2008

GSA Division Awards

Presented at the

120th Annual Meeting

of the

Geological Society of America

4 October 2008

Houston, Texas

RIP RAPP ARCHAEOLOGICAL GEOLOGY AWARD

Presented to E. Arthur Bettis III

E. Arthur Bettis III
University of Iowa

Citation by Rolfe D. Mandel

It is a great pleasure and honor to introduce my friend and colleague, Art Bettis, for the presentation of the 2008 GSA Rip Rapp Award. Recognition of Art's contributions to archaeological geology is long overdue, so I am pleased that the AG Division selected him for this award.

Art's academic training and professional experience in anthropology, soil science, and geology make him one of those rare individuals who can excel in all three disciplines. He also has the ability to combine knowledge from these disciplines in addressing archaeological problems that demand an understanding of human behavior and the earth sciences. Few people can effectively do this, but Art is one of them. In short, he is truly an interdisciplinary scholar, and archaeological geology, which is an interdisciplinary science, has benefited from his research and teaching.

Art's involvement in geoarchaeology spans more than 30 years. His most significant contribution to archaeological geology, and to the broader field of archaeology, is his work on soils and landscape evolution in archaeological contexts. He has played a leading role in determining how temporal and spatial patterns of erosion and sedimentation in stream basins affect the archaeological record. Art has published many articles dealing with this topic, beginning in the early 1980s with several papers that focused on archaeology and Holocene landscape evolution in drainage systems of western Iowa. Soon after that he turned his attention to the Des Moines River valley, then moved farther east and attacked a bigger stream and more daunting problem: the relationship between the spatial pattern of landform sediment assemblages (LSAs) and the archaeological record of the upper Mississippi River valley. Art's approach to identifying and mapping LSAs in the Mississippi valley revolutionized alluvial geoarchaeology. Conceptualizing the landscape in this manner has provided archeologists with a range of powerful tools for evaluating and interpreting cultural resources preserved in sediments that constitute valley landscapes.

Art's expertise and contributions are not limited to the Midwest. Recently he has been studying Pleistocene and Late Pliocene landscape evolution in Central Java (Indonesia) as a context for *Homo erectus* occupation of Southeast Asia. In addition to reconstructing paleoenvironments, Art has provided information critical to interpreting the taphonomy of the hominid-bearing deposits in Java.

I have learned a lot from Art because he has always been willing to share his ideas. Collaboration is his mantra. This comment has been echoed by many of his colleagues. Art also has gained great respect among students for his teaching skills and willingness to train others who are interested in geoarchaeology. Although Art has heavy teaching and research loads and numerous other commitments, he often devotes considerable time to students. He has been a role model for many young geoarchaeologists coming out of the geoscience and archaeology programs at the University of Iowa and elsewhere.

In addition to his research and teaching, Art performed a significant service to the geoarchaeological community during his tenure as Chair of the AG Division in 1992, and as Editor-in-Chief of *Geoarchaeology: An International Journal* from 2003 through 2006. He is currently an Associate Editor for *Geoarchaeology*, and he continues to play an important role in promoting the journal.

If I had to identify a single attribute that stands out among Art's many qualities, it is his role in promoting the merits of field research. He is the ultimate "dirt" geoarchaeologist, always emphasizing the need to see landscapes and soils up close in person. Simply reading about theories and methods of geoarchaeology in books and journals is not going to cut it with him. His passion for field research is apparent in his teaching, presentations at professional meetings, and collaboration with colleagues. Many of Art's students claim that his enthusiasm is contagious.

In sum, Art has been a driving force in geoarchaeology and undoubtedly will continue to have a strong influence on its direction. He deserves the recognition associated with the Rip Rapp Award because of his many outstanding contributions to the interdisciplinary field of archaeological geology. The Geological Society of America and members of the Archaeological Geology Division should be proud of honoring him in this way.

Response by E. Arthur Bettis III

Thank you, Rolfe, for the very kind words. I'm honored to receive this award and thank the Archaeological Geology Division Awards Committee for its support and George "Rip" Rapp, Jr. for his foresight in helping establish this division and for endowing this award. I've had the good luck of playing in the dirt with archaeologists for most of my career and what a wonderful windfall to be placed with the eminent prior awardees for the effort!

Reflecting on how I ended up doing geoarchaeology brings to mind the classic Grateful Dead line "what a long strange trip it's been …" I've had a fascination for all things dirty and muddy since my parents let me start playing in the gully next to our house when I was 10. By the time I entered college at Iowa State University I had cleaned up my act—I was on a Navy ROTC scholarship to study bacteriology for climate control on nuclear submarines. To fulfill my social sciences requirement I took Introduction to Anthropology and met Bill Ringle, a disheveled Anthropology instructor who over the course of the quarter convinced me that Anthropology offered much more excitement and fun. I've always been somewhat of a science nerd and archaeology hit me as the part of Anthropology where I could pursue my interest in biology and get dirty at the same time. A summer field school at the newly reopened Lubbock Lake Site in 1973 convinced me that archaeology, especially zooarchaeology was for me.

After graduating with a BS in Anthropology in 1975 I worked for a year as a site supervisor mitigating prehistoric sites in the wake of Saylorville Dam flooding the central Iowa's Des Moines valley. Since we had taken a soils and geology class Larry Abbott and I were charged with assessing the stratigraphy of several sites and soon realized that our surface surveys in the valley had missed significant buried archaeological deposits and that we were in way over our heads. During visits to several deeply buried sites by soil stratigraphers from the ISU Agronomy Department I realized that the "matrix" rather than the artifacts was what interested me the most about archaeology; so much for my budding career as a zooarchaeologist.

Fall of 1976 found me enrolled in the Agronomy Department at ISU to begin a Masters program in soil genesis and morphology. I began a project on loess, changed to the origin of stone lines, and then had one of those life changing happenstances that pointed me back toward geoarchaeology. While on a soils field trip to Effigy Mounds National Monument I ran into Clark Mallam, an archaeologist at Luther College researching Effigy Mounds in northeastern Iowa. During our conversation Clark asked if I had a thesis topic and offered a soil genesis study at a mound group he and Dave Benn were excavating along the Mississippi Valley. That began a very productive collaboration with Dave that continues today. While completing my MS I became involved in stratigraphic and soils work with Dave at the Rainbow Site in western Iowa where I found myself back in a gully very similar to the one I entered at age 10. That winter I came across a monograph by Daniels and Jordan outlining their stratigraphic and soil geomorphology studies in western Iowa's Thompson Creek Watershed. The alluvial stratigraphy they described was nearly identical to what I had documented at the Rainbow Site 120km to the north. This was a watershed moment for me—a regional alluvial stratigraphy that could have archaeological significance. Since that time much of my research has focused on the implications of regional alluvial stratigraphy for the archaeological record.

The accomplishments that this award is based on are due in large part to the colleagues and friends I've had the good luck and pleasure to work with. My "Dirt Brothers" Rolfe Mandel and Ed Hajic have been constant companions, a source of great ideas and critics of the best kind. Archaeologists Dave Benn and Dean Thompson were willing to look at sediment to understand the archaeological record and thus provided a new perspective on how to assess cultural resources in the Midwest. George Hallberg gave me the opportunity to become a "real " geologist, introduced me to the Quaternary and made it possible for me to pursue my interests in geology, soils and geoarchaeology while working for a state geological survey. Under the tutelage of Tim Kemmis I learned to pay very close attention to the details of stratigraphic sections and came to better appreciate how scale affects our perceptions of sedimentary records. Dan Muhs opened my eyes to the wonders of geochemistry and has been an incredible springboard for ideas. Dick Baker has been my greatest inspiration both as an outstanding researcher and teacher and most of all by showing that one's greatest contribution is to be a really nice person. The person I owe the most to is my wife Brenda for enduring my long absences from home, for listening to my frustrations about academia, my musings about soils and mud and for being my moon and stars.

A final word to those aspiring to be geoarchaeologists. If you are a geologist, physical geographer or pedologist take as many archaeology courses and an archaeological field school if you can squeeze it in. If you are an archaeologist take as many soils, physical geography and geology courses as you can. Take every opportunity to go to the field. Go on field trips. Volunteer to work in someone's lab. Read voraciously. As Dr. Seuss said "The more you learn the more places you'll go".

GILBERT H. CADY AWARD

Presented to Maria Mastalerz

Maria Mastalerz
Indiana Geological Survey

Citation by James C. Hower

It is an honor to be here tonight recognizing Maria Mastalerz for her outstanding contributions to coal geology. I first got to know Maria in the mid-1980's when she wrote letters asking questions about my papers. Neither of us could have anticipated that the inquisitive young Polish student would end up being the distinguished colleague we are honoring tonight.

I believe that, in order to be a coal geologist, it is important to go to the coal. In many parts of the world, such as in Poland and in the Illinois Basin, sometimes this means going underground. In this respect, Maria has more than paid her dues. Her graduate fieldwork was conducted in difficult, deep-coal conditions. There is really no substitute for personally collecting samples for your research, a lesson she learned early in her career.

Since arriving in North America in 1990, she has established research in the electron microprobe examination of coal and the in situ organic geochemical characterization of macerals. Both activities have been valuable in characterizing material that would be difficult to separate from the coal matrix.

More recently, she has conducted research in the petrology and chemistry of Indiana coals and their combustion by-products. She has undertaken a thorough investigation of the coal in the mine, tracing it through its path to the power plant and beyond. Just as it is important to study the coal in place, it is vital to understand the power plant as the factory producing new products: the fly ash, bottom ash, and flue gas desulfurization products. Through her own work in Indiana, and by means of collaborations with other investigators, she has contributed to our understanding of mercury capture in fly ash, an important aspect in the prospects for utilization of fly ash.

Arguably, her most important contributions have come in coalbed methane and carbon dioxide sequestration research. Through field studies and subsequent laboratory investigations, she has become one of the leaders in this important discipline.

For her research in many aspects of coal geology and petrology, for her dedication to her students, and for her exemplary service to our professional organizations, it is an honor to be recognizing Maria Mastalerz, one of the outstanding coal scientists of this generation, with the Gilbert H. Cady Award of the Geological Society of America's Coal Geology Division.

Response by Maria Mastalerz

I would like thank Jim Hower for his kind words and the Coal Geology Division of the Geological Society of America and the Nominating Committee for presenting me with this year's Gilbert H. Cady Award. I feel particularly honored to be only the second woman, after Marlies Teichmuller, to receive this award. It is also satisfying that this year's award is for work done primarily in the Illinois Basin, the region where Gilbert H. Cady devoted most of his professional life.

I became a geologist relatively early in my life. At the age of 14, I decided that I would be a scientist. "Geology" sounded very scientific to a 14-year old girl in my native Poland, and I chose to attend a geological high school. Five years later, I received a diploma in geology after defending a project on a design of an underground coal mine. Perhaps this was the first sign, unrecognized at that point, that coal geology was in my future. Finishing high school as a number-one–ranked student gave me automatic acceptance to any university and department in Poland. I filled an application to study international trade in Warsaw, but after two days of thinking, I changed my mind. "Geology is not so bad," I thought, and put in an application to study geology at Wroclaw University.

The next sign that I should become a coal geologist came five years later after I defended my M.S. thesis on the clastic sedimentology of a Permian basin in Poland. The professor of coal geology at Wroclaw University unexpectedly left Poland, and I was offered a position to teach and work towards a doctoral degree in coal geology. It was 1981. Because no one at Wroclaw University was studying coal at the time, I turned to Prof. Wieslaw Gabzdyl from the Silesian Technical University in Gliwice for help and guidance. For the next several years, I split my time between teaching at Wroclaw University, doing field work in the underground coal mines in the Intrasudetic Basin, and working in the coal petrology laboratory in the Upper Silesian region.

In 1986, I was offered a British Council Fellowship at Newcastle-upon-Tyne University in England to work with Prof. Duncan Murchison and Dr. Mike Jones in their organic petrology/organic geochemistry lab. It was my first international exposure and it turned out to be of critical importance in my life. During my nine-month stay in Britain, I completed all the analyses towards my doctorate, learned English, and wrote my first article for an international journal. I will always be grateful to Prof. Murchison for giving me that life-changing opportunity.

After my return from Britain, I completed my dissertation and graduated with a Ph.D. in Mining Geology from Silesian Technical University in 1988. My thesis work on depositional conditions and coal rank in the Intrasudetic Basin received a Polish Ministry of Education Award. I then started as an assistant professor at Wroclaw University, continuing my work on coals and oil shales from the Intrasudetic Basin.

The next turning point happened in 1990 when Prof. Marc Bustin offered me a postdoctoral position at the University of British Columbia in Vancouver. I am very grateful to Prof. Bustin for giving me the chance to work with him. Those four years in Canada were extremely fruitful and enjoyable, and to a large extent influenced my further career.

My job as a coal geologist with the Indiana Geological Survey at Indiana University provided more opportunities to work on coal and coal-related issues. My 14-year association with Indiana University has also been very rewarding. A collaborative effort with my colleague Arndt Schimmelmann allowed us to successfully address many geological and chemical aspects of organic matter and generated hydrocarbons, not only from coal but also from other kerogen types, and resulted in excellent graduate theses and first-rate publications. Work with John Rupp, Agnieszka Drobniak, Nelson Shaffer, among others, on practical aspects of coal geology resulted in maps and reports that are used by industry and the government. I value the support of my supervisors, Norman Hester and, more recently, John Steinmetz. I am also greatly indebted to past and current graduate students: Rachel Walker, Grzegorz Lis, Dariusz Strapoc, Wilfrido Solano-Acosta, Ling Gao, Hui Jin, and Penny Meighen. Their enthusiasm, scientific curiosity, and humor make my work more complete, exciting, and fun.

While working at Indiana University, I have enjoyed many fruitful collaborations with my colleagues from other centers. Joint projects with Jim Hower, University of Kentucky; Miryam Glikson, University of Queensland; Erwin Zodrow, University College of Cape Breton; Colin Ward, University of New South Wales; and others have contributed to my success. And it is an honor for me that these people have become not only my co-workers but lifelong friends.

Finally, I would like to thank my husband, Brian, for his continuing support, and my daughter Kasia for always believing in her mom.

In closing I would like to say that I love my work, I love doing research, and it has already been a great reward for me to have had the opportunity to work on coal-related issues for all these years. It makes me feel even better to see the current renewed and diversified interest in coal and the increased demand for information that only we, coal geologists, can provide. I gratefully and humbly accept this award. It assures me that the choices I made and directions I chose were good ones, and it will motivate me to work even harder to deserve it. Thank you very much indeed.

E.B. BURWELL, JR., AWARD

Presented to Derek H. Cornforth

Derek H. Cornforth
Cornforth Consultants Inc.

Citation by Paul M. Santi

Landslides in Practice was selected for this award as a superb example of the interdependence of engineering geology and geotechnical engineering to adequately identify, analyze, and mitigate landslides. Strong chapters covering landslide causes, mapping, investigation, and monitoring focus on the geologic components of these hazards. Chapters detailing laboratory and analytical work, as well as remediation options, demonstrate the engineering side of the equation. A dozen detailed case histories show how the components work together.

As the title implies, the book is, above all, practical. The author elucidates problems that are often short-changed or entirely omitted in slope stability texts. What is the importance of strain rate? What are the typical pitfalls with back analyses? How can reliability and risk-based analyses be incorporated into the evaluation? How are horizontal drains designed and maintained? How is erosion control incorporated into landslide mitigation? All of these issues are accompanied by example calculations, drawings, and charts, many of which are derived from the author's own experience. As a result, *Landslides in Practice* filters a vast array of practical technical literature, through the lens of a practitioner who has applied these principles for over 45 years.

The quality of the writing and illustrations is outstanding. The text is clear and the use of headines, bullets, and tables makes the book easy to navigate and quick to track down specific ideas. The figures are immaculate, with numerous 3-D drawings, clearly reproduced photographs, and hundreds of maps and cross-sections, all drafted in a consistent style.

The author, Dr. Derek H. Cornforth, is a highly trained Civil Engineer, with a B.S. from Durham University in England, an M.S. from Northwestern University, and a Ph.D. from Imperial College in London. He has worked primarily out of offices in Seattle, London, and Portland, and his career has led to direct involvement in about 200 landslides. He is the founder of the well-regarded firm, Landslide Technology, whose work has ranged from the Western United States and Alaska, to Africa and New Zealand. Dr. Cornforth has authored numerous technical papers related to slope stability, taught graduate university courses in the subject, and served on a national committee of the USGS and on a Board of Consultants formed to address landslide investigation and mitigation. He resides in Lake Oswego, Oregon.

Response by Derek H. Cornforth

I am most grateful to the Engineering Geology Division of the Geological Society of America for honoring me with the Burwell Award. I also want to thank Professor Santi for nominating my book and for his very gracious citation. I can tell you that this is one of the highlights of my career.

Although trained as a civil engineer, I have spent most of my career working closely with engineering geologists on earth dams and landslides. Therefore, I really appreciate the insights that an experienced engineering geologist can bring to these types of project.

The book *Landslides in Practice* is the result of a fortuitous chain of events, and I will briefly describe a few key experiences. First, I was fortunate to obtain my doctorate degree as a student at Imperial College, London University, where Professors Skempton and Bishop were doing their pioneer work on slope stability and landslides in the late 1950s. After that, I increased my knowledge of soil and rock properties by a two-year stint at the large Soil Mechanics Ltd. laboratory in London. The rest of my career primarily was that of a consultant working on geotechnical projects but it included 12 months on the site of a huge earthworks contract. I also spent a few years working for a contracting firm. These broad experiences helped me to become proficient in both theoretical and practical knowledge of landslide work.

My final piece of luck was that I ended my career as the owner of my own consulting firm. Professor Santi has already mentioned the high quality of the drawings in the book, and other reviewers have been complimentary about them. In fact, there are more than 600 drawings, all drawn to a consistent technique and requiring thousands of hours of drafting time. This would not have been possible if I had not had the resources of my firm available to me.

Landslides in Practice took almost a decade to research and write. It is mostly a collection of the ideas and publications of other people, but it contains some previously unpublished items. I'll mention three of them.

The first is the section of the book describing the use of piles in the stabilization of landslides. When I first wanted to use piles for this purpose, I was rather appalled at the lack of acceptable design criteria. I think this can be attributed to a poor understanding of how piles interact with landslides. I believe that the method described in the book corrects this omission in the published literature.

Another "first" was to provide analytical solutions to the stability analyses of double and triple wedge landslides, both of which are relatively common landslide profiles on larger slides. Previously, these were solved by either graphical procedures or by using non-circular stability analyses on a computer. The analytical procedure allows double and triple wedge stability analyses to be completed relatively quickly by hand. My staff have found that hand calculations often help the designer obtain insights into the most appropriate treatment of a landslide.

The third item concerns the widespread use of "back analysis" in which the designer assumes that the factor of safety F is 1.00 on the landslide. However, the book points out that many landslides are actively moving and the static F is lower than 1.00. It includes an example of how much below 1.00 it can fall. The significance of this issue is that an extra margin of safety has to be included in the remediation of active landslides just to bring the static factor of safety back to 1.00 before improving the slope stability.

In closing, may I thank the GSA again for this honor in recognizing my book. I hope it will achieve its objective of providing sound advice on remediating soil landslides to both new and practicing engineering geologists.

GEORGE P. WOOLLARD AWARD

Presented to
Eugene D. Humphreys

Eugene D. Humphreys
University of Oregon

Citation by Alan Levander

Many of us in Earth sciences were attracted to the field by a love of the outdoors, and I think in this regard Gene Humphreys is no exception. In his youth, Gene made several extended bike trips around the western U.S. that sparked his interest in Earth science and his curiosity about how the west became the way it is. Listening to Gene describe his bike trips, my impression is that he had experiences that combine Jack Kerouac's "On the Road", John Steinbeck's "The Grapes of Wrath", and John McPhee's "Basin and Range", against an aesthetic backdrop of Ansel Adams.

Many other things about Gene seem to be the exception rather than the rule. As an example, he's apolitical in the broadest sense of the word, in my opinion this is an essential part of a scientist's character: Gene comes to any Earth science problem interested in what is true, and although he gives credit for the provenance of ideas, his interest in the more social aspects of science are confined to the pleasure of having interesting friends and colleagues to work with. A self-taught, and gifted amateur photographer, Gene can see multiple scales, tones, facets, and dimensions, and has a keen sense of motion and time, in any scene that he sets his eye and his mind to. These qualities have served him well as an Earth scientist.

Few geophysicists have made as many, or as diverse, contributions to understanding geology using geophysical methods as Gene. Among them is the development of the tomographic method for imaging with seismic waves. Seismic tomography was developed for different purposes almost simultaneously by several academic groups in the US and Europe, as well as by a large research team at one of the US oil companies.

As a graduate student at Caltech, Gene Humphreys, with his advisor Rob Clayton, developed regional teleseismic tomography, and applied it to data from the southern California seismograph array. They presented their results, which included the Transverse Ranges high velocity mantle drip and the Salton Trough low velocity mantle upwelling, at an historic session at the 1984 Fall AGU meeting. The meeting room was packed, the questioning was lively and at times heated, and the audience left with a sense that our field of science had been fundamentally altered: The upper mantle, until then, had been largely *terra incognita*. The discussions continued, radiating out in all directions, as the session adjourned and the audience dispersed. Gene continued this early work in tomography as a young professor at the University of Oregon with a group of talented students, producing tomographic models for many parts of the western U.S. upper mantle, in fact almost every part that had permanent seismograph arrays.

Gene was one of the early proponents of USArray. The first P-wave velocity anomaly map of the entire western U.S. was a compilation of results from many different seismic arrays produced by Ken Dueker and Gene. This image became one of the selling points for USArray, because of the surprisingly high degree of upper mantle heterogeneity it exhibited. I think Gene was startled by how popular the image became, and a bit disappointed at how little people actually tried to understand it.

A great photograph not only has technical brilliance it has some element of beauty and soul, which, translated to Earth science, is what Gene extracts from his seismic images:

As examples: Gene and Ken Dueker interpreted their upper mantle images for physical state, invoking global and regional convection systems to produce the compositional, thermal, buoyancy, and rheologic variations that explain the character of the large tectonic provinces in the western U.S. Gene proposed the "Folded Taco" model for removal of the Farallon slab from beneath the western U.S. to explain the early Cenozoic ignimbrite flare up. He and his colleagues proposed that flat Farallon slab dehydration mechanically weakened the lithosphere leading to the Laramide uplifts, and he and other colleagues developed an upper mantle corkscrew flow model in the wake of the Yellowstone hotspot. Gene and Karl Karlstrom first documented the importance of inherited Precambrian mantle structures in modulating Phanerozoic tectonics in western North America. In the shear wave split map of the western U.S., Gene and George Zandt have identified toroidal asthenosperic flow around the southern edge of the subducted Farallon plate. Gene has also developed a force balance model, or a stress balance model, if you prefer, for the entire North American plate, because he wants to understand how the western orogenic belt came to be the way it is.

As an Earth scientist I think that it's impossible to think about the western U.S. as a geologic entity without thinking of the works of Clark Burchfiel, George Thompson, Tanya Atwater, and Gene Humphreys. Their papers are essential reading for understanding the western US orogenic plateau.

It gives me great pleasure to see Gene receive this year's George P. Woollard award.

Response by Eugene D. Humphreys

Thank you, Alan, for the nice words. And also, I'd like to acknowledge the GSA and the Geophysics Division for keeping geophysics alive within the GSA. It is at the GSA that a geophysicist can best keep up with the geological observations that place so much constraint on our mutual effort to understand the Earth.

I would also like to thank the succession of Earth scientists who I've had the good luck to encounter. My progress in Earth sciences has been largely a consequence of their talents and efforts. This includes Shawn Biehler and Tien Lee at UC Riverside, who each demonstrated deep interest in understanding the Earth and integrity in this endeavor (excellent lessons for a young student). At Caltech I was blessed when two new faculty, Rob Clayton and Brad Hager, arrived full of enthusiasm. I benefited greatly from their creativity and insight, and by having these two for advisors and friends. Since coming to the University of Oregon, Harve Waff's spontaneous honesty and Doug Toomey's persistent pursuit of quality in science and all facets of life have provided a good perspective as well as the basis of good friendship. And working with Alan Levandar has been both a joy and a good example of one who sets his mind on achieving and then doing so. Also essential to me have been many outstanding students, who number too many to mention here. However, I am compelled to mention Ken Dueker for his insistence on getting to the bottom of an issue, with little regard for dogma. And, of course, my wife Monica deserves a special thanks for not only enriching my life, but for putting up with the demands of my work.

Finally, I acknowledge the geologic and geophysical community at large; this is an unusual group of people who share freely of ideas, enjoys the effort to understand the Earth, and appreciates each other. I have not seen this in other professions, so I think we must consider ourselves fortunate.

To conclude, I think it is remarkable that I have been given chance to simply do what I enjoy, the financial and moral support to do so, and the opportunity to contribute to the field and those involved. To be acknowledged for this is a surprise and a pleasure.

2008 BIGGS AWARD FOR EXCELLENCE IN EARTH SCIENCE TEACHING

Presented to Karen M. Kortz

Karen M. Kortz
Community College of Rhode Island

Citation by Daniel P. Murray

I am both pleased and honored to be the citationist for this year's recipient of the Carolyn Biggs Earth Science Teaching Award, my colleague Karen Kortz. I have known Professor Kortz for six years, originally as "that gifted new teacher" in the Physics Dept. of the Community College of Rhode Island (CCRI), and more recently as my Ph.D. student. Specifically, I first met her as a co-member of the RI Space Grant program, from which she has secured competitive funding for students to build and test an experiment in conjunction with the Reduced Gravity Student Flight Opportunity Program by NASA.

Ms Kortz received her B.A. in Geology, Magma cum Laude, from Pomona College in 1998 and a M.Sc. in planetary geology from Brown University in 2001. Although she originally planned to continue on for a Ph.D. in planetary geology, a funny thing happed. During a leave of absence after her Masters, she took an adjunct position in the physics department (they have no geoscience department) at CCRI . She fell in love with teaching, and quickly decided to make it her career, and she is now a tenured associate professor. Additionally she is currently enrolled at the University of Rhode Island for her Ph.D. in Geoscience Education, where she is expected to complete all work by the end of this semester. Good career change, as in her short time in the profession she has made great progress. But wait, you may ask, how can such an ABD—even a very good one—merit consideration for such a prestigious award as the Biggs, when there are so many other gifted young geoscience educators in the discipline? But Professor Kortz is much more than an excellent teacher, for despite her youth she has emerged as a major player, nationally, in earth science education. Let me elaborate.

At CCRI she has developed from scratch an exemplary earth and space science curriculum, in which she does all the teaching, including courses in introductory geology, planetary geology, and oceanography. She is also director of the Honors Program and a member of a variety of committees that deal with issues ranging from mentoring students with disabilities to college accreditation. Her teaching is superb, as evidenced by summaries of course evaluations, student comments, and letters of support from former students. The following comments from former and current students capture the essence of her impact on their careers: "Prof. Kortz had us work with our classmates … As a shy person I was not so sure that this would be helpful for me to learn. Well as it turns out, It was helpful! It allowed myself and classmates to discuss what we had learned … It also helped me overcome my shyness. That is something that I can apply to my future in every area of my life.…" and "Karen's general excitement for the subject of Geology and caring personality makes it virtually impossible not to learn. The knowledge I received from Geology I will carry with me for the rest of my life. There is no way to just look at a rock anymore;…".

Her doctoral research focuses on alternative ways to present E&SS materials to students that takes into account learning differences and the latest research in the cognitive sciences. The first chapter of her thesis identifies barriers to learning introductory geology, and develops ways to counter them through the creation of Lecture Tutorials. This work is complete and was published in the May issue of the Journal of Geoscience Education, and in an expanded form as a book (for which a publisher has been lined up). Additionally, she has presented workshops on the use of Lecture Tutorials at the 2007 New England section of the NAGT meeting, and at this GSA meeting. Other chapters (which are also presented at this meeting) address difficulties students have with core issues in cladistics and the rock cycle. Her early publications dealt with Venusian and Martian soils and volcanism. More recently her work has focused on the aforementioned Lecture Tutorials, the development of outcomes- and assessment-based curricula in the geosciences, and misconceptions in geosciences, in general. Her grantsmanship is also enviable, as she is the PI or Co-PI on three NSF grants and a DLESE grant.

In addition to the Biggs award, Professor Kortz received the Dedicated Teacher Award at CCRI, and an award from the American Association of Woman Geologists. Part of her success in these endeavors is due to her initiative in making the effort to become a major player in the national geoscience community. This includes her involvement in DLESE, CERES & Cutting Edge activities, NAGT (for which she is the vice-president of the New England section), GSA, and AGU. Let me draw from the words of her peers, as they speak eloquently to her impact on all of us in Rhode Island and elsewhere in the profession: "This balance between challenging students and making a subject enjoyable is difficult to achieve, yet Karen has managed to do this in her classes.… It was interesting how the students tended to highlight different activities and projects, indicating to me how carefully Karen has constructed her class to use many different assessment techniques, such as web-research homework, presentations, small and large group discussions, and hands-on activities." and "Karen is a remarkably inventive and versatile teacher. She has collaborated on the creation of new types of curricula; most importantly, she strives to understand the effectiveness of the materials that she uses and develops. Her passion for teaching, for engaging students in research, and for being a life-long learner makes her an excellent resource for students. Karen seems to have boundless energy for teaching, understanding how students learn, and investigation of learning in her own classrooms."

Given the sad state of STEM education in the USA today, the infusion of young teachers such as Professor Kortz into the system is critical, especially at the community college level. CCRI, as with many community colleges nationwide, educates students who, to a greater extent than at four year schools such as the University of Rhode Island, have physical, cognitive, and cultural issues that impede learning. Karen is keenly sensitive to these issues and they are, at least partially the reason she has devoted considerable time and energy to development of alternative teaching instruments.

Bottom line, Karen Kortz is the complete package. She is a gifted teacher who is not content to limit her efforts to her own classroom. Rather, she is continually striving to improve science education, nationally as well as parochially, through her efforts to develop new methodologies and approaches to teaching. It has been my great fortune to have such a gifted young teacher as my student, colleague, and friend, to be able to watch her grow intellectually and professionally, over the last few years. And as a bonus, I've learned much from her about what comprises a great teacher and educator, and how to go about becoming one.

Response by Karen M. Kortz

I am delighted and deeply honored to be named this year's recipient of the Donald and Carolyn Biggs Award for Excellence in Earth Science Teaching. I thank Dr. Dan Murray, who nominated me, and my colleagues and students who wrote letters of support. I also thank the selection committee and the Geoscience Education division of the GSA for selecting me to be the newest member of this distinguished group of faculty. I am truly humbled.

I want to begin by saying that I am actually a second-generation Biggs recipient. Two of my former professors at Pomona College, Eric Grosfils and Linda Reinen, received the Biggs award. I appreciate their excellent teaching, and they have been wonderful role models for me.

My path to becoming a professor was not a straight and simple one. I didn't start off knowing what I wanted to do, and I ended up where I am now through a series of fortunate events. I entered graduate school with the goal of getting my Ph.D. After earning my Masters degree, though, I began to re-visit my long-term career aspirations. So, I took a break from graduate studies. At the same time, the local community college (the Community College of Rhode Island) was looking for an adjunct professor in geology, so I applied. Since it was one week before classes started, I got the job.

I quickly discovered that I loved teaching. However, after my first semester, I felt that I could do more to help students learn. I knew I could do better, but I wasn't sure how. Looking around online, I accidently stumbled across a website with information about On the Cutting Edge workshops. I had never heard of the workshops, but because they were free and because the one for beginning geology teachers sounded to be just what I needed, I attended.

The workshop, once more, changed my career. I not only learned about great ideas to improve my teaching, but also that there was a field of geology, called geocognition, where you actually learn how people think about geology. I have always loved geology, but now I had finally found my passion within the field.

After discovering the field of geocognition, I started doing some research on my own and began to re-entertain the notion of pursuing a Ph.D. At a meeting with representatives from colleges across the state (in Rhode Island, that's not too difficult), I talked to a geologist from the University of Rhode Island, Dan Murray. I floated the possibility by him that I was thinking of pursuing my Ph.D., and he was very enthusiastic about the idea and was willing to take me on as a student.

Since then, I've been researching and taking classes in addition to keeping my teaching position at CCRI, and I have been loving every minute of it. I want to thank Dan for his support and his nomination. He has been a wonderful mentor for me. He has guided my education and influenced my teaching with his broad interests ranging from art history to geology to cognition.

I also especially want to thank Jessica Smay, who has played many roles in my life. She is a colleague, a collaborator, a supporter, a friend, and my little sister. She also has an instinct for teaching, and has an excellent vision of how to approach the teaching of difficult topics. Our unique relationship as colleagues and sisters allows us to be excellent collaborators. And without her, I would not be where I am today.

In addition, I would like to thank my family. My parents always supported me in doing whatever I wanted that would make me happy, and I thank them for that. I couldn't have accomplished what I have done without my husband, Brian. He has been there for me, and his dedication and support have allowed me to take on everything that I have, and actually succeed at it.

I would like to wrap up by saying that I teach at a community college, and it is my understanding that I am only the second community college professor to be selected for the Biggs Award. I am honored to be in such prestigious company, but disappointed that there are not more community college professors selected for the award. Faculty at community colleges face difficulties not typically seen at four year institutions. Community college instructors are often the sole geologists at their schools, so they work in isolation, and do not have colleagues to nominate them for awards such as this one. They often do not have funding to travel to meetings, and their teaching loads prevent them from conducting research and publishing papers. As a result, although I'm sure there are many community college professors that are deserving of this award, their efforts are not being recognized. I hope that this is something that will change in the future.

Thank you again for this extraordinary honor.

MARY C. RABBITT HISTORY OF GEOLOGY AWARD

Presented to Gregory A. Good

Gregory A. Good
West Virginia University-Morgantown

Citation by Julie R. Newell

The Mary C. Rabbitt Award is presented annually by the Geological Society of America's History of Geology Division to an individual for exceptional scholarly contributions of fundamental importance to our understanding of the history of the geological sciences. Achievements deserving of the award include, but may not be limited to, publication of papers or books that contribute new and profound insights into the history of geology based on original research or a synthesis of existing knowledge."

This year's recipient of the Mary Rabbitt award, Gregory Alan Good, exemplifies the principles spelled out in the official description of the award. Not only does his own scholarship provides us with rich insight and careful analysis, but he has made a tremendous contribution to the scholarship in our field by challenging—and helping—many of us to produce stronger work than we would otherwise have been able to do.

Greg received his B.S. (with highest honors—which will surprise no one who knows him) in Physics from St. Vincent College in Pennsylvania in 1974. From there, he moved on to graduate work in History & Philosophy of Science at the University of Toronto, earning an M.A. and a Ph.D. From the very beginning, Greg's scholarly activity has been characterized by the four C's: content, clarity, context, and connection.

The *content* of Greg's work is broad and yet concrete. From his dissertation on the methodology of John Herschel's optics, through articles and papers on geomagnetism, and on into work on geophysics and geosciences, Greg's work is always rooted in the concrete: the individuals, the institutions, the methodology, and the scientific work that produce our evolving understanding of the small planet on which we all live.

And the story Greg tells in his scholarly work is always one rich in *context*—how the pieces fit together, why time and place and human nature and culture matter in how the science gets done. By exploring a number of adjacent fields—and always insisting that the history of the earth sciences is *plural*—Greg constantly reminds those of us who work only in the history of geology that geology exists as part of a family of sciences.

He tells this story with great *clarity*—both in his mastery of the details and the clarity of his writing. One of his greatest gifts to the scholarly content of the history of the earth sciences is to improve the strength of argument and clarity of writing in the work of others. He has been phenomenally generous—and gentle—with his gifts.

But the "C" that best characterizes the whole of Greg's work is *connection*. His contributions to the scholarship of the history of the earth science are multiplied by the constant connections he creates.

For Greg, the earth sciences is always multidisciplinary. He creates essential connections within the subject matter by drawing together multiple threads of the earth sciences in his own scholarship and by his editorial work. This is evident in the breadth and quality of the work that appeared in *Earth Sciences History* under his editorship (1998–2004). And I can personally attest to the fact that most or all of those papers were better written and their arguments more sound because they were subjected to Greg's keen eye and always constructive feedback. But even more important, and reaching a wide audience, his 1998 two-volume *Sciences of the Earth: An Encyclopedia of Events, People, and Phenomena* is an invaluable resource. Greg's introductory essay, "Toward a History of the Sciences of the Earth," gives the best introductory course in the history of the earth sciences that one could ask for—and in under ten pages. The final two sentences are not only a desideratum for the discipline, but an excellent description to Greg's scholarly work: "Let history be a repository for our memories of what we have tried, of what has been good and what has not. And let this history be based on an honest, hard-nosed evaluation of what we have known about the Earth."

The degree to which Greg creates connections reaches far beyond the content of his scholarly work. His model of scholarship requires connection to his university community, the broader community in which he lives, and the members of the academic community worldwide. It is this sense of human connectedness that shapes not only his written work but the way he works. Scholarship is conference papers and articles and books—and Greg has given us all of those, but it is also being there, being connected in a community of discourse that creates and disseminates understanding. Greg has given us that, too. And he's given it to us in person in the United States, in Canada, in Germany, in England, in Brazil, in Ireland, in the Czech Republic, in Denmark, and in Italy. He has worked and shared as a Smithsonian Post-Doctoral Fellow, a Carnegie Institution Research Associate, and a visiting scholar at Cambridge University—a tradition he will surely continue when he becomes Director of the Center for History of Physics at the American Institute of Physics this coming January. And he has surely created a community of scholarly discourse among his colleagues and students at West Virginia University.

The 4-Cs may be content, clarity, context, and connection rather than cut, color, clarity, and carat-weight, but it very much was my intent to imply that Greg Good is a diamond in the discipline of the history of the earth sciences. And I've very carefully counted my words so I might conclude with some of Greg's. Greg dedicated *Sciences of the Earth* to a recently deceased friend and mentor, who, he wrote, "taught me that a passion for the world and the living augments scholarship." We have all been enriched because Greg has learned that lesson so well, and because he shares the results so freely—in print and in person.

Response by Gregory A. Good

I am extremely honored that the History of Geology Division of the Geological Society of America has conferred the Mary C. Rabbitt Award in honor of my efforts in history of the earth sciences. This award says volumes about the broadminded tolerance of historians of geology, since so much of my writing lies elsewhere: history of physical optics and scientific method, history of magnetospheric physics, of meteorology, and climatology. And I do invite all of you to read my articles, which must seem far beyond history of geology to some. Much that I have written, however, I base on ideas I encountered at meetings of the Geological Society of America. My ideas grew out of contrasting the different views of earth science and its history among geologists, geophysicists, and many others. I strive to integrate – and differentiate – tales from Earth's core to its cosmic connections.

Don't, however, look for me to write a version of Alexander von Humboldt's *Kosmos* for the 21st century! I intend to continue my historical writing on more restricted topics, such as "Magnetic Lives," currently underway. A large part of this book does concern investigators of rock magnetism and paleomagnetism, but in the context of a broad range of geomagnetic topics. I hope also to write a few scientific biographies, one of the natural philosopher John Herschel and one of Sydney Chapman, aeronomer, theoretical physicist, and magnetician, to use his word. Both Herschel and Chapman contributed greatly to our understanding of Earth as a planet, although neither was a geologist. Maybe someday I will unite these interests into a history of knowledge of the Earth from a cosmic perspective, something like "Earth in the Heavens."

So you won't find much about paleontology or sedimentation in my writing. I approach the Earth from space, as a planet, at least back to Copernicus. Before that this approach is anachronistic. Earlier periods require the historian to approach the ideas of alien cultures, whose Earth was not whole, even when it was spherical. That is another story, another time, another historian.

My background differs from that of most historians of geology. As one might guess, I have come to this cosmic view of the history of the earth sciences from a different starting point. My first scientific love, astronomy, led me to major in physics. Astronomy, I thought, could wait until grad school. But I couldn't. I bought telescopes and built an observatory on a relative's farm. I lectured to school children in planetariums and assisted at observing sessions at my college. I eagerly read histories of astronomy. Undergraduate professors introduced me to Kuhn's revolutions and Polanyi's tacit knowledge. Then I stumbled on something new: history of science as a professional possibility. When I was filling out applications to grad schools for astronomy, I noticed that three had graduate programs in history of science. Two seconds with an eraser changed my future.

Given my different background, how did I end up spending so much time with geologists and historians of geology? Happy accident contributed somewhat, of course. My roommate in grad school, Tony Green, was a geologist who worked for a while on a mapping project for Tuzo Wilson. Evening discussions with Tony introduced me to plate tectonics. Summers took me to the Canadian Rockies, Newfoundland's "fiord" country, and various mountain ranges for peak bagging and botanizing. Camp talk centered on glacial rebound, William Logan, and the Franklin search expeditions. My job was to teach my friends about the history of exploration of these places. We also collected rock samples in the Byam Martin Mountains on arctic Bylot Island for a geologist back home.

Geologists, I find, have one advantage over physicists when it comes to history. Geologists, naturally, think about time. They think about a succession of unique events, whereas physicists seek uniform laws. I find geologists quite able to "get" what a historian is trying to do. So many stories told by historians of geology revolve around characters with a wonderful spatial imagination and a substantial appreciation of processes over geological time. The stories also show individual scientists to have been real people, who worked both the field and the study. All of these attributes of history of geology make this community a natural fit for me, even if I mainly write about histories of geophysics, geomagnetism, and electrical currents throughout Earth and near space.

I have benefited immensely from a series of editorial experiences. When I decided in 1990 to edit the Garland encyclopedia on the history of the earth sciences, I thought of it as a "community-building" activity. I thought it would be done in a few years and I could get back on track, writing the book that would promote me to professor. Eight years later, *Sciences of the Earth* burst from the press, at a price beyond most scholars' budgets. A tribute to my determination – I'm like a Labrador retriever that will not let go of the duck. But more so, this first-ever comprehensive history of (almost) all the geosciences was a tribute to 140 authors, from dozens of countries. The field needed a "state of the art" book so that the next generation of historians might proceed further. I learned much from all of those authors.

My seven years as editor of *Earth Sciences History* from 1998 to 2004 and then as subject area editor for geology and solid-earth geophysics for the *New Dictionary of Scientific Biography* from 2005 to 2007 provided my crowning experiences working with more wonderful historians of geology. INHIGEO has also widened my experience by putting me in face-to-face contact with many I had previously known only as authors.

I certainly have been privileged to have met and worked with so many good people, inquisitive people. Thank you for these experiences, and for the greatest honor I can imagine for a historian of the earth sciences, the Mary C. Rabbitt Award.

O.E. MEINZER AWARD

Presented to
Donald C. Thorstenson

Donald C. Thorstenson
U.S. Geological Survey-Denver

Citation by L. Niel Plummer

I am honored to introduce Donald C. Thorstenson as the recipient of the 2008 O.E. Meinzer Award of the Hydrogeology Division of the Geological Society of America. Don Thorstenson is a pioneering geochemist who has tackled some of the most difficult scientific problems in the hydrochemical sciences throughout his career. The impact that Don's science has had on the field of hydrogeochemistry is pervasive and multifaceted. He is a scientist who advanced the way we understand equilibria between impure solids and aqueous solutions, demonstrated the non-equilibrium nature of redox reactions in the environment, showed that individual molecules of isotopic gaseous species moved in accordance with thermodynamic theory in unsaturated zones, developed fundamental principles that govern modeling of geochemical reactions, and developed a means to calculate the distribution of individual isotopic species in aquatic systems.

Don's most significant publications include theoretical calculations and the application of theory to field experiments. One of the first papers Don published is from his doctoral research on the equilibrium distribution of small organic molecules in natural waters (Thorstenson, 1970, Geochim. Cosmochim. Acta, v. 34, p. 745-770). The paper explains how one can use equilibrium and irreversible mass transfer calculations to simulate reaction paths for species that are associated with the decomposition of organic matter. This paper set the stage for quantitative geochemical investigations involving redox reactions and has influenced the work of many who followed to study degradation of organic contaminants in ground-water systems.

At the USGS, Don began field investigations measuring the concentrations of multiple oxidation states of redox-active species in the Fox-Hills aquifer of North Dakota (**Thorstenson et al., 1979, Water Resources Research, v. 15, p. 1479-1498**). He then investigated the thermodynamic properties of the hydrated electron and the fundamental properties of the Standard Hydrogen Electrode (Thorstenson, 1984, U.S. Geological Survey Open-File Report 84-072, 45p). Through these studies, Don demonstrated, both in theory and in practice, that unique values of "the redox potential" could neither be defined nor measured in low-temperature natural environments. Don developed a convention for accounting for electron transfer that greatly facilitated modeling of geochemical reactions undergoing oxidation-reduction in ground-water systems.

In another area of research, Don and Niel Plummer investigated the thermodynamic behavior of impure solids in aqueous solutions. Don introduced the concept of "Stoichiometric Saturation", a thermodynamic state in which a mineral of variable composition reacts as if fixed in composition, a concept originally recognized by J. Willard Gibbs in the 1870s, but still on the back shelf of geochemistry. Don derived the fundamental thermodynamic relationships between solids that react to thermodynamic equilibrium and those in the kinetic state of stoichiometric saturation. He showed how to derive thermodynamic properties from stoichiometric saturation states. This research (**Thorstenson and Plummer, 1977, Amer. Jour. Science, v. 277, p. 1203-1223**) was the foundation on which numerous theoretical and experimental studies followed. The fundamental concepts developed by Don are now found in most geochemical textbooks, and are being employed in a variety of areas, such as nuclear waste disposal, cement stability and reaction behavior, and contaminant transport.

Don Thorstenson brought fundamental rigor to the study of unsaturated-zone gas transport processes. His work started with investigations of carbon isotopes in the unsaturated zone of the western Great Plains (Thorstenson et al., 1983, Radiocarbon, v. 25, 315-346). With Dave Pollock, Don brought the "dusty gas" model of porous media transport into the earth sciences and applied it to unsaturated-zone processes (**Thorstenson and Pollock, 1989, Water Resources Research, v. 25, p. 477-507**, and 1989a, Revs. Geophys., v.27, p. 61-78). Finally, Don applied his expertise to the assessment of nuclear waste disposal at Yucca Mountain (**Thorstenson et al., 1998, Water Resources Research, 34(6), 1507-1529**). Don recognized and demonstrated that isotopically different gaseous species of CO_2 ($^{14}CO_2$, $^{13}CO_2$, $^{12}CO_2$) had unique transport properties and therefore diffused independently and not simply with "total CO2" in natural porous media. Going further, he also reexamined the assumptions inherent in Fick's laws, and came to the conclusion that the application of Fick's laws could lead to significant errors in many real-world situations. His work advanced the understanding of unsaturated zone processes at Yucca Mountain. Working with Ed Weeks and others, Don showed that unsaturated-zone air residence times are only a few years in the shallow parts of the mountain.

Recently, Don Thorstenson developed a unified formulation that can be used to describe the transport and reaction of multiple isotopic species in gases, water and solids. Present approaches make such calculations using the average isotopic composition of the element, and do not explicitly allow consideration of individual molecular species interactions. In this latest research achievement (**Thorstenson and Parkhurst, 2004, Geochim. Cosmochim. Acta, v. 11, p 2449-2465**), Don went once again back to the basics, re-examining all the assumptions made in modern theories of isotopic fractionation, back through the classic works of Urey and others. In collaboration with David Parkhurst, this treatment has now been implemented in a version of the PHREEQC geochemical code. Don retired from the USGS National Research Program in 2003; however, he continues to expand the isotopic calculation capabilities of the PHREEQC code under the USGS Scientist Emeritus Program. It will likely be years before geochemists catch up with Don's research in this area.

For 20 years at the USGS, Don was one of the principal instructors for a training course on the geochemistry of ground-water systems. This course produced a generation of hydrologists and geochemists who

---
** Citation publications noted in bold.*

have gone on to apply their knowledge to many USGS programs at state and national levels. Don leaves a legacy of outstanding fundamental science that has profoundly influenced the application of thermodynamics and kinetics to hydrogeological systems. As recipient of the 2008 O.E. Meinzer Award, we thank Don Thorstenson for helping us get to where we are today and for the path he has put us on for the future.

Response by Donald C. Thorstenson

I would like to thank the Hydrogeology Division, the awards committee, all those involved in nominating me for this award, and Niel Plummer for his flattering citation. Many people are owed heartfelt thanks for the fact that I am here. First and foremost, the three most important people in my life, my wife Gail and sons Eric and Donald. Gail put me through school, raised the kids, helped support the family, and with Eric and Donald survived many summers in unexpected places. But most of all, she was always there with a sympathetic ear for uncounted hours when I would arrive home from work feeling the need to talk Had she been able to charge proffesional therapist rates, she would now be a wealthy woman.

In an amazing stroke of good luck for me, Bob Garrels, Hal Helgeson, and Fred Mackenzie all arrived at Northwestern University the year after I enrolled there as a graduate student in geology. In addition to his teaching, Bob spent many hours working with me on practice oral exams in the hope that I might survive the real thing, and Hal and his courses provided the theoretical and computational framework for my dissertation. Fred (who I worked with for another decade) showed me how to integrate it all in the field and laboratory, at times shared his home with me, and helped get my career off to a running start.

From Northwestern I moved to a faculty position at the Department of Geological Sciences at Southern Methodist University, where four graduate students deserve my thanks—Bob Leeper, Alfred Liaw, Jackie Pruitt, and Keith Talley. At SMU I developed an interest in groundwater studies, and through Blair Jones, was able to arrange a sabbatical year at the USGS Water Resources Division geochemical research group in Reston, Virginia. Two years later I moved to the USGS permanently.

Shortly after my sabbatical arrival, Don Fisher and I attended a USGS coal hydrology meeting in North Dakota, where we met Mack Croft, who introduced us to the Fox Hills Aquifer. Mack had the hydrologic expertise, Don the analytiical skills, I did the field work and modeling, and the result was the cited paper on Fox Hills geochemistry.

The second cited paper, with Niel Plummer, deals with magnesian calcites and solid solution theory.

Niel had a data set, I had some theoretical concepts, and the result was a paper outside the realm of conventional geochemical wisdom—the following year it received 33 journal pages of discussion, pro and con. The literature search for work supporting our concepts led me finally to the classic work of J. W. Gibbs (1878) where they were laid out clearly. Had he possesssed Niel's data set, and the aqueous speciation concepts available to us, he could have published our paper exactly 100 years earlier. It's hard to be truly original…

Niel mentioned in his citation the work on thermodynamics of hydrated electrons. This research was done with John Hostettler, a friend and physical chemist from San Jose State. John spent a sabbatical year at the USGS pursuing this topic and its implications for natural redox processes. The resulting publications could not have happened without him.

Early in my sabbatical year I also met Ed Weeks. Approximately a year later, Ed, myself, and Herb Haas were in the field to begin a 2-decade study of unsaturated-zone $^{14}CO_2$ distribution and gas transport. Herb was director of the radiocarbon laboratory at SMU, then DRI Las Vegas, and in addition to providing the ^{14}C analytics, worked in the field with us throughout these studies. Much of our early work was done at a lignite mine in North Dakota, where we noted small gradients in N_2 and argon at a site where advective transport processes other than barometric pumping appeared to be minimal. The quest to explain these gradients led to the literature of the "dusty gas" model.

The dusty gas mathematics are daunting, and I was near, or at, the limit of my abilities when another chance meeting occurred, this time with Dave Pollock. Dave's background is in chemical engineering, and he brought a new and much greater understanding to this work. We generated various applications of the dusty gas equations to the North Dakota field site, but the only contribution to the actual dusty gas model itself—showing that the equations kept the same form in terms of potentiometric head, as well as pressure—was produced entirely by Dave.

Ed Weeks eventually led our unsaturated-zone studies to Yucca Mountain. Here advective gas transport is dominant, exemplified by the "blowing boreholes" that Ed is noted for studying. The geochemical aspects of this study helped identify CO_2 sources and put a time frame on the transport processes in the mountain through the use of carbon isotopes and CFC's. Many thanks are due coauthors Ed Weeks, Herb Haas, Ed Busenberg, Niel Plummer, and Charlie Peters.

I also met Dave Parkhurst during my sabbatical—another personal and professional association to span three decades. Dave, Niel, and I worked on the geochemical modeling code PHREEQE, worked and published on forward and inverse geochemical modeling, and jointly taught a USGS-WRD geochemistry course for more than twenty years. Recently Dave and I published the last paper cited in this award. Once again I had some theoretical concepts, and in this case, Dave was able to implement them in PHREEQC, resulting in the ability to calculate individual isotope equilibrium constants from fractionation data. Originality was again hard to come by - in his classic 1947 paper, Harold Urey calculated fractionation properties for the individual species H_2O, HTO, and T_2O, to cite one example. Had today's aqueous speciation modeling capabilities been available then, it seems very likely that calculations of Urey and/or his colleagues would have taken the same direction that I did 60 years later.

I was very surprised to be invited out of near-retirement to receive this award, and extrordinarily pleased and honored to do so.

INTERNATIONAL DIVISION DISTINGUISHED CAREER AWARD

Presented to Rolf Emmermann

Rolf Emmermann
GeoForschungsZentrum, Potsdam, Germany

Citation by Paul T. Robinson

It is my pleasure this evening to introduce Professor Rolf Emmermann, of Potsdam, Germany, the winner of the 2008 GSA International Division Distinguished Career Award. Prof. Emmermann is a leading international scientist who has made extraordinary contributions to the geosciences in several roles. He served for 15 years as Director of the GeoForschungsZentrum (GFZ), Potsdam, Germany, a national geoscience research center set up in 1991, following German reunification. Professor Emmermann was the first Director of the Institute and has been responsible for its direction and accomplishments since its inception. During his 15 years as Director, the GFZ grew to include a staff of nearly 700 and gained international recognition for its innovative science, particularly in the fields of mineralogy, geochemistry, geophysics and remote sensing. The GFZ is currently the leading geoscience institute in Germany and one of the most prominent in Europe. It is famous not only for cutting-edge scientific research, but also for responding to the needs of society. For example, immediately after the deadly earthquake and tsunami that struck Indonesia in 2004, Professor Emmermann sought funding from the German government to set up a tsunami early warning system, which is now in place. Under Professor Emmermann's direction, the GFZ also aids and mentors young scientists from developing countries, allowing them to use state-of-the-art analytical equipment and to interact with established scientists.

Professor Emmermann is one of the world's most effective supporters of scientific research drilling. He first became involved with research drilling as a participant on DSDP and ODP cruises in the Atlantic, Pacific and Indian Oceans. As a result of this experience, he became a strong advocate for continental drilling and in 1986 he became Coordinator of the German Continental Deep Drilling Project (KTB). The KTB sampled nearly 10 km of continental crust in southern Germany, providing new insights into the tectonic evolution of Europe, the 3-dimensional structure and composition of the crust and the relationship between geophysical data and crustal lithology. The scientific success of this project was due largely to Prof. Emmermann who served as the Scientific Director of the program from 1989-1995. Professor Emmermann led a team of over 150 scientists who collected a vast array of core and borehole data, all of which was carefully integrated with the local geology and regional structure.

The successful completion of this decade-long venture was a remarkable achievement in its own right but it had implications far beyond this one project. Building on the success of the KTB, Prof. Emmermann vigorously pursued establishment of the International Continental Drilling Program (ICDP). He organized a coordinating committee, held an international conference attended by 250 scientists from around the world, and in 1996 signed a MOU with Germany, China and the USA formally establishing the ICDP. The membership now stands at 17 countries and 2 corporate affiliates, and negotiations are underway with several additional countries that wish to join. The ICDP owes its existence to the vision, scientific knowledge, determination and political skills of Professor Emmermann. Headquartered at the GFZ since its inception, the ICDP has carried out a highly successful program of research drilling throughout the world. Working with a relatively small budget, the ICDP has produced vast amounts of valuable information on meteorite impact structures, ultrahigh pressure metamorphism and tectonics, volcanic and hydrothermal activity, fault characteristics, paleoclimates and natural resources. The success of this program is due in large part to the scientific management and oversight provided by Prof. Emmermann.

Professor Emmermann was trained as a geochemist and his personal research has involved the study of igneous rocks in a number of different environments. He has focused on four main areas of research: study of Mesozoic igneous complexes in Namibia related to rifting of the African margin, investigation of oceanic seafloor basalts and gabbros utilizing the DSDP and ODP, as well as drilling projects in Iceland and Cyprus, study of Andean volcanism and investigation of continental crust utilizing deep drilling. In addition to carrying out personal studies, Professor Emmermann was typically the leader or coordinator of these projects, which involved graduate students, post-doctoral fellows and numerous colleagues.

Professor Emmermann has had a dramatic impact on international geoscience over a period of 30 years. His contributions extend from development of a new world-class scientific institute to establishment and direction of the International Crustal Drilling Program. His scientific knowledge, energy, enthusiasm and dedication have created new research opportunities for geoscientists from around the world. He is an ideal selection for the 2008 GSA International Division Distinguished Career Award.

Response by Rolf Emmermann

I am very glad and deeply honored to receive this prestigious award from the International Division and the GSA Council.

The geosciences are progressing fast. During my professional career I have experienced two major revolutions that fundamentally changed our view on the nature and workings of planet Earth. The first, the plate tectonic revolution, was essentially restricted to the solid Earth. But the second encompassed the entire Earth as a system, from the inner core of our planet to its outer magnetosphere. This System Earth is highly dynamic and subject to perpetual change. It is comprised of a multitude of subsystems linked by numerous interwoven cycles and is distinguished by fluxes of matter and energy across all its interfaces. Processes operate on a vast range of spatial and temporal scales with intricate patterns of interaction that preclude simple predictability. Current research, therefore, is focussed on monitoring and modelling key-geoprocesses and quantifying the interference of mankind with parts of System Earth.

The German poet Bertolt Brecht, in his play about the life of Galileo Galilei, captured the turning-point of astronomy in these words: "I tell you, astronomers did not progress for a thousand years because they did not have a telescope." In geology, scientific drilling has become our "telescope". The turning-point in our science was the proof of the Seafloor Spreading hypothesis by a series of drillings into the ocean floor conducted by the famous Glomar Challenger in the early stages of the Deep Sea Drilling Project. Immediately after the internationalization of this US-american program, I got the chance as a young professor at the University of Karlsruhe to participate in this research frontier of the Earth Sciences. And it was this experience, the intense discussion about science goals, drilling targets and site selection as well as the dependence on and need for appropriate technologies, that greatly influenced my later career.

With the progress of ocean drilling and the confirmation of the theory of plate tectonics it soon became evident that we had to reconsider all our views about the evolution and dynamics of the continents. Because our models on the architecture, properties and state of the continental crust at that time were mainly based on surface geology, geophysical deep sounding and laboratory experiments, "ground truth" was required and that could only mean: direct observation and testing through drilling. In Germany we began development work in the late 1970s for the concept of a national Continental Deep Drilling Program. This concept was, for two main reasons, from the very beginning centred around a superdeep borehole embedded in a large-scale R&D program: First, we wanted to obtain fundamental data on the crustal stress field by drilling down to the present day brittle-ductile transition; and second, we wanted to push the development of innovative methods and new technologies by advancing the frontiers of Earth drilling.

Out of this effort came Germany's first "big research project" in the geosciences, the KTB. The KTB achieved all major goals and it greatly enhanced our knowledge on the makeup and functioning of the continental crust in the sense of System Earth. Its integrated scientific and technical approach provided a new perspective on the role for scientific drilling in modern Earth system research, its tremendous potential and its formidable challenges as well. I had the good fortune to be intimately involved with the KTB program from beginning to end, as scientific coordinator and director. Like the DSPD to ODP transformation before, the KTB was a national program which then promoted the establishment of an International Continental Scientific Drilling Program, the ICDP.

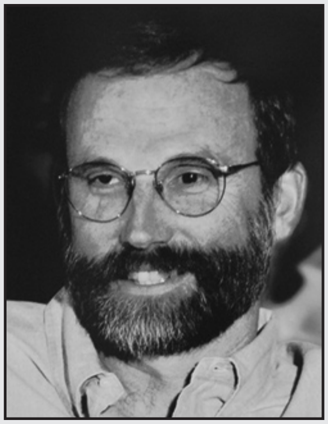
In my country, the success of the KTB program and a growing awareness of the importance of geosciences for society and economy, led to the founding of the GeoForschungsZentrum Potsdam (GFZ) as the German Research Centre for Geosciences. This was in 1992, shortly after the German unification. A major task of the GFZ, from the very beginning, has been to promote geoscientific research in Germany through development of modern technologies and provision of scientific infrastructure and large-scale facilities for joint programs in national and international cooperation. Today, the GFZ has, I think, made its mark in international geosciences as well.

Among the outstanding achievements of the GFZ is the realization of the concept of dedicated "Low Earth Orbiting Satellites". In close collaboration with the German Aerospace Centre (DLR) and three other National Labs current R&D activities concentrate on the overarching strategic aims of the research area "Earth and Environment" which due to the climate discussion has received a high political priority in my country. By linking the Earth observation activities and competences of these four centres and by integrating the methodological spectrum of all partners, from remote sensing to process modelling, we have established a national Research Network "Integrated Earth Observing System". Goals of this collaboration, which has a particular focus on probing System Earth from space, are the documentation and long-term monitoring of its state as well as the assessment of fluctuations and changes and the determination of global, regional and local trends. The vision is to derive critical tolerance limits and threshold values and to quantify the human interference. This knowledge is critically needed for orientation and policy recommendations aimed at the sustainable use of habitat Earth, for the sustainable management of its natural resources, and for the protection of the environment. These are the grand challenges which both the geosciences and the society have to cope with in the next decades and which require a broad international cooperation and effort.

Thank you, Paul, for your citation; I have profited immensely from our long-term friendship and fruitful collaboration over the years. I also wish to extend my sincere thanks to my colleagues and friends Professor Bill Fyfe and Professor Mark Zoback for their continuing support and sage advice on so many occasions. And finally, my thanks to the Geological Society of America for this distinction.

G.K. GILBERT AWARD

Presented to Philip R. Christensen



Philip R. Christensen
Arizona State University

Citation by Ronald Greeley

I first met my friend and scientific colleague, Phil Christensen, during the Viking mission to Mars in 1976. Those were indeed heady times, with the first successful landings on the Red Planet, and the successful operation of two spacecraft in orbit, with all four spacecraft operating concurrently. Phil was part of Hugh Kieffer's *Thermal Infrared Mapping Spectrometer* team, which allowed him not only to hone his skills in the science of IR remote sensing, but also to learn the complexities involved with flight-qualified planetary instruments. After coming to Arizona State University, Phil was able to put those skills to use through his innovative application of the IRTM data to solve some of the mysteries of Mars, as well as to position him to propose successfully the *Thermal Emission Spectrometer* (TES) instrument for the ill-fated *Mars Observer* (MO) mission.

Anyone who has suffered a spacecraft failure can relate to the agony experienced by Phil and his team during the attempted insertion of *Mars Observer* into Mars orbit. The silence was deafening, awaiting the never-received signal from MO; later analysis indicated that the spacecraft had experienced a catastrophic explosion. Not to be deterred, Phil worked diligently to build the case for a re-flight to achieve the original science objectives of the MO mission. Although it would take three subsequent orbiters to meet this overall goal, Phil's TES experiment was selected among the first to fly on the highly successful *Mars Global Surveyor* spacecraft.

The scientific achievements from the TES experiment are too numerous to list here, but we can highlight one that stands apart from all the others, and which was critically important for planetary geology, and that was the proposed identification of hematite in specific locations on Mars based on TES data. If this hypothesis could be shown to be correct, it would have profound implications for the history of Mars and the evolution of its surface. Based on this hypothesis, one of the *Mars Exploration Rover* (MER) sites was selected to test the idea and provide "ground truth" for the IR remote sensing data. As is well known now, the MER *Opportunity* results confirmed the existence of hematite and, coupled with other observations, have shown the critical role played by water in Mars' surface history.

Allow me to segue into what I believe is a unique accomplishment by Phil. During the operation of TES, he and his technical and scientific teams developed concepts for a "mini-TES," capable of operating from Mars' surface to complement observations from orbit, as well as a "next-generation" IR instrument, the THEMIS (Thermal Emission Imaging System). Mini-TES was proposed as part of the MER Athena payload, while THEMIS was proposed for the Mars Odyssey orbiter. All of these experiments were selected for flight, leading to what I believe is unprecedented in planetary science by a PI—the operation of four instruments all operating concurrently: TES on *Mars Orbiter*, Mini-TES on *Spirit* and *Opportunity*, and THEMIS on *Mars Odyssey*.

Throughout this period of intense instrument development, operation, and data analysis, Phil conducted front-line research in terrestrial remote sensing and field work, and trained a cadre of students and post-docs who today are leading planetary scientists. Incredibly, at the same time, Phil and his team developed the premier NASA education and outreach program for Mars, leading to thousands of teachers and students who are now better equipped to understand the Red Planet and planetary science in general. As part of this activity, Phil was invited by China to show-case Mars exploration, representing the first University to do so. Attending by some thousands of visitors, the exhibit helped pave the way for China to join the "deep-space" club for planetary exploration.

In summary, Phil has set the "gold standard" for planetary geology through his scientific discoveries, development of successful leading-edge instruments, community service contributions, and training of the next generation of scientists. Ladies and gentlemen, I am honored to present the 2008 recipient of the G. K. Gilbert Award by the Planetary Geology Division of GSA, Professor Phil Christensen.

Response by Philip R. Christensen

Let me begin by expressing how deeply honored I am to be receiving the G.K. Gilbert award. When I am asked what it is I do, I always respond by saying that I am a geologist - not a Mars scientist, or a geophysicist, or an instrument builder - so receiving this award from the Geological Society of America is truly an honor. I would like to specifically thank Ron Greeley and all those who supported my nomination, and Ron for his very generous introduction. This award is especially meaningful to me because I have long admired G.K. Gilbert and have been intrigued by many of the same scientific questions that he pursued throughout his career. I grew up in the west, having been born in Utah and lived in Kansas and California. Each summer my family would drive across the west to visit our scattered relatives, and during those long drives I spent many hours looking out the window of our car at the mountains and landforms. I didn't realize it at the time but I was becoming a geologist. Much like Gilbert, I was fascinated by the western landscape and wondered at its formation and history. My family liked to explore out of the way places and we probably traveled many of the same routes that Gilbert did, seeing landscapes that have not changed much since his time. When I was 12 my parents gave me a telescope and, again like Gilbert, I spent countless hours looking at the Moon. The only features I could see with my small telescope were the craters, and in reading the few books about the geology of the Moon I quickly learned of Gilbert's early hypothesis for crater formation and his role in shaping our understanding of the Moon's history. Finally, like Gilbert I have worked to bring quantitative analysis to geology. Hugh Kieffer instilled in me the understanding that in order to study the planets it is necessary to make quantitative measurements and apply quantitative models. Following Hugh's inspiration I have spent much of my career working to build instruments that give us the data we need to advance our knowledge of the processes by which planetary surfaces evolve.

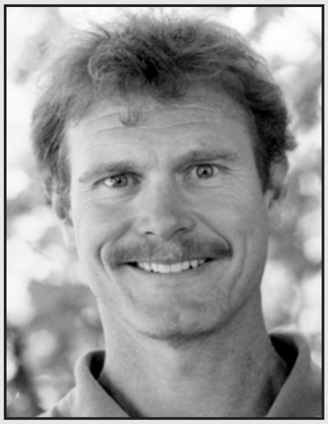
The past 30 years have been a remarkable period in planetary exploration, and I consider myself to be very fortunate to have participated in this modern age discovery. Throughout these years many people have inspired me, and many more have contributed to the results that have defined my career. Hugh Kieffer has played a remarkable role, from the job he gave me cutting up Mariner 9 images as an undergraduate, to his mentoring me through graduate school, to his willingness to point me in the right direction but let me find my own way as I attempted to build flight hardware. Ron Greeley provided a wonderful opportunity for me at ASU and I have benefited greatly from his guidance. From Ron I have learned the importance of participating in the exploration process. Ray Arvidson, Bruce Jakosky, Rich Zurek, Arden Albee, and Mike Malin are among the many who have inspired and tempered my thinking and provided encouragement and stimulation. Finally, I would like to sincerely thank my wife Candace and our kids Kevan and Alexandra who have led me to understand what is truly important in life.

One of the greatest pleasures I've had over the past 25 years has been the opportunity to work closely with a remarkable group of engineers, including Still Chase and Steve Silverman. This experience has made a deep impression on me about the benefit, and personal enjoyment, that comes when scientists and engineers work closely with a shared vision.

The future of planetary geology is remarkably bright. In my lifetime our perception of Mars has changed from a point of light in the night sky to a complex planet we are coming to know as well as our own. The images we have of Mars rival the views I had out the window of our family car, and the data being acquired will allow us to investigate Mars in the same way and to the same depth that geologists investigate the Earth. We are now asking questions about Mars that are as complex as those that Gilbert asked about the American west over 100 years ago. I am extremely proud to have helped form a new generation of geologists who are pressing these questions forward. Their talent and enthusiasm give me great confidence that the next 30 years will see an explosion in our understanding of our solar system and the increasing application of geologic methods to planets beyond our own. In closing, let me say again how honored I am to have received this award, how rewarded I feel at having had the opportunity to work with a remarkable group of students and young scientists, and how excited I am about the future of planetary geology.

KIRK BRYAN AWARD FOR RESEARCH EXCELLENCE

Presented to Jon J. Major



Jon J. Major
U.S. Geological Survey, Vancouver, Washington

Citation by Barry Voight

It is my very great pleasure today to introduce Jon Major as the recipient of the 2008 Kirk Bryan Award for Research Excellence. The award recognizes his contribution to geomorphology through the publication of the paper, "*Posteruption suspended sediment transport at Mount St Helens: decadal scale relationships with landscape adjustments and river discharges*", which appeared in 2004 in the *Journal of Geophysical Research*.

Jon's paper addressed the widespread landscape disturbance by the great 1980 eruption at Mount St Helens, which damaged or destroyed many tens of thousands of hectares of vegetation, displaced or altered several river corridors, and deposited large volumes of easily erodible sediment on hillslopes and in channels of several watersheds surrounding the volcano. Jon recognized the exceptional opportunity to examine the responses of sediment yields and peak flows to the abrupt and devastating disturbances. He was well aware of the value of a great and sustained compilation of 15 years of unique hydrologic data, then mainly collecting dust in USGS archives. Assuming leadership of the geomorphology project, he chose to combine thorough statistical evaluation of these rich and unique data with his own field observations and insights on processes. The result is a wonderfully well-documented study of landscape disturbance, one that in my experience is unmatched.

Jon distinguished between the impacts on hydrologic responses of 1) a debris avalanche that buried 60 sq km of valley, 2) a lateral volcanic blast that destroyed 550 sq km of forested terrain and deposited (mainly) a sandy tephra with a silt cap, 3) debris flows that reamed channels and deposited decimeters to meters of gravelly sand, and 4) pumice fallout forming decimeter thick gravelly/sand deposits proximal to the volcano. The spatially complex disturbances produced a variety of compensating effects that influenced hydrologic responses. The disturbances abruptly increased basin sediment supplies and transiently decreased infiltration, increased surface runoff, and reduced channel roughness. As a result, Jon could demonstrate that the sediment yields from disturbed watersheds increased initially as much as several hundredfold. He showed that sediment transport has been greater and more persistent from basins having severely disturbed channels, than from basins having mainly disturbed hillslopes. The temporal patterns of posteruption sediment transport mainly reflect depletion and isolation of the primary sources of sediment, but also reflect the variations of water discharge. Jon showed that the persistent extraordinary sediment yields from much-disturbed channels indicate that the supplies of sediment remain accessible, and will not be exhausted for many more years and perhaps decades. This result led Kevin Scott to conclude that, *"Jon's expert and devoted analyses are not only a model of scientific endeavor—his body of work on this subject will save lives and public expenditures in the future…"*

I'll add here just a few other quotations from exceptional scientists to illuminate the quality of Jon's research. From John Costa, National Flood Science Coordinator: *"Jon's 2004 publication…is a wonderful example of rigorous interpretation of the changes, response, and recovery of a catastrophically disturbed landscape… I cannot think of another example of documentation of extensive disruption and careful documentation of processes that follow the landscape response that is as carefully documented and presented as this one."*

Jim O'Connor, a former recipient of the Kirk Bryan Award (1995), says this: *"This paper is a major contribution to the field of geomorphology and Quaternary geology. It addresses the fundamental question of the magnitude and frequency of geomorphic processes and does so with leading-edge quantitative analysis of one of the most complete sets of data ever collected for documenting the effects of major landscape disturbance on water and sediment transport." Jon's research provides "one of the most comprehensive and data-rich analyses of major landscape disturbance ever attempted…"*

Jon Major has enjoyed a distinguished career with the USGS, in geomorphology research, and in the mitigation of volcanic flowage hazards. He has published numerous high-impact journal articles and important USGS publications, and has participated in many responses to volcanic crises. I am proud of what he has accomplished in science and public service. I am equally proud of his strength of character. At the risk of embarrassing him, I want to mention one instance to illustrate the point. In the early 1980s, the debris avalanche deposit at Mount St Helens was being studied in unprecedented detail by Harry Glicken, under the direction of the late Dick Fisher of UCSB, and myself. At the same time, Jon was also engaged in thesis research, involving lahars on another part of the volcano. Many of you know that Harry had narrowly missed death in the 1980 Mount St. Helens blast, but later lost his life along with volcanologists Maurice and Katia Krafft and forty Japanese, from a pyroclastic density current at Mount Unzen in Kyushu on 3 June 1991.

Glicken's 300 page revolutionary thesis on the debris avalanche remained unpublished. Jon Major then sought to remedy this, and on his own time, and borrowing time from his own research, he revised Harry's thesis, had all the illustrations and plates redrafted, and prepared for its publication as a USGS Professional Paper. When the USGS, because of a budget crunch, had to relinquish plans for the publication, Jon persevered and finally saw to it that Harry's thesis was published in full, by the Geological Society of Japan. For this achievement, which did much to stimulate debris avalanche research worldwide, Jon received no personal credit, and yet he had sacrificed about a year of his personal and intellectual pursuits.

I mention this saga in the citation in the hope it might inspire others to serve science in a similar fashion, should occasion arise, and also because it is a measure of the character of our Awardee. On the other hand, when it came time for Jon to measure the hydrologic response of the gigantic debris avalanche deposit at Mount St Helens, it might also be said that Jon was thoroughly prepared.

Jon's research on landscape disturbance at Mount St Helens has produced a monumental work that advances the science of geomorphology, and is eminently worthy of the Kirk Bryan Award. I am sincerely proud of Jon, in many ways, and I congratulate him on this well-deserved recognition of his groundbreaking achievement.

Response by Jon J. Major

Thank you, Barry, for nominating the paper, for your generous citation, and for your mentorship. I also wish to express my sincerest gratitude to Richard Iverson, Kevin Scott, John Costa, Jim O'Connor, and Tom Dunne for their fervent support of the nomination, and to the Quaternary Geology and Geomorphology (QG&G) Division panel members for selecting this paper to receive the Kirk Bryan award.

As the QG&G Division secretary, I was in the odd position of not only knowing that this paper had been nominated, but also of serving as the conduit through which all the other nominations flowed. You will be pleased, but not surprised, to know that we have very talented members in our discipline, as several worthy papers were nominated for this award. I was thus extremely surprised, but most delighted, to learn that my paper had been selected for the award. I am honored, but very humbled, to join those who have previously received this award. I am also acutely aware that this is the 2nd consecutive Kirk Bryan award given to a member of the current QG&G management board. I can assure you that this is merely a happy coincidence mdash; board members receive no advantage in the evaluation process, and awardees certainly need not be board members.

Receiving this award is particularly gratifying for several reasons. This is the 50th time the award has been given. By my count, 18 of those awards have gone to USGS scientists, in whole or in part. But most noteworthy is the fact that this is the 4th time in a generation that the award has gone to someone at the USGS Cascades Volcano Observatory (CVO)—where awardees Richard Iverson, Kevin Scott, and Richard Waitt reside—or perhaps the 5th time if, by extension, I include Jim O'Connor of the USGS Oregon Water Science Center, who received the award for a paper he completed during his tenure as a postdoc at CVO. It is an honor to work at this institution, and a pleasure to work with these and other colleagues of such high caliber. I thank the late Dick Janda and John Costa for providing my career an unconventional trajectory by taking a chance and hiring me with only a MS degree, and then supporting my pursuit of the PhD afterwards. And I appreciate Barry Voight, Richard Iverson, and Tom Dunne taking me under their wings as a student and providing the occasional kick in the pants.

This award is also gratifying because to me it represents a triumph of what I will call "small" science within the field of geomorphology—the kind of science that flourished in Kirk Bryan's day. This is not to say that collecting and processing sediment data over decadal time scales is easy or inexpensive—indeed it requires significant financial and physical resources, and is the type of work the USGS is uniquely suited to conduct. What I mean is that this was a simple, unglamorous, low-profile, small scale project that relied on a foundation of unparalleled data that was freely available in the public domain, rather than the fruit of a multidisciplinary, multi-institutional "big" science project that is commonly sought and aggressively funded these days. I am grateful to the managers of the USGS Volcano Hazards Program for their appreciation of the significance of long-term sediment data collection and to my past and present supervisors for letting me pursue my curiosity unabated. This award also shows that volcanology is truly interdisciplinary—and not simply the bastion of petrologists, seismologists, and geophysicists—and highlights the theme that posteruption geomorphological processes can have more direct societal impact than an eruption itself, something that is sometimes overshadowed within the volcanological community. It also speaks to the need to maintain long-term gauging stations throughout the nation, and the need to figure out how to establish viable, long-term sediment measuring programs—a need that may increase in importance as, for example, more and more moderate to large dams impounding large amounts of sediment are removed across the nation.

Although mine is the only name on the paper, this award in spirit recognizes the supreme efforts of many others who collected, and in some instances initially analyzed, the high-quality data upon which the paper is based—Kurt Spicer, Tom Hale, Dennis Saunders, Randall Dinehart, Dallas Childers, Rick Kittleson, Karl Lee, Mark Uhrich, Dave Meyer, and Holly Martinson to name a few. It is said that ideas come and go, but good data are immortal. To those hardworking colleagues, I offer my sincerest gratitude for creating immortality. I especially recognize the initial data analyses by Randall Dinehart, which served as a launching point for my own analysis.

Regarding Barry's comment about my involvement seeing Harry Glicken's study of the Mount St. Helens debris avalanche come to fruition, I'll say that it was simply a way for me to honor the memory of a friend. I regret that I failed to fulfill Harry's dream of getting it published as a USGS Professional Paper, but I delight that what was published has had such international impact on the fields of volcanology and mass movements. Under different circumstances perhaps Harry might have received the Kirk Bryan award for that work.

To my wife, Michelle, I offer my deepest appreciation for letting me pursue an unconventional lifestyle while she leads the charge handling our spirited twins.

In closing, I want to thank Pete Antilla, now retired from the USGS, for asking me a simple question: after noting that suspended sediment flux is a double mass problem he wanted to know whether sediment concentration or water discharge was the major control on long term trends in sediment flux at Mount St. Helens. Such a simple question launched the analysis that culminated in the paper that is honored today. I also thank John Pitlick, Peter Wilcock, and Rob Ferguson for helping shape the final form of the paper. Finally, to the anonymous reviewer who wrote a particularly scathing review of the original manuscript, I hope you found something positive to take away from the published paper. Thank you, GSA and QG&G for this wonderful honor.

LAURENCE L. SLOSS AWARD

Presented to Peter G. DeCelles

Peter G. DeCelles
University of Arizona

Citation by Stephan A. Graham

Dr. Peter DeCelles is imbued with the same passion for regional- to sub-global scale sedimentary geology as was Larry Sloss, and is richly deserving of the award named in his honor. Consistent with the Sloss legacy, an overarching aspect of Pete's career is his ever-broadening view of sedimentary systems as he focuses on important problems in earth sciences, such as the origins and evolution of orogenic plateaus as reflected in the sedimentary record. Pete is especially identified with his major contributions to regional sedimentary geology and sedimentary tectonics in western North America, southern Asia, and Andean South America. These geographic concentrations reflect Pete's career focus on foreland basin and fold-thrust systems (although he also has worked in rift and strike-slip basin systems). For a broad group of geoscientists, including structural geologists/tectonicians, Pete's name is synonymous with foreland systems. Viewed either topically or geographically, it is impossible to conduct a literature search on foreland basins of South America, western North America or southern Asia without encountering the name of Peter DeCelles.

His studies in Asia, in particular, have a holistic feel to them. In that work, he has explored the linkages between deep crustal processes; upper crustal structure; surface uplift, geomorphology and elevation; weathering processes and products; denudation and sediment accumulation. Accordingly, he has variously employed, through development of new personal skills or through collaboration, a wide variety of investigative methodologies that go well beyond the 'normal' sedimentary approaches of facies analysis and sedimentary petrology, including light stable isotope geochemistry, detrital grain geochronology, structural geology, and paleomagnetism. In the course of his general studies of foreland systems, Pete has contributed to development of methodologies in sedimentary geology ranging in scale from measurements of cross-bedding in outcrop, to linked sedimentary-structural response in creation of retro-deformable balanced structure sections.

In addition to these readily identifiable, direct contributions to sedimentary geology, Peter DeCelles has made and continues to make an even more important contribution to the future of the science in the legacy of graduate advisees advanced to the professoriate. His former students occupy faculty positions in sedimentary geology at colleges and universities across the U.S. and internationally, including a number of prestigious institutions. These former students will impart the DeCelles rigor and work ethic (integrated with their own personal styles) to successive generations of sedimentary geology students.

Many career awards are made retrospectively. In Peter DeCelles' case, it is appropriate to recognize his past contributions, but in fact, his career contributions are notably forward-looking. Most sedimentary geologists realize that an important future path for our science lies in better understanding the linkages between sediment production, transport and sedimentation, and the rest of the earth system. Peter DeCelles' career contributions provide a wonderful example for young sedimentary geologists of how to view sedimentary systems in a larger earth context. He is an exemplary recipient of the Sloss Award.

Response by Peter G. DeCelles

I am thankful to the Geological Society of America and to my colleagues and peers for this recognition, which I feel so fortunate to receive, and to you Steve, for this kind and generous citation.

My story is one of teachers and collaborators who have guided me and opened doors to new problems and opportunities. I met Larry Sloss at a field conference in Montana back in 1981, at the end of my first dissertation field season. My advisor Lee Suttner had been unable to attend the meeting, so he kindly asked me to give his presentation. The talk was a sweeping synthesis of the Montana Cretaceous foreland system, so I was forced to learn Lee's broader view; at the same time I could pretend that I had somehow been partly responsible for the content of the presentation. Larry undoubtedly saw through my thinly veiled delivery, but still made a point of striking up a conversation afterward, highlighting for me the importance of reactivation of ancient basement structures in the Montana foreland. Having been trained as an undergraduate by Ray Gutschick, I knew who Larry was, and was astonished that a person of his stature would bother to talk with me.

That, and the two summers that followed, were a magical time for me as I scoured the countryside of western Montana for outcrops and burrowed into the then-burgeoning literature on fluvial sedimentology. What made that time so exciting were the breakthroughs resulting from cross-pollination between geomorphologists and 'hard-rock' sedimentologists, linking processes with preservation. It seemed obvious that the only way to go in geology was to cross train. Throughout my graduate school years, I was encouraged to transgress discipline boundaries by my teachers at Indiana University—mainly Lee, Enrique Merino, Abhijit "Indiana" Basu, and Gordon Fraser. Working with Bob Schwartz in the field was a non-stop intellectual adventure. A chance meeting with Steve Graham and Ray Ingersoll in 1983, again in Montana, landed me a postdoc at Stanford with Steve and provided the opportunity to learn about California tectonics and basins. A couple years later, Asish Basu hired me at Rochester and began to gently nudge me toward recognition that isotope geochemistry was something in which I could actually get involved, despite being a self-proclaimed field sedimentologist. At the same time Gautam Mitra and his graduate students took me under their collective wing and started to teach me the wonders of thrust belt geology.

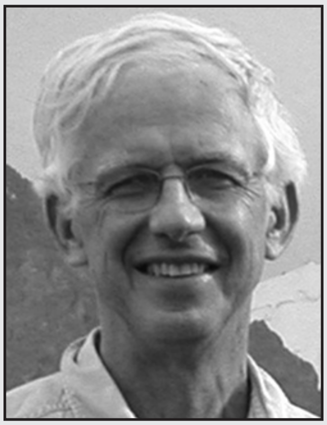
A few years after starting at Rochester, my wife Jill informed me that we were going to live in Italy for a year, so I had better find something to work on over there. Fortunately, my old friend William Cavazza was there with open arms to instruct me in the proper Italian manner of doing fieldwork on a variety of remarkable Mediterranean-style tectonics problems.

By the time I arrived in Tucson in 1993 I was anxious to get involved in some of the numerous strands of tectonics-related research going on in the Geosciences department. Jay Quade, George Gehrels, Bob Butler, Jon Patchett and Paul Kapp have been particularly instrumental in involving me in diverse projects around the world, opening my eyes to all sorts of new approaches as well as fascinating questions. Bill Dickinson has provided consistent encouragement and healthy skepticism throughout my career, virtually from the time I tracked him down in a restroom at the IU field station in 1979 until today. At both Arizona and Rochester I have been blessed with gifted, hard-working graduate students who stubbornly retain me as their undeserving Ph.D. advisor in spite of the appalling lack of attention they receive from me. The most valuable lessons have come from my family—Paul and Jeanne, Jill, Naomi and Clare—and I thank them for their long-suffering patience with my lengthy absences in far-flung places.

To all these people, and the many more who I cannot thank individually in such a short space, I say thank you.

STRUCTURAL GEOLOGY & TECTONICS DIVISION CAREER CONTRIBUTION AWARD

Presented to John Suppe



John Suppe
The National Taiwan University

Citation by John H. Shaw

John Suppe is a preeminent scholar and teacher of structural geology, who has profoundly influenced our understanding of deformation in the Earth's crust. He is perhaps most renowned for his pioneering work on fault-related folding, a broad family of concepts and theories that quantitatively relate the growth of the two main classes of structures in the brittle crust - folds and faults. Building on his training and experience as a field geologist working in California and Taiwan, John recognized that the positions and geometries of folds in sedimentary strata were closely and predictably related to the shapes and displacements of underlying faults. John formulated an elegant theory, based on simple physical principals, that quantitatively related these structural forms. In his Landmark 1983 paper, "Fault-bend folding," John presented a formulation of these theories that allowed use of fold shape to predict fault shape and displacement. This theory rapidly became a standard approach for generating balanced geological cross sections in fold-and-thrust belts, and further sparked a field of structural geology dedicated to developing quantitative theories that describe other styles of fault-related folding. While many scientists have made important contributions to this subject, there should be no doubt that John's pioneering work is responsible for defining and inspiring this field. Based on a Science Citation Index Search of fault-bend, fault-propagation, and fault-related folding yields well more than one hundred works since the 1983, when John's initial paper was published, and none before.

Fault-related folding theories naturally expanded through their applications to the regional structural geology of orogenic margins throughout the world. Inspired by collaborations with the petroleum industry, John soon began investigating structures throughout the world using various types of subsurface data, including seismic reflection profiles. Working with seismic reflection data in offshore regions, John recognized how syntectonic sedimentary deposits were deformed by these structures into unique and revealing patterns that record the kinematics of folding much as magnetic anomalies record the process of sea-floor spreading. John then expanded his theories to describe folding of syntectonic growth deposits, again defining a major theme of research in this field which focuses on using growth strata to infer fault-related folding mechanisms as well as to determine rates of folding and faulting.

Collectively, these expanded growth fault-related folding theories have become widely used, both in academic and applied fields. In particular, John's methods are now regularly applied in the analysis of oil and gas prospects, and have contributed to the discovery of major fields in several of the world's most petrolific basins. Moreover, fault-related folding techniques have proven well suited to investigating active faulting and folding, providing means to define the subsurface positions, geometries and displacements of faults that are capable of generating destructive earthquakes. John defined the geometry of the Chenglupu fault in Taiwan more than 25 years before it ruptured in the 1999 (Mw 7.6) Chi Chi earthquake, and similar efforts have helped define active faults in southern California, including major blind thrust faults beneath Los Angeles. Insights from these studies have lead to a redefinition of seismic hazards in southern California, influencing how building codes are defined and emergency responses are planned. Few research topics in geology have proven to have so significant a financial and social impact.

John's development of, and contributions to, the science of fault-related folding clearly amounts to a stellar career accomplishment; however, it is important to note that he has made many other important contributions to related fields of science. These include defining the state of stress acting on the San Andreas fault using bore-hole breakout data, which is the basis for the weak-fault hypothesis, and helping to decipher the tectonics of the active Taiwan orogen. In this latter work with colleague Tony Dahlen and students, John helped developed a new quantitative description of how mountain belts such as Taiwan, and large thrust sheets that underlie them, form. The theory of critical taper wedge mechanics describes how fold-and-thrust belts behave much like soil pushed in advance of a bulldozer, deforming internally until a critical shape, or taper, is achieved and then sliding stably until more material is added to or removed from the wedge. The theory invokes brittle deformation mechanisms to relate the taper of the fold belt to its internal strength and that of its basal detachment, and has proven widely successful in explaining the mechanics of both active and passive margins fold belts. This remains an active area of research for John, and he will undoubtedly continue to provide us with exciting new insights.

Finally, it cannot be said that John's research has been provincial, in the spirit of the classical geologists who spent their careers working on the rocks and structures of a given region. Rather, he and his students have consistently sought the best datasets to solve fundamental challenges in our science regardless of geography. A case in point is the body of work by John and his students investigating structural styles and patterns of deformation on Venus—using synthetic aperture radar (SAR) data and altimetry collected by the Magellan mission to define patters of stress and deformation that reflect a system of plate interactions very distinct from plate tectonics on the Earth.

As an educator, John's career accomplishments include publication of his influential undergraduate textbook—*Principals of Structural Geology*. The book has been widely used as an undergraduate text, and a brief review of similar texts published before and since reveals how influential John's approach to the topic has been. Over his distinguished career, John has also served as a mentor to lineage of successful graduate students, who now hold distinguished positions in academia and industry, and has contributed through service to Princeton University, the National Taiwan University, and the broader field of structural geology through his guidance and leadership.

Based on this tremendous body of work and service, John Suppe is most worthy of the GSA Career Contribution Award recognizing his tremendous career contributions to the field of structural geology and tectonics.

Response by John Suppe

Thank you John for your gracious words. Actually, when I read your citation a few weeks ago, it brought to my mind several impressions. I would like to share these with you all, if you will indulge me.

My first impression was that when John mentioned various research contributions, what popped into my mind wasn't the science at all, but various people I know—former students, postdocs, collaborators in these projects, and other contributors to these fields. Of course science is people—all our structural geology and tectonics is done together, we're an intellectual and social community. This is true even if we publish single-author papers, because science is fundamentally discovering, communicating and testing ideas about the universe in public community discourse. Sociologists of science like Bruno Latour understand this very well. So if we somehow did our research in secret and we didn't share it with the community, then it wouldn't be science. It would be research but it wouldn't be science, because it wouldn't lead to robustly tested knowledge and it wouldn't be available for use by other researchers to fuel the growth in public knowledge.

But this public community of scientific discourse, if we are honest, isn't an idyllic utopian community—for a number of reasons. For example, one weakness in structural geology and tectonics is that a lot of the research is secret industrial research—which doesn't lead efficiently to growth in robust public knowledge. This holds us back and it's not going to change. So we have to make the best of this, and actually working with industry can be very fruitful. Another reason science isn't idyllic is that we can very easily get into serious conflicts that are not just scientific disagreements. We don't just disagree with each other; we make serious personal enemies. I know this because I've done it—and I think that this is true of everyone who stands up here to receive such career awards. But this isn't the way it's supposed to be. We need to be able to have strong-minded scientific disagreements and we need to be able to compete for scientific resources in ways that don't make us personal enemies. So when I say that John's recounting of various research contributions caused me to remember people, most of these memories are fond memories, but a few are painful and even embarrassing memories. But hopefully my enemies and I have patched things up by now and are becoming fast friends again, because truly one of the great delights of a career is the ongoing friendships spanning decades and spanning the entire globe. We really have a great racket in structural geology and tectonics.

My second impression is more elaborate and will actually take the remainder of my time to sketch out. John's citation, and the science he describes, for some reason made me think of Harry Hess. Now I imagine that some of the younger people here tonight might not know of Harry Hess—after all, even very great fame is actually quite ephemeral. Hess was a professor at Princeton and a very famous and influential guy fifty years ago. He was famous long before he made his best known contribution, which was the idea of sea-floor spreading. The only time I ever met Hess was when I was an undergraduate at UC Riverside in the early 60s and some of us drove to Pasadena to hear him give a talk at Caltech. By the time I arrived on the faculty at Princeton in the early 70s, Hess had already died, quite suddenly of a heart attack. In those days people who had known Hess were full of Harry Hess stories—it was very clear that he had made profound and diverse impressions on many people. Some of the stories were very funny; Hess was colorful.

But the story that made the biggest impression on me concerns his Caribbean Research Project and how he assigned students their PhD projects. It seems that Hess would give each student a quadrangle to map—many of them were in northern Venezuela—and it didn't seem to matter what the geology was. It could be all alluvium or all granite for all he cared. He figured that if you mapped your quadrangle and you wrote your thesis, you got your PhD. But he was also very confident that the better students would find important science to study in their quadrangle. And some of the students clearly did just that—for example one of the better ones was Ron Oxburgh, who later was knighted to become Sir Ronald and is now Baron Oxburgh. It seems that Hess had the confidence that you could plop down anyplace on Earth and there would always be something fascinating and fundamental to discover.

Now when I heard this story about Hess it sounded completely preposterous. It seemed to me that you should choose projects for their importance and likelihood to succeed. I remember arguing about this. But as I look back on my career, I have to admit that I blindly stumbled upon nearly all the important things I have discovered. I certainly did not set out to make any of these discoveries—they just plopped down in front of me like "Pennies from Heaven." I literally tripped over them. So I've come around to think that there are some fairly basic truths underlying Hess's research strategy. But I still wouldn't choose field areas at random, just like I wouldn't drill wildcat wells at random.

The fundamental reason I think Hess was right is that the Universe is very rich and it has many fascinating surprises that are largely unanticipated. Now this is a controversial idea. For example there was a book "The End of Science" written a dozen years ago by the journalist, John Horgan, who argued, based on his rather strange personal philosophy plus interviews of well known scientists, that science is getting mined out, that most of the big discoveries have already been made. This is actually a fairly light-weight book, but it is a serious discussion. A more substantial analysis comes from Nicholas Rescher, who is a well-known philosopher at Pittsburgh and an amazingly prolific guy, having published over a hundred books. Rescher argues that the Universe is intrinsically very rich with things to discover, providing essentially no practical limit to science. I'm not sure I buy his full argument, but my limited experience is that the universe of structural geology and tectonics is very rich.

But it is also true that science is like mining. Once discoveries are made you can't make them a second time. And areas of science clearly get mined out and are left behind as people move on to new rich opportunities. Subdisciplines in science typically last for less than a scientific career. We need to move on if we aren't going to inhabit scientific ghost towns well before we reach the ends of our careers. I remember that immediately after I defended my PhD at Yale, my advisor John Rodgers took me aside and told me that it was OK to keep working for while on my line of thesis research, which was the Franciscan terrain in California, but I shouldn't keep working on the same mountain belt for my whole career. Rodgers' advice was very good advice.

So we need to ask ourselves, are we miners or are we prospectors? Both are good ways to make a living; each suits different personalities. But if we are miners we need to ask ourselves, when is it time to move on to some richer mines? And if we are prospectors, how do we discover new fields, new subdisciplines, that would be exciting to mine? People who get career awards and people who get elected to the National Academy or receive Nobel prizes and other awards are largely people who have discovered new disciplines, subdisciplines, or in my case sub-subdisciplines. They are basically prospectors who have found rich new mines for all of us to work at mining out. This sort of entrepreneurial effort is really needed to make our science move forward—just like entrepreneurs are needed keep the economy moving forward and to provide new jobs.

In my career I've done a lot of mining, but I've also done some prospecting and I've even stumbled upon a few new intellectual mineral deposits. So let's ask ourselves, "What will increase my odds of stumbling upon a new subdiscipline?" That's worth thinking about. I actually think that Harry Hess's strategy of assigning every graduate student a random quadrangle to map is OK, but I don't think it's the best way to increase your odds of discovery. Let me share a few research strategies that have been fruitful in my career.

The first one sounds crazy. It goes like this. When you are starting out in what is for you a new area of research, don't read the literature. Avoid reading the literature as much as you possibly can. Often new graduate students want to carefully read all the relevant papers before they start their research. That can poison your mind because you will very likely end up falling into intellectual ruts. It keeps you from coming up with fresh perspectives. But once you come up with some ideas, then you need to get in and wrestle with the literature.

My next advice is this. Consider being somewhat contrarian, in the investment sense of the word. That is, try working on some research projects in areas that aren't popular, that other people aren't working on. For example when I was an undergraduate we were all taught the uniformaterian slogan, "The present is the key to the past." If I had been really smart as a young man I would have immediately gone out and studied the present, but I didn't—essentially nobody was studying active tectonics in those days, even in southern California where I was a student. People thought of orogeny as something in the past. For example, they thought the Transverse Ranges behind Los Angeles formed back in the Pleistocene in what Hans Stille called the Pasadenan orogeny. But today we realize that the Pasadenan orogeny is going on full force, and we can study it with a diverse set of tools. Similarly when I first came to the Taiwan in the mid-70s people thought it had formed in the Plio-Pleistocene Penglai orogeny—but now it's obvious that the Penglai orogeny is going on full force today and that it's an incredibly fruitful thing to study. It was in Taiwan that I started to be somewhat contrarian, working more and more on things that weren't popular, like active tectonics. Being a little contrarian is actually a lot of fun and it makes it fairly easy to stumble onto new discoveries.

The most important ingredient of discovery is probably rich unstudied data. Ground-breaking discovery often requires rich data and new technology—the astronomers understand this very well. I've often been attracted to rich unstudied data. When I started to realize that petroleum companies had excellent data that academic structural geologists weren't working on, it was fairly easy to stumble onto new insights. This is what fueled the discoveries in fault-related folding, growth strata and borehole stresses. And I've recently moved back to Taiwan in part because it has become one of the best-instrumented mountain belts in the world. One kind of data I'm really excited about right now is new very high-resolution crustal and upper mantle tomography under Taiwan produced by my colleague Yih-Min Wu—this is giving us an amazingly detailed 3D image of what's happening under Taiwan. For example, you see ribbons of crust extending down into the mantle under Taiwan. We are probably seeing ultra-high pressure metamorphism taking place today. And it really takes experienced tectonicists to understand such data, people who understand outcrop geology, who think about processes, and who think palinspastically and historically.

Finally, it's often useful to think of new research interfaces. Try looking for separate disciplines or subdisciplines that can be fruitfully brought together. For example, I've been interested in the interface between crustal earthquake seismology and structural geology. This is a very natural marriage of fields in principle because upper-crustal deformation is dominated by slip in earthquakes. This is a field that is really starting to move in a number of fruitful directions. Similarly when I was Chair at Princeton I became convinced that research at the interface between low-temperature geochemistry, microbiology and molecular biology was really ripe for progress. So we started to hire faculty in this area and it has been enormously fruitful.

I should wrap this up by saying that thinking about what makes our science successful at moving into new fields is very important. That's what ultimately leads to new subdisciplines and new excitement. It provides exciting research opportunities and indeed fruitful employment for ourselves, our students and our colleagues.

Finally, I would like to thank all those, like John Shaw and all my former students, postdocs and collaborators, and my fellow structural geologists like Eric Erslev, who have shared this with me. It's a fun career with a lot of great people. Take a look at our new web pages at the National Taiwan University to see many of my current and former students and friends and what's going on in Taiwan (http://suppelab.gl.ntu.edu.tw/). We have a growing international research group and Taipei is a fun city with great food. And finally I want to sincerely thank all of you in the Structural Geology and Tectonics Division of the GSA. And sincere thanks to Eric Erslev and John Platt, and to John Shaw and others who nominated me for this award.