions help guide their interpretations or demonstrate why such conclusions are wrong."

Whether the glacial geology community has embraced this challenge is still unclear. However, there is little doubt that the extensive body of experimental work presented in this paper is innovative, rigorous, informative, and very significant to understanding the dynamics and subglacial processes of past glaciers and ice sheets. The paper and its authors are richly deserving of the Kirk Bryan Award.

Response By Neal R. Iverson

Thanks Scott, for your generous words. To avoid repetition of responses like the one I'm about to give, I'm going to speak for my co-authors today. Let me take a moment to acknowledge them. When they first considered graduate school, they probably envisioned themselves working on an Alpine moraine, in the high Arctic, or at least in a Midwest gravel pit. I am guessing their plans did not include spending long days in a small room hunched over a peculiar looking piece of experimental equipment, meticulously sampling wet till. Thank you, Tom, Jason, Matt and Jackie for adapting, persevering, and innovating—and for helping to educate me along the way.

When I first thought about building the device that we used in our study, I was a post-doc in the early 1990s at the University of Minnesota struggling to find an academic position. One of my interests was till rheology—a popular topic of the day among glaciologists who had realized that glaciers and parts of ice sheets can ride piggyback on shearing sediments. I was reluctant, however, to sink major effort into building a custom device with future pay-offs that seemed both uncertain and distant. When I raised those doubts with my supervisor, Roger Hooke, his response, delivered after a thoughtful pause, seemed less than sage: "I'd just build it and see what happens." In retrospect, Roger was right on target. Not until the device was built and we had learned that slowly deforming till does not obey a fluid rheology did all sorts of other untested hypotheses become evident to us. One such hypothesis was that till fabric could be used to quantitatively characterize the style and magnitude of glacier-bed deformation.

The subject of untested hypotheses brings me back to the point of that somewhat didactic paragraph that Scott just read from the end of our paper. In our field, as we all know, community-wide consensus can become mistaken for fact, and models can drift from one textbook to the next, unanchored to data. Compelling ideas and models seem plentiful; hypothesis tests that leave us with definitive knowledge seem rare. Experiments, of course, can provide a concrete reality check that complements field studies—but only if a chunk of the natural system is bitten off that is small enough to be chewed and swallowed. And there's the rub: the limited scopes, tightly drawn objectives, and baby steps forward that characterize most experimental work can seem out of step with a modern science culture that emphasizes "Earth systems," "grand challenges," and "transformative research." Tennyson's famous verse stating that "Science moves, but slowly, slowly, creeping on from point to point" is still true, but it would be unlikely to fly in an NSF proposal. Against this backdrop, experimental reductionism can seem a bit old-fashioned.

For this reason my co-authors and I are especially indebted to Scott for his nomination, to those who wrote letters on our behalf, and to the awards committee. Thank you for finding value in playing with mud in the laboratory and honoring our small step forward.

LAURENCE L. SLOSS AWARD

Presented to
Gail M. Ashley

Gail M. Ashley
Rutgers State University

Citation by Steven G. Driese

Gail Ashley has made original and lasting contributions to numerous areas of sedimentary geology, any one of which would qualify her for the Sloss Award.

Gail has published 91 papers in refereed journals, supervised the research of 37 graduate students, edited 6 volumes of research papers, given 5 keynote lectures at international scientific conferences, 80 invited lectures and authored or co-authored ~150 papers at professional meetings. Her career spans about 34 years. Her research is field-based and she has worked in areas ranging from the poles to the equator (Antarctica, Alaska, Canada, U.K., Ireland, New England, New Jersey and East Africa.).The common theme to her research is the application of earth surface processes (sedimentology, hydrology, and geomorphology) to interpreting the recent past (Plio-Pleistocene-Holocene) in terms of paleoenvironment and paleoclimate.

In the 1970s Gail was one of the pioneers in the application of modern sedimentological concepts to interpreting glacial deposits. In the 1980s she conducted fluid dynamics research, using flume runs at M.I.T. In the early 1990s she contributed a seminal classification of large scale bed forms, sequence stratigraphy of the Atlantic continental margin, and a number of papers on glacial sedimentology of the Brooks Range in Alaska, as well as in Ireland and Antarctica. She earned the nick name the “Varve Queen” (coined by colleague Jon Boothroyd). From the mid-1990s to the present her research has emphasized reconstruction of paleoenvironments of hominins in East Africa, including Olduvai Gorge in Tanzania and Kenya, as well as freshwater wetlands and related sites. In 1990, she developed the **Quaternary Studies Graduate Certificate Program** at Rutgers University, which has awarded 25 certificates, presently involves ~15 participating faculty from 5 departments, has 15 students presently enrolled, and 6 interdisciplinary courses approved by the Graduate School.

For the first 23 years of her career at Rutgers, she was the only tenured female faculty member in Geological Sciences and thus the only female to represent the department on College and University committees. During this time she served as the sole female role model and mentor for the increasing number of female students in the department. She has also served as a role model for female geoscientists at the national and international level through her leadership as an editor of premier journals such as the Journal of Sedimentary Research, as President of high-profile scientific societies including SEPM, GSA and AGI, and her leadership on NSF and NRC panels charting research directions in sedimentary geology.

I have worked closely with Gail since 1997 on research in East Africa, and cannot imagine a better colleague—or a better friend. As she has done for more than three decades, Gail Ashley continues to lead sedimentary geology in new directions. Larry Sloss would be proud were he still alive.

Response by Gail M. Ashley

I am very flattered and grateful to receive the Laurence L. Sloss Award from the Sedimentary Geology Division and want to thank all involved in the nomination, particularly those who wrote letters and Steve Driese for his kind words. I knew Larry Sloss, back when….he too had been president of SEPM, GSA, and AGI and did not hesitate to call me up to give advice when he thought I could use it. He called often! But, I think he would be o.k. with this award. I am very pleased.

Listening to Steve’s summary of my career, it sounded like a well-planned trajectory. It was anything but that. My career was a series of 5-year plans that zigzagged across the sedimentological landscape from the Antarctic to Africa, changing topics along the way. At the time I started, there were essentially no senior women scientists for me to take cues from; how to juggle kids, family and field work. But, I was fortunate to have many male colleagues who gave me encouragement, built my confidence and opened doors for me. Marshall Schalk (Smith College) was my next door neighbor and gave me my first book on geology and told me it was something girls could do. George Magill admitted me into grad school with a less-than-stellar academic record and, incidentally, with 2 small children. This instilled in me desperately needed self-confidence. Miles Hayes taught me the value of modern process studies and supervisors Joe Hartshorn and Bill Mathews encouraged research independence. Jon Boothroyd and Norm Smith were great role models for field work in modern environments. Tom Hamilton (USGS) relentlessly hammered home the importance of careful observations and note taking. John Southard was an inspirational guide on how to try to answer sedimentological questions with experimental studies. Richard Hay, who wrote the book on Olduvai Gorge, graciously encouraged me to take on stratigraphic and geo-archaeological research at the Gorge and shared his vast knowledge with me.

In the last four decades I have seen the gender gap in geology narrow and most programs now have ~50% women students. There remains a long way to go for parity in Earth Science faculties. Universities need to be “family friendly”, to recognize that academics are people first (not just a commodity) and have the right to a full life that includes relationships.

My career had a steep learning curve and is getting steeper. Yet, I feel I have received more from my colleagues and the 37 grad students and hundreds of undergrads, than I have contributed.

Research has always been fun for me. Varves, bed forms, pingos, eskers, tidal channels, springs, wetlands and now the Critical Zone have all been grist to my mill. I have been lucky to have the backing of my two children, Kim and Tod) during a sometimes very chaotic life. I want to particularly thank my husband Jerry; he is my reality check, my chief critic and my best friend. I would not be where I am without my family.

STRUCTURAL GEOLOGY & TECTONICS CAREER CONTRIBUTION AWARD

Presented to Richard W. Allmendinger

Richard W. Allmendinger
Cornell University

Citation by Larry Douglas Brown

Citation text not available.

Response by Richard W. Allmendinger

Steve Jobs famously said that you can only connect the dots looking backwards, so please indulge me for a minute as I do just that. It was really as an undergrad at Cornell in the early 1970s that I knew I wanted to become a geologist. Cornell was an incredibly exciting place to be, with many of the gods of plate tectonics: Jack Oliver, Bryan Isacks, Jack Bird, Dan Karig, Don Turcotte, Muawia Barazangi. But there was another reason—one which I didn't appreciate until much later—why Cornell had such a profound effect on me: The department had just moved to the engineering college so I took a suite of classes much closer to that of your typical engineer, which it turns out is also a splendid background for a structural geologist: a year of computer programing, more math than the typical geology major of that day (or even today).

I arrived at Stanford in the heyday of Arvid Johnson, Ray Fletcher, Bernard Hallet, and David Pollard (still at the USGS at that time) and took course from all of them. But, because of my interest in tectonics that was nurtured at Cornell, I was more attracted to the work of Ben Page, Bob Compton, and Bill Dickinson and thus did a more typical, field-based thesis. However, to this day, Ray Fletcher's random, no holds barred, emails continue to make me think more deeply about many things than I otherwise would. It was also in my Stanford days and shortly after that I was mentored by two of the finest field geologists at the USGS, Steve Oriel and Max Crittenden, firmly cementing my worship of basic field relations.

I returned to Cornell, first as a post-doc, and then worked my way up the academic ladder: research associate, professor, and most recently associate dean for diversity and faculty development in engineering. It was at Cornell that I began to apply geophysical methods to structural geology problems via the COCORP project and by working with earthquake data. Thanks to Bryan Isacks and Terry Jordan, I also started a life-long love affair with the Andes and formed many deep and abiding friendships with South American geologists such as Victor Ramos, Constantino Mpodozis, Betty Coira, Rene Manceda, Roberto Hernández, Ernesto Cristallini, Gabriel González, and José Cembrano. As a professor at Cornell, I learned early on that your graduate students will make or break your research program, and I have been exceedingly fortunate to have had an extraordinary group, of which Randy is just one example. From most, I have learned more than I ever taught them and they are the ones who have kept my research program moving in new directions throughout the years.

I like to joke that: "geophysical data and methods are much too valuable to be left in the hands of the geophysicists." But my scientific philosophy is better summed up by comment I heard Bob Dott, Jr. make many years ago: "If your data fit you hypothesis, that's nice; if they don't fit, now that is really interesting." This appealed to my iconoclastic streak. My advice to today's students is:

- Get as quantitative background—math, physics, chemistry, computer science—as you can, but also see as many rocks as you can.
- Science changes during your career and you should, too (and grad students are a great way to make that happen).
- Be fearless about working with people outside your discipline (and in other fields entirely).
- Almost no one sets out to make a profound insight, they just do good science and get lucky. But, there are ways that you can enhance that luck by questioning sacred cows, measuring something completely new, or applying methods from completely outside your discipline.
- And finally, remember that models only exist to help us identify what to observe next; they are not an end, but a beginning. You should never set out to prove a model, but to disprove a model, especially your favorite one—if you can't then you know you have something.

I am probably more widely known for my computer programs than I am for my scientific research, a conclusion one can glean from the fact that, for my career to date my citation count is about 4500, and my impact factor is somewhere between 33 and 39, but my Stereonet program download page had 20,000 hits this past year, alone. Some of the most gratifying emails I get come from students somewhere in the world who have taken the time to write "I just want to say thanks for making the program available." All of the programs, though, were written to solve the research problems on which we were currently working and were, ultimately a vehicle by which I learned new things.

So where is structural geology going? Plate tectonics played a fundamental role in rejuvenating structural geology 50 years ago and today, I believe, the most pressing problems of the 21st century—energy, global climate change, and natural hazards—likewise will help to rejuvenate structural geology yet again. Consider that one of the biggest unknowns in climate science right now is the dynamics of continental ice caps: who knows better than structural geologists about the deformational behavior of crystalline materials near their melting temperature?

Of course, many parts of tectonics remain as relevant today as they were 30 years ago and good field data never go out of style, but we do need to begin to shift the context and perspective that we bring to these issues: The new global tectonics is nearly 50 years old, we've been trying to understand continental plateau uplift for 30 years or more, and we have to admit that in many areas, including many of my own favorites, we are fine-tuning rather than bringing profound new insight. In the meantime, today's undergraduates are likely to be much more interested and motivated by energy and climate change, and if your university is anything like mine, other disciplines are co-opting these fundamental topics as their own and don't even realize that they are encroaching on core Earth Science issues.

In closing, let me say how completely humbling it is to look down the list of previous winners of this award, many of whom were my professional heroes. Of the 24 on the list I met or know all but about five. Though I would like to think this makes me special, just about anyone from my generation of structural geologists could make the same claim. It is a measure of the intimacy of our discipline. In what other discipline can one claim to have such easy and informal access to the very best and brightest in our science? That said, it is even more humbling to think of all the deserving greats of our field who are not on the list of recipients. There is definitively (and unfortunately) one way that I do belong on this list though: I am white and male. There is but a single woman and no underrepresented minorities on that list. If structural geology is to remain relevant in a time of rapidly changing demographics, that must change.

As I turn 60 next year, I figure that I have about 10 more years to try to live up to the honor that you have given me tonight. I'll do my best. Thank you again.