

STRUCTURAL GEOLOGY AND TECTONICS DIVISION Newsletter

Volume 32. Number 1

January 2012

Chair's Message

I am pleased to report that our Division is on an upward trajectory with continuing growth in membership, and a student fund that continues to grow because of your enthusiastic support. We gained more than 150 new members last year, bringing our roll up to a total of 1862. Please continue to support our student fund through your donations; we are entering our third year since the advent of the fund. Donations can be made during annual membership registration, through the GSA website, and by purchasing field notebooks with the SG&T label that will be available at the GSA bookstore during professional meetings (see additional information on the field below). If you have further questions about the fund please contact me or another one of the board members; you will find us listed on the Division's web site and Facebook page.

Those of you who know me realize that I have been in the earth science game for several decades, and I do look back from time to time thinking of how my training in structural geology and tectonics was used in applied as well as academic pursuits. The variety of applications will come as no surprise to our professionals, but perhaps our student members will be interested in knowing my SG&T skills formed a strong foundation for applied work in petroleum and mining geology, hydrology, earthquake hazards, and landslide studies, in addition to basic science research and teaching. Speaking directly to our student members – you should be aware that more than 28 states now require Professional Geologist licensure for work in environmental and engineering geology. Take a look at the National Association of State Boards of Geology website (<http://www.asbog.org/>) for further information concerning the benefits and requirements for licensed professional geologists. Starting the process directly after your undergraduate degree is most efficient, and licensure will become more important when working in applied geology in the future.

The program for the annual meeting in Charlotte, North Carolina is going to be exciting with sessions that range from our 'bread and butter' structural geology and tectonics interest, to earthquakes, unconventional energy reservoirs, and planetary impact structure. As usual, we continue to co-sponsor a number of sessions with our colleagues in the Sedimentary, Planetary Science, and Geophysics Divisions. I would like to see more co-sponsored sessions in the future with the Environmental and Engineering Geology Division – go to work on your colleagues in that area if you will to build a closer relationship with our SG&T Division.

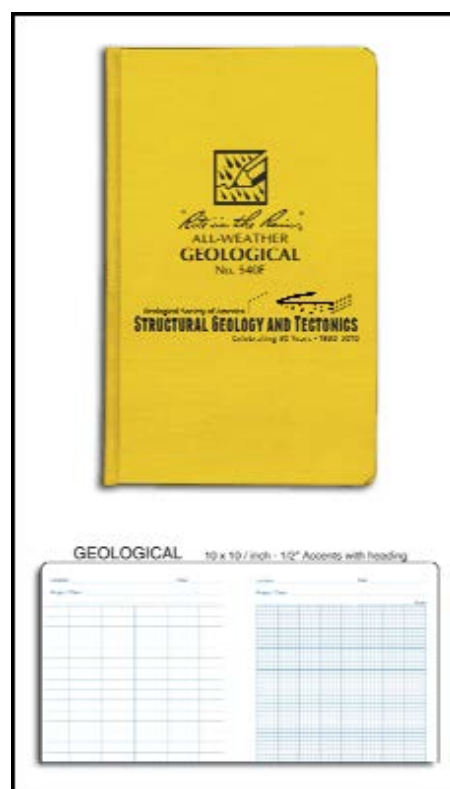
Don't forget to nominate colleagues for the Outstanding Publication Awards and Career Contribution Awards; the deadlines are March 1 and March 10, respectively (see below for additional details). Also, remember that proposals for the Stephen E. Laubach Award in Structural Diagenesis are due on April 15. Check the SG&T website or Facebook page for further details concerning requirements.

I would like to close by wishing you all well in the New Year, and extending my appreciation to the members of our governing board, committees and editorial group who are guiding our division forward. Also, thanks to past Chair Scott Johnson, and also Mary Hubbard who served as Secretary/Treasurer for several years. If are interested in participating on the Division's board or a committee in the future let us know.

Ron Bruhn
Chair, Structural Geology and Tectonics Division

The SG&T Division Student Fund

Students represent the future of our division, and the board considers the support of students who are interested in structural geology and tectonics to be among our highest priorities. The student fund, established within the GSA Foundation, will allow us to more effectively meet this priority. Our initial goal is to grow the fund to \$80,000 before drawing interest from it. The interest from this amount, even in bad economic times, will provide more support for students than the division has ever been able to offer. You can donate to the fund at the GSA Foundation web site (<http://www.gsafweb.org/makeadonation.html> and then scroll down to SG&T Student Fund). Another way to support the SG&T student fund is to buy commemorative *Rite-in-the-Rain* field notebooks from the GSA store on-line (<http://www.geosociety.org/bookstore/> - product code SGTRITR). Approximately \$7 from every book sale will go to the student fund.



Call for Nominations

Outstanding Publication Award (Nomination deadline -- March 1, 2012)

This award is given annually for a published work (paper, book, or map) of exceptional distinction that clearly advances the science of structural geology or tectonics. In 2011, the award went to Basil Tikoff and Haakon Fossen for their two 1993 papers on pure and simple shear deformation.

The Outstanding Publication Award is not limited to members of the Division or the Society, and awardees may be single or multiple authors, with no restrictions as to nationality, citizenship, publisher or publishing agency. The award may not be given posthumously unless the decision to give the award is made before the death of the awardee(s).

The award committee depends on participation by the membership of GSA and of the Division to make this a successful the award, so please take a few minutes to give your favorite papers some thought and nominate one that you think is outstanding. All nominations will be held under consideration for a period of three years, after which time they will be retired.

Nominations should include the following information:

- (1) A full citation: author[s], title, date, journal or book (with publisher), volume number, and page numbers.
- (2) Statement in support of nomination (particularly comment on the exceptional achievement or significance of the publication; additional supporting material such as letters, published discussions, or reviews may be included).
- (3) Name and address of nominator.

Please mail or e-mail nominations (or questions) to:

W. Adolph Yonkee, *Chair – Outstanding Publication Award Committee*: Department of Geosciences, Weber State University, Ogden, UT 84408
Phone: (801) 626-7419 e-mail: ayonkee@weber.edu

Call for Nominations

Career Contribution Award (Nomination deadline March 10, 2012)

This award will be given for the 25th time in 2012. It is awarded to an individual who throughout his/her career has made numerous distinguished contributions that have clearly advanced the science of structural geology or tectonics. Nominees need not be citizens or residents of the United States, and membership in the Geological Society of America is not required. The Career Contribution Award cannot be given posthumously, unless the decision to give it was made before the death of the awardee. All nominations will be held under consideration for a period of three years, after which time they will be retired. A new nomination for the same individual can be submitted after the previous nomination is retired. In 2011 the award went to Richard (Rick) Sibson of the University of Otago, New Zealand.

Mail or e-mail nominations (or questions) to: **Gary Axen**, *Chair - Career Contribution Award Committee*: Department of Earth and Environmental Science, New Mexico Institute of Mining and Technology, Socorro, NM 87801, Phone: (575) 835-5178, e-mail: gaxen@ees.nmt.edu

Call for Nominations

Stephen E. Laubach Structural Diagenesis Research Award (Proposal deadline April 15, 2012)

The Stephen E. Laubach Structural Diagenesis Research Award Fund promotes research combining structural geology and diagenesis, and curriculum development in structural diagenesis. The donors believe multidisciplinary approaches often reveal new insights into long-standing problems and expose productive avenues for enquiry. To help promote the cross disciplinary emphasis of this annual award, the *Sedimentary Geology* and *Structural Geology & Tectonics Divisions* have been designated to jointly select the recipient. Graduate students, postgraduate and faculty level researchers are eligible. In 2011, the award went to Veerle Vandeginste.

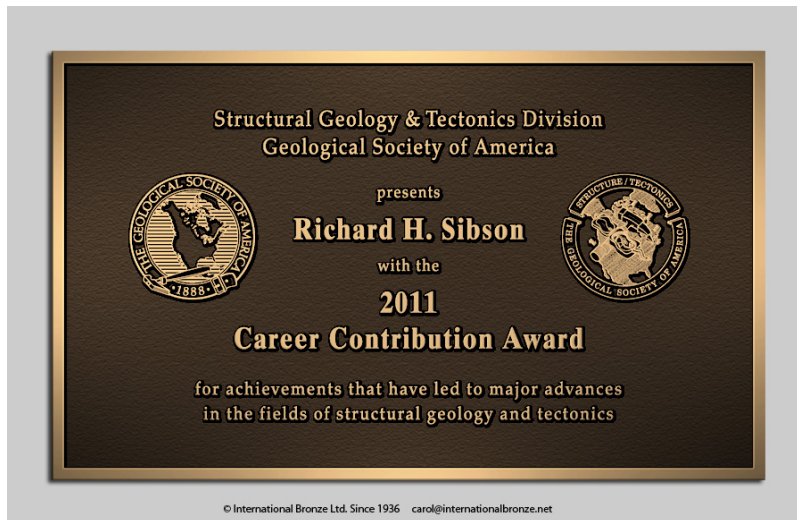
This award addresses the rapidly growing recognition that fracturing, cement precipitation and dissolution, evolving rock mechanical properties and other structural diagenetic processes can govern recovery of resources and sequestration of material in deeply buried, diagenetically altered and fractured sedimentary rocks. The award highlights the growing need to break down disciplinary boundaries between structural geology and sedimentary petrology, exemplified by the work of Dr. Stephen Laubach and colleagues.

Application Instructions for the Stephen E. Laubach Structural Diagenesis Research Award can be found on GSA's Structural Geology and Tectonics website. For additional information please contact Dr. Charles M. Onasch at Bowling Green State University (conasch@bgsu.edu).

Career Contribution Award: Richard (Rick) Sibson

Citationist: Barbara John

The Division thanks the CCA committee: Peter De Celles, Gary Axen and Steve Wojtal



The Geological Society of America Structural Geology and Tectonics Division 2011 Career Contribution Awardee Rick Sibson at the SG&T Awards Ceremony in Minneapolis, MN. Rick is flanked by Award Citationist Barbara John, and SG&T Chair Scott Johnson.

**GEOLOGICAL SOCIETY OF AMERICA
STRUCTURAL GEOLOGY AND TECTONICS
2011 CAREER CONTRIBUTION AWARD**

Presented to Richard (Rick) H. Sibson

Citation by Barbara John:

It is my pleasure to introduce Professor Richard (Rick) H. Sibson the 2011 recipient of the Career Contribution Award. This award is given to an individual who throughout their career has made numerous distinguished contributions that have clearly advanced the science of structural geology or tectonics, and 'distinguished contributions' is a very apt description of Rick's career studying earthquakes in the field as a geologist. In fact, I know each of us has been influenced by his contributions toward understanding the structure and mechanics of crustal fault zones, but some may not know the man – for those a brief history.

Rick was born and raised in Auckland, New Zealand the son of R.B. Sibson (classics master at King's College, life-long birder, and inveterate island-hopper), and J.W. Fleming, sister of Sir Charles Fleming, Chief Paleontologist with the New Zealand Geological Survey. This auspicious birth led to his love of the outdoors, a career choice likely prejudiced by his uncle, and an ability to recite literature at any time and place. At the University of Auckland, he was strongly influenced by an inspirational class in structural geology taught by Professor Arnold Lillie. At the same time he took up caving and exploring old gold-silver mines east of Auckland, which likely led to his later diversification from pure structural geology into the structural controls on ore deposits, and processes of mineralization.

In the 1970s, Rick was a post-graduate at Imperial College London, where his PhD supervisor, Janet Watson, had the wisdom to let her students run by themselves and 'follow their noses'. And so he did, selecting his field area on the basis of a New Scientist article by Peter Francis entitled 'The Geology of Whiskey Galore'. Rick's investigation of the deep-seated 'guts' of the ancient fault zone exposed adjoining the peat bogs of the Outer Hebrides (Scotland) convinced him of the relationship between structural geology and earthquake rupturing. His thesis recognized that systematic changes with depth in fault rocks could be used to define a mechanical transition in the crust between brittle near-surface faulting and deeper, more ductile shear zones. This work defined the basic architecture of fault zones, and presented the terminology for fault rocks that remains widely used today. It emphasized the important point that 'earthquake geology' extends below the dirt levels beloved of paleoseismologists well into the 'underburden'.

In the early 1980's Rick was invited to the Office of Earthquake Studies at the USGS in Menlo Park. This 'intoxicating' environment led to him recognizing the correlation between the depth distribution of crustal earthquakes, and his earlier fault zone models, transforming our understanding of faulting processes and earthquakes. In 1982 he moved to U.C. Santa Barbara where Rick mentored me. There I was called into service to aid him in his newfound passion of 'launching' from remote mountaintops strapped into nothing more than a pair of dacron wings, hoping to fly - something he called hang gliding. I felt the need for him to remain alive to sign my dissertation, so decided monitoring his activity was reasonable. At the time I worked on well-exposed low-angle normal faults whose existence Rick reluctantly admitted though he considered them mechanically unfeasible. Over the same period he was developing comprehensive models highlighting the interrelationships between fluid flow, faulting, and earthquakes in the crust. This led to his fault-valve model tying the earthquake cycle to the flow of overpressured fluids and mineralization. By applying simple mechanical

principles, Rick demonstrated that transient permeability generated by earthquake rupture can lead to fault-hosted hydrothermal mineralization; a concept that is now widely utilised in gold exploration.

In 1990 he returned to New Zealand as Professor and Head of the Department at the University of Otago. Since his return 'home', Rick has continued studying natural examples of deformed rocks from denuded fault zones and hydrothermal mineral deposits. He quietly/calmly but repeatedly reminds our (structural geology) community that rock structures we consider as developing slowly and steadily in the upper half of the crust are likely accomplished by earthquake faulting. Integral to this mission has been raising public awareness of earthquake hazards surrounding the New Zealand plate boundary, and Pacific Rim in general. However, this did not stop him and his geologist wife Francesca Ghisetti from acquiring property near Christchurch City! He helped define the scientific rationale and objectives for the NSF/USGS San Andreas Fault Observatory at Depth (SAFOD), and continues to contribute to the drilling program on New Zealand's Alpine fault.

Rick, you have had a profound influence on both pure and applied geosciences over more than 35 years, and are truly a distinguished international scientist. It is therefore my great honor to present to you the 2011 Career Contribution Award from the Structure and Tectonics Division of the Geological Society of America.

Response by Rick Sibson:

Thank you Barbara John for your very kind remarks. Once, during a break from field-camp Bobbie drove my truck while I was desperately trying to avoid getting sucked up into a thunderhead in Owen's Valley - an early near-death experience - so it is entirely right that she should be here giving this citation. More properly, one should note that graduate students like Bobbie always teach you a lot more than you teach them - "*I don't care what your mechanics tell you, Rick - look at the rocks - you just cannot deny the physical existence of low-angle normal faults!*"

The biologist Jacques Monod tells us that *life as a whole evolves through chance and necessity* - a pretty fair description of my own career adapting to changing circumstances. Back in pre-plate tectonic days, my grounding in structural geology and tectonics at the University of Auckland came from Arnold Lillie who had mapped the high Southern Alps around Mt Cook with the help of a field assistant called Ed Hillary. My transition to Imperial College in London in 1969 was due largely to Arnold's coercion in forcing me to sign a series of scholarship applications.

Some will recall 1968 as the magic year when many of the fundamental papers of plate tectonics were being published in the *Journal of Geophysical Research* - intoxicating reading for someone growing up in an island arc. One that particularly impressed was '*Seismology and the New Global Tectonics*' by Bryan Isacks, Jack Oliver, and Lynn Sykes - earthquakes, apparently, had something to do with displacement along plate boundaries. I thus arrived at Imperial College to study quantitative structural geology with a head full of the new-fangled notions of plate tectonics. With this in mind I sat through John Ramsay's cohesive and wonderfully flowing lectures on the earth as a ductilely deforming continuum, occasionally wondering whether anything fast and violent ever occurred in structural geology. But Neville Price's 'think of a number' approach combined with Ernie Rutter's materials science set me off along another track! Around that time earthquakes appeared as 'flyspots' on maps and were the property of seismologists - they were not generally considered part of structural geology. However, over in Civil Engineering, John Tchalenko and Nick Ambraseys were preparing wonderfully detailed maps of the 1968 M 7.2 Dasht-e-Bayaz rupture in central Iran where c. 4 m of left-lateral strike-slip had occurred in just a few seconds.

Then came the problem of selecting a PhD topic. Daunted by the vast literature on the Alps, I decided to have a crack at the peculiar '*flinty crush phenomenon*' associated with the Outer Hebrides Thrust and somehow persuaded Janet Watson that 'those awful rocks' were worth studying. Structural geologists have a bad tendency of being distracted by beauty but 'rock uglification' also turns out to be important. Demonstrating that the pseudotachylytes so widespread in the Lewisian Gneisses of the Outer Hebrides were 'fossil earthquakes' and reconstructing the rheological structure of an ancient thrust zone was enormous fun but I soon realized I needed to know a lot more about modern earthquake processes.

In 1981 I had the great fortune to be a Visiting Scientist in the Office of Earthquake Studies at USGS in Menlo Park where I encountered the generous hospitality of the Californian earthquake science community - Tom Hanks, Dave Hill, Art McGarr, Bill Ellsworth, and many others including the great Bob Wallace who began as a mining geologist but was surely the pioneer of modern Earthquake Geology. Then came the move to UC Santa Barbara working alongside John Crowell and Art Sylvester. NSF was surprisingly supportive though I do recall one review that noted: "*Sibson's idea of field work seems to consist mostly of touring*". Quite right - if you see the same field relations in a variety of locations you may be looking at something important! A growing interest in fluid activity in the ductile roots of fault zones then led me to the Archean shield of Canada where I was introduced to the wonderland of mesothermal lode gold systems by Howard Poulsen and Francois Robert of GSC.

My return to New Zealand to the University of Otago in 1990 allowed me to continue work in these three overlapping fields - structural geology of fault zones, the mechanics of shallow crustal earthquakes, and the role of faults and fractures as fluid conduits for mineralization. Sadly, I had to let go of the hang-gliding. Many of our students first find employment in the Archean craton of Western Australia but I like to think that growing up on the active Pacific Rim contributed to their education.

To a student of active Earth processes, the South Island of New Zealand is a geological paradise. But as you all know, much of geologic process resembles warfare - long periods of boredom punctuated by short periods of unusual interest (and terror!) - so you have to be careful what you wish for. The ongoing earthquake sequence around our newly adopted city of Christchurch in fact turns out to be a classic example of conjugate 'Andersonian' wrench faulting. But the fascination of 'living over the shop' certainly fades after a year of rich and violent aftershock activity!

A structural geologist is soon lost without a compass. The America I knew, lived in for 10 years, enjoyed hugely and benefited from immensely, was the land of boundless possibility, of "*let's make it happen*", of science as "*the never-ending frontier*", of "*the only thing we have to fear is fear itself*". It was not the America that condones torture, abandons *habeas corpus*, and conducts drone assassinations. This seeming 'loss of moral compass' is of enormous concern to friends of America around the world.

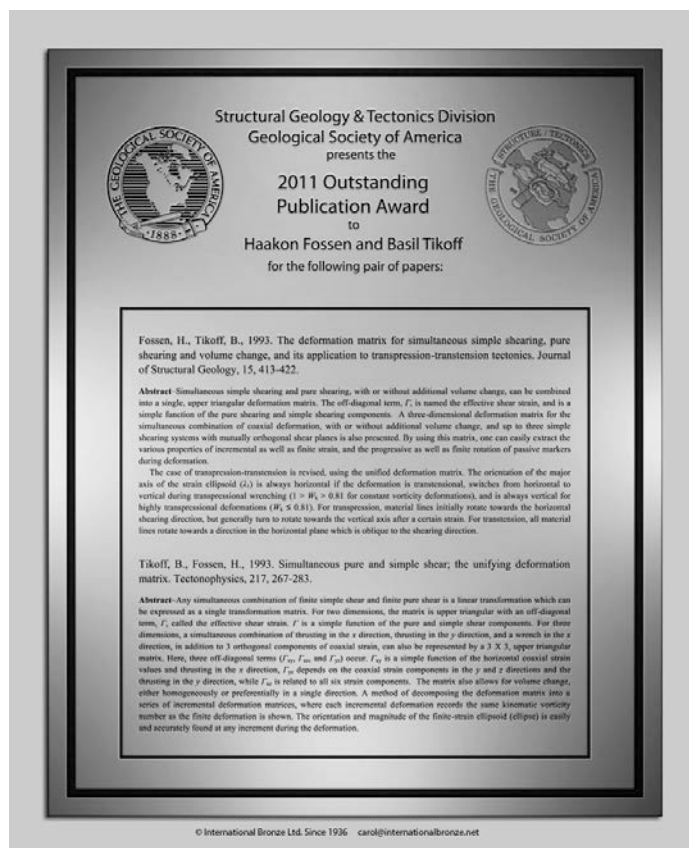
That said, I am grateful beyond words to the Geological Society of America for this award, to my parents who let me fly free, to all my colleagues and students, and most importantly to my wife Francesca Ghisetti - best of companions.

Thank you all very much indeed.

Outstanding Publication Award: Basil Tikoff and Haakon Fossen

Citationist: Peter Hudleston

The Division thanks the OPA committee: Arlo Weil, Adolf Yonkee and Jonathan Caine



The Geological Society of America Structural Geology and Tectonics Division 2011 Outstanding Publication Award winners Haakon Fossen (center) and Basil Tikoff (right) with SG&T Chair Scott Johnson at the SG&T Awards Ceremony in Minneapolis, MN.

**GEOLOGICAL SOCIETY OF AMERICA
STRUCTURAL GEOLOGY AND TECTONICS
2011 OUTSTANDING PUBLICATION AWARD**

Presented to Haakon Fossen and Basil Tikoff

Fossen, H., & Tikoff, B. (1993) The deformation matrix for simultaneous simple shearing, pure shearing and volume change, and its application to transpression-transension tectonics. *Journal of Structural Geology* **15**, 413-422.

Tikoff, B., & Fossen, H. (1993) Simultaneous pure and simple shear; the unifying deformation matrix. *Tectonophysics* **217**, 267-283.

Citation by Peter Hudleston

It looks like the awards committee this year could not make up its mind when it selected two papers to be given the best publication award of the division. But the two papers, by Haakon Fossen and Basil Tikoff: “Simultaneous pure and simple shear; the unifying deformation matrix” and “The deformation matrix for simultaneous simple shearing, pure shearing and volume change, and its application to transpression- transtension tectonics,” published in 1993, are two sides of the same coin – the first presenting elegant theory and the second presenting practical applications. It makes perfect sense to take them as an entity. They stand out as milestones in the large literature that has developed over the past several decades on the geometry and kinematics of strain, the interest stemming from the fact that strain is commonly localized and the growing recognition that localized strain is rarely “simple shear.”

Basil and Haakon developed the ideas for these papers while they were graduate students in an institution not far from here, and it was stimulating to have the pair of them, with their different temperaments, involved in intense discussions in the department as these papers took shape.

Pure shear and simple shear have been fundamental concepts used by geologists in interpreting and modeling natural structures almost since the beginning of the discipline. These two papers utilize the kinematics of combined pure shear and simple shear in the most general way for the first time. The first paper builds most closely on the work of Ramberg (1975), by generalizing Ramberg's approach to 3D, allowing for deformation involving combinations of stretch in three directions and simple shear on three sets of orthogonal planes. This allows very general deformation states and deformation histories to be modeled simply and efficiently. The mathematics is presented clearly, and in a way that simplifies the algebra and allows for a more intuitive understanding of the way the components of deformation are combined. The bottom line is that this paper provides a powerful tool for kinematic modeling of general strain paths and resulting finite strains. And that tool has been used!

In the second paper, Haakon and Basil apply their theory to analyze various combinations of pure shear, simple shear, and volume change. They provide the framework in which the kinds of data that structural geologists collect in the field can be interpreted. This paper is frequently cited by aficionados of kinematic vorticity, a specialty within the discipline that has expanded at an amazing rate since the publication of these papers. This paper explains, I believe, better than any other the kinematics and structural consequences of transpression/transension.

These two papers have stimulated much work by others on the kinematics of deformation, as evidenced by the 100's of citations they have received. In recognition of the original and continuing

influence the papers have had on our discipline, it is surely fitting that they are to receive the 2011 Best Publication Award.

Response by Haakon Fossen

It is a great honor to receive the Outstanding Publication Award, and we both wish to thank the Division for selecting our papers. We take this as evidence that our two papers have been found to be useful, which is something we all hope for every time we submit a new manuscript.

The papers were written about two miles from here by two graduate students, who were both taking a bit of a detour from what our PhD projects were supposed to be about. Prior to that I (Haakon) had run into strain matrices as a Master student in Bergen in some papers authored by Derek Flinn, David Sanderson and Mike Coward. Like many other geology students I had kept mathematics at a respectful distance, but I was convinced by UMD professor Tim Holst, who at the time spent his sabbatical in Bergen, that this strain matrix stuff wasn't hard to deal with at all. This lead me to take some math courses, first in Norway and later at the U of MN when I started my PhD there in 1989.

The snowball really started rolling when I got to know fellow student Basil at the U of MN and found that we shared a common interest in strain and structural modeling. We "attacked" several papers, particularly some authored by the late Hans Ramberg, who pioneered much of the theory on which our two papers build. After meters of paper with mathematical derivations and weeks on the Mac II in room 210 in Pillsbury Hall, we felt that the work had rewarded us with a much better understanding of what deformation theory is all about and the usefulness of linear algebra in this context. Writing these papers was a great learning process.

Response by Basil Tikoff

I'll start by acknowledging Steve Wojtal, who got me started on thinking about strain and strain history during a senior project at Oberlin College. Steve provided me with a geological context for this work, and motivated my intellectual curiosity to pursue it. We would also like to thank Gerhard Oertel, whose review – particularly of the mathematics – allowed the Tectonophysics paper to be published.

Francis Pettijohn, toward the end of his book, "Memoirs of an unrepentant field geologist" addresses the question "What is it that makes a department a creative, stimulating place – an exciting place where the lights burn late into the night, while students and faculty often appear on Sunday and holidays...". I can't answer that question, but we know that we were part of one of those times, much of which occurred in room 210 in Pillsbury Hall. We were privileged to have been part of a dynamic group of structural geology students under the wings of two outstanding structural geology professors, Christian Teyssier and Peter Hudleston, and with repeated interaction with co-students Jim Dunlap, David Kirschner, Labao Lan, Paul Kelso, Gustave Tolson, Jerry MagLoughlin, and Eric Heatherington. Our two papers would never have materialized without that supportive and creative environment, which we were lucky to be part of.

Thank you, again, for this award.

Student Research Awards

Each year the SG&T division recognizes graduate students for excellent research proposals in the annual GSA solicitation. This year's impressive winners were recognized at SG&T's Business Meeting and Awards Ceremony at the GSA annual meeting in Minneapolis and received funds to help with travel to the meeting.

Kristin Morell, Penn State University (Donald Fisher, Advisor), 'Timing and rates of exhumation of the Cordillera de Talamanca, Costa Rica due to Cocos Ridge subduction: Insights from Apatite fission track analysis'

Meridith Petrie, University of Iowa (Jane A. Gilotti, Advisor), 'High-pressure assemblages in the Yukon-Tanana terrane, Canada: Mélange or coherent slices?'

Jonathan Pratt, University of South Carolina (David L. Barbeau, Advisor), 'Thermochronologic constraints on the initiation of the Messinian salinity crisis.'

Benjamin Melosh, McGill University (Christie Rowe, Advisor), 'Field analog for the tremor source zone of the San Andreas Fault: The Pofadder Shear Zone, Namaqualand, South Africa'

GSA SG&T Division Management Board Meeting

Monday, 10 October 2011, Minneapolis, MN

Prepared by Yvette Kuiper, Secretary/Treasurer of the GSA SG&T Division

Attending: Ron Bruhn, Michele Cooke, Scott Johnson, Yvette Kuiper, Andrew Meigs, Phil Resor, Dave West, Donna Whitney, Steven Wojtal, Adolph Yonkee

1. Report from Division Chairs meeting in May in Boulder, CO – Donna Whitney

Donna filled us in on discussions held at that meeting, including GSA's new logo requirements and the request to Divisions and Sections to start revising their logos accordingly.

2. New Division Initiatives – Scott Johnson

- Dues increase from \$8 to \$10 for professionals and from \$3 to \$5 for students
- The student fund is currently ~\$35,000. The revenue from the 30 year anniversary bottles caps and field notebooks should add another ~\$7,000
- Guidelines for student research and travel grants were discussed and may be revised.

3. Treasurer's report – Mary Hubbard

The Division is in good financial shape with more than \$12,000 in balance as of June 30 2011. While this is somewhat lower than last year, that is to be expected due to the investment in bottle, caps and field notebooks.

The timing of transfer of money from donations from the Operating Account to the Foundation was discussed. It was suggested to move the money by a certain deadline each year, e.g. in Jan. or Feb..

4. Outstanding Publication Award (OPA) committee – Adolph Yonkee

We discussed ways to encourage geoscientists to nominate papers and the possibility of holding over nominations for more than one year. It was decided to bring the guidelines in line with those of the CCA, so that nominations are held over for three subsequent years.

Current members on the committee are Adolph Yonkee (chair), Arlo Weil (outgoing) and Jonathan Kane (incoming). We discussed potential names for a new member.

5. Career Contribution Award (CCA) committee – Steven Wojtal

Current members on the committee are Gary Axen (chair), Peter DeCelles (outgoing) and Steven Wojtal (incoming). We discussed potential names for a new member.

6. Stephen E. Laubach Structural Diagenesis Research committee – Scott Johnson for Peter Eichlub

This is a joint committee with the Sedimentology Division. SGTD handles the award next year. Each division has two members and a new member needs to be on the SGTD committee Potential candidates were discussed.

7. Membership communications

- a. Webmaster and Facebook: Webmaster and Facebook: The current webmaster is Kevin Smart who we wish to thank for his contributions. Additionally, the Facebook site needs to be handled by an individual. Potential volunteers for one or both jobs were discussed.
- b. We discussed whether the newsletter should be continued in its current format as a web link in an email, or whether (part of) the letter should be copied directly in the email. Some servers do not accept the web link. For now, the current format is preferred with the addition of the letter from the chair in the email itself. We also discussed whether one letter per year is sufficient (as opposed to two) and decided two is useful and appropriate.

8. Annual Program Committee for 2012 – Ron Bruhn and Donna Whitney

Several sessions are already in the works. It was suggested to have fewer sessions so that more people would attend those sessions and also because of the smaller number of rooms in the Charlotte venue than in Minneapolis. Potential topics were discussed.

9. Annual Keynote Lecture – Scott Johnson

Currently, the Annual Program Committee with the session conveners decide on who is invited to give the keynote lecture. This is still preferable. It was suggested that the Joint Technical Program Committee tries to schedule the keynote lecture sometime in the afternoon, if possible, to increase attendance.

10. Annual Calendar of Board Responsibilities – Scott Johnson

This document has been developed over the past year to ensure all board members know their duties. All members did receive a digital copy.

11. Agenda for the Business Meeting – Scott Johnson

The agenda was discussed.

12. Other

It was decided to increase the student travel grants from \$250 to \$500, to ensure that student travel to the GSA meeting is covered to a larger extent than before.

The meeting was adjourned

Notes from the NSF Tectonics Program

David Fountain and Stephen Harlan, Program Directors

Recent Activities in the Tectonics Program

During fiscal year 2011, the Tectonics Program received 177 proposals with a total request level of about \$41M. We were able to fund 63 of these (36% success rate), which includes a handful of EAGERs and workshops. Proposals submitted to the two competitions were sent out to external review and then discussed in panel meetings held in October 2010 and April 2011. We are most appreciative to all of you who took the time to review proposals and to our panelists for their dedicated service. Our recommendations were based on the content of the external reviews, the panel recommendations, the available budget, and various programmatic considerations. Over the past decade, we have been successful in maintaining a success rate in the 25% to 35% range, a goal that is increasingly difficult given the large request level (the request level for 2012 is over \$45M), a relatively flat budget, and an increasing award size: the average annual award size for the program has increased from \$61K in FY 2008 to \$75K in FY 2011!.

CAREER awards were made with fiscal year 2011 funds to two PIs: Yvette Kuiper (Boston College, but recently moved to Colorado School of Mines) and George Hilley (Stanford University). Titles of their projects can be found in the award list below.

New National Academies Report

The National Research Council of the National Academies released a pre-publication version of a report entitled *New Research Opportunities in the Earth Sciences* that supersedes the previous report *Basic Research Opportunities in the Earth Sciences (BROES)*, which was published in 2001. The new report, which was requested by the Division of Earth Sciences, was drafted by a committee lead by Dr. Thorne Lay (University of California Santa Cruz) and is scheduled for final publication sometime in March. The committee recommended increased emphasis in six different research areas two of which are of particular interest to the SGT community: 1) faulting and deformation processes; and 2) interactions among climate, surface processes, tectonics, and deep earth processes. The report also recommends that the Earth Sciences Division address the need for new mechanisms to support geochronology laboratories. An article in *Eos* (January 3, 2012) highlights the committee's recommendations and the full pre-publication of the report can be found at the National Academies Press website.

Some New NSF Initiatives

SEES: The Science, Engineering and Education for Sustainability (SEES) effort at NSF is a collection of activities and programs aimed at advancing science, engineering, and education to inform the societal actions needed for environmental and economic sustainability and sustainable human well-being. The SEES umbrella includes several activities that are of interest to the earth sciences. These include the Sustainable Energy Pathways (SEP) program, SEES Fellows, Sustainability Research Networks (SRN), Partnerships for International Research and Education (PIRE), Research Coordination Networks (RCN), Dynamics of Coupled Natural and Human Systems (CNH), Decadal and Regional Climate Prediction Using Earth System Models (EASM), Climate Change Education (CCE), and Ocean Acidification (OA). The SEES effort at NSF has recently been described by Killeen et al. in *Eos* (2012, BRIEF REPORT: A focus on science, engineering, and education for sustainability: EOS, Transactions American Geophysical Union, v. 93, no. 1, P. 1) and a description of the various SEES activities can be found at the NSF website <http://www.nsf.gov/sees>.

SAVI: To expand NSF's international activities, NSF announced Science Across Virtual Institutes (SAVI) in a Dear Colleague Letter (NSF 11-087: <http://www.nsf.gov/pubs/2011/nsf11087/nsf11087.jsp>). The primary objective of SAVI is to bring together leading STEM researchers/educators from different countries, both physically and virtually, to work collaboratively on problems of mutual interest, building on relationships initiated by NSF-supported teams of researchers. NSF will support U.S. participants, while their international partners will be supported by their own national or regional funding source. Details can be found in the above mentioned Dear Colleague Letter and the SAVI website <http://www.nsf.gov/savi>.

CREATIV: NSF recently announced a pilot grant mechanism: Creative Research Awards for Transformative Interdisciplinary Ventures (CREATIV). The goals are to: 1) Create new interdisciplinary opportunities that are not perceived to exist presently; 2) Attract unusually creative high-risk / high-reward interdisciplinary proposals; 3) Provide substantial funding, not limited to the exploratory stage of the pursuit of novel ideas. Only internal merit review is required, proposals must be interdisciplinary and potentially transformative, and requests may be up to \$1,000,000 and up to five years duration. Details may be found in the Dear Colleague Letter (NSF 12-011: <http://www.nsf.gov/pubs/2012/nsf12011/nsf12011.jsp>) and the Frequently Asked Questions (<http://www.nsf.gov/pubs/2012/nsf12012/nsf12012.jsp>).

National Science Board Broader Impact report

The National Science Board (NSB) recently released a report about NSF's Broader Impacts merit review criteria. This report, which can be found on the NSF website (http://www.nsf.gov/news/news_summ.jsp?cntn_id=122794&org=NSF&from=news) is a result of the work of a NSB task force on Merit Review that involved considerable feedback from various stakeholder groups both internal and external to NSF. An implementation plan will be developed by NSF and revised criteria should appear in the next release of the NSF Proposal and Award Policies and Procedures Guide.

What the Tectonics Program funds

The Tectonics Program supports a broad range of field, laboratory, computational, and theoretical investigations aimed at understanding the evolution and deformation of continental lithosphere through time. Proposals to elucidate the processes that act on the lithosphere at various time-scales and length-scales, either at depth or the surface, are encouraged. Because understanding such large-scale phenomena commonly requires a variety of expertise and methods, the Tectonics Program supports integrated research involving the disciplines of structural geology, petrology, geochronology, sedimentology, stratigraphy, geomorphology, rock mechanics, paleomagnetism, geodesy, and other geophysical techniques.

We recommend two sites where you can get a sampling of the projects funded by the Tectonics Program, including abstracts. The first, and most familiar, is the NSF web site (<http://www.nsf.gov>).

1. Click on the "Awards" link on the header bar (just below the NSF logo and then click on the "Search All Fields" tab;
2. Under "Program Information" enter 1572 in the "Element Code" field;
3. Under "Additional Information", use the Original Award Date pull down menu to "Search Awards Using a Date Range";
4. Enter the date range of interest and click "Search".

A better site is the Research.gov site (<http://www.research.gov>), which is the next generation proposal and grants management tool that will eventually replace FastLane. This site will give you much more information about awards than the familiar NSF site. One very nice feature of Research.gov is that it serves many agencies besides NSF.

1. From the Research.gov home page select the "Research Spending and Results" link;
2. Select the "Advanced Search" link in the lower right hand corner;
3. Enter the date range of interest, enter "Tectonics" in the Program field, and click "Search".

Finally, for those not keen to drill into these sites, we offer a list of the awards from the October 2010 and April 2011 panel meetings below (fiscal year 2011 funds):

Age of the Socorro Magma Body: Surface Uplift History from River Terrace Correlation and Cosmochronology
Award: 1049966 Axen (New Mexico Institute of Mining & Technology)

Collaborative Research: Exploring Extensional Tectonics beyond the Ethiopian Rift
Award: 1119209 Bendick (University of Montana)
Award: 1118931 Flesch (Purdue University)
Award: 1118747 Keranen (University of Oklahoma)

The Pamir Frontal Thrust System: Rates, Style, and Controls on Deformation
Award: 1050070 Burbank (University of California Santa Barbara)

How Does the Mid-crust Accommodate Deformation in Large, Hot Collisional Orogens? Insight from the Himalaya-Tibet System
Award: 1119380 Cottle (University of California Santa Barbara)

Testing the Hypothesis that Detachment Faults are Active and Generate Microearthquakes
Award: 1143693 Cowan (University of Washington)

Sponsoring Early Career Researchers for Penrose Conference: Deformation Localization in Rocks
Award: 1128849 Czeck (University of Wisconsin Milwaukee)

Microstructure in Marble: Evolution of Strength in Natural and Laboratory Deformation
Award: 1118562 Evans (MIT)

EAGER: Upper-plate Response to a Great Earthquake: Integrating Deformation from Seismic to Geologic Timescales
Award: 1153317 Furlong (Pennsylvania State University)

Collaborative Research: Improved Cenozoic Paleoelevation Estimates for the Sierra Nevada, California: Linking Geodynamics and the Atmospheric Sciences
Award: 1049903 Galewsky (University of New Mexico)
Award: 1049921 Huber (Purdue University)

Collaborative Research: Provenance and Thermal Evolution of the Chugach-Prince William Terrane Flysch, Southern Alaska
Award: 1116554 Garver (Union College)
Award: 1116536 Davidson (Carleton College)

Eclogites in the Yukon-Tanana Terrane, Canadian Cordillera: Subduction Erosion of the Overriding Plate?

Award: 1118834 Gilotti (University of Iowa)

Tracking the Siberian-Laurentian Detrital Transition in the Farewell Terrane, Southwestern Alaska

Award: 1119550 Hampton (Michigan State University)

Reconstructing the Late Cenozoic History of Surface Uplift and Climate Change in the Central Rocky Mountains

Award: 1119005 Heller (University of Wyoming)

Travel Support for Students and Early-career Professionals to attend Fragile Earth: Geological Processes from Global to Local Scales, Associated Hazards and Resources

Award: 1143509 Hess (Geological Society of America)

Collaborative Research: Isotopic, Geochronologic, and Tectonic Character of the Western Piedmont, Virginia - Implications for the Closing of Iapetus

Award: 1048476 Hibbard (North Carolina State University)

Award: 1048472 Miller (Texas A&M)

CAREER: Bridging Earthquakes and Earth Structure along the Northern San Andreas Fault

Award: 1055981 Hilley (Stanford University)

Integrated Analytical-Computational Analysis of Microstructural Influences on Seismic Anisotropy

Award: 1118786 Johnson (University of Maine)

Forearc Uplift in Northern Chile

Award: 1049978 Jordan (Cornell University)

Structural Geology and Tectonics Forum

Award: 1153210 Karabinos (Williams College)

Collaborative Research: Testing Hypotheses for Neotectonic Mantle-Driven Surface Uplift of the Colorado Plateau Region

Award: 1119629 Karlstrom (University of New Mexico)

Award: 1119635 Aslan (Mesa State College)

Collaborative Research: Testing the Role of Magma and Related Fluids in Early-Stage Rifting, East Africa

Award: 1113677 Kattenhorn (University of Idaho)

Award: 1113346 Roecker (Rensselaer Polytechnic Institute)

Award: 1113355 Ebinger (University of Rochester)

Award: 1113066 Brearley (University of New Mexico)

Collaborative Research: Time Scales and Dimensions of Rheological Heterogeneity and Fabric Evolution in the Lower Continental Crust during Extensional Orogenic Collapse

Award: 1119248 Klepeis (University of Vermont)

Award: 1119039 Stowell (University of Alabama Tuscaloosa)

Petrologic and Chronologic Evaluation of Himalayan Tectonic Models in Southern Bhutan

Award: 1048124 Kohn (Boise State University)

CAREER: Exhumation of a High-Grade Metamorphic Terrane, and Late-Stage Orogenic Collapse in the Southeastern New England Appalachians

Award: 1052458 Kuiper (Boston College)

Collaborative Research: Comparative Studies of Circum-Arctic Neoproterozoic-Paleozoic Terranes

Award: 1049463 Macdonald (Harvard University)

Award: 1049368 McClelland (University of Iowa)

Ediacaran Paleomagnetism and Geochronology of Eastern Baltica: A Key to Paleogeography and Climatic History of the Continent

Award: 1119038 Meert (University of Florida)

Collaborative Research: Evaluating the Influence of Eocene Ridge Subduction on Magmatism, Deformation, and Basin Evolution, Pacific NW

Award: 1119358 Miller (San Jose State University)

Award: 1119252 Tepper (University of Puget Sound)

Award: 1119063 Umhoefer (Northern Arizona University)

Award: 1118883 Bowring (MIT)

Fluid Flow and Growth of Active Salt Structures at Decadal Timescales: Paradox Basin, Utah

Award: 1119173 Mueller (University of Colorado Boulder)

Collaborative Research: Geochemical Imaging of Post-Pangean Lithospheric Structure in the Southern Appalachians

Award: 1053465 Mueller (University of Florida)

Award: 1053404 Grimes (Mississippi State University)

Collaborative Research: Effects of Structural and Compositional Heterogeneity on Upper Mantle Deformation and Rheology

Award: 1050044 Newman (Texas A&M)

Award: 1050041 Tikoff (University of Wisconsin Madison)

Collaborative Research: Controls on Termination of Great Earthquakes in a Restraining Double-Bend of the Altyn Tagh Fault

Award: 1050060 Oskin (University of California Davis)

Collaborative Research: Controls on Termination of Great Earthquakes in a Restraining Double-Bend of the Altyn Tagh Fault

Award: 1049834 Duan (Texas A&M)

Collaborative Research: Crustal Overturn in Continental Margin Arcs during Magmatic Surges

Award: 1019525 Ducea (University of Arizona)

Award: 1019636 Paterson (University of Southern California)

Collaborative Research: Hypothesis Testing of a Mediterranean-style Closure of the Paleo-Tethys Ocean

Award: 1118525 Pullen (University of Rochester)

Award: 1118908 Weislogel (West Virginia University)

The Earthquake Cycle and its Role in Permanent Vertical Deformation in the Western Solomons Arc from Coral Paleogeodesy of the Past Few Centuries

Award: 1119211 Taylor (University of Texas Austin)

Colliding Channels and Double Domes in Metamorphic Core Complexes

Award: 1050020 Teyssier (University of Minnesota Twin Cities)

Collaborative Research: Differential Geometry and Statistics of Deformation Tensors

Award: 1119606 Tikoff (University of Wisconsin Madison)

Award: 1119181 Titus (Carleton College)

Fluids in Continental Fault Zones: Evidence from Neomineralized Clays

Award: 1118704 Van der Voo (University of Michigan)

Collaborative Research: Thermochronology of Dominant Thrust Sheets in the Sevier Fold Thrust Belt, Utah and Nevada:

Determining Fault Timing and Slip Rates

Award: 1050073 Wells (University of Nevada Las Vegas)

Award: 1050069 Yonkee (Weber State University)

Collaborative Research: Evaluating Ancestry of the Tibet Plateau: Did a Mesozoic Proto-plateau Exist?

Award: 1119219 Weislogel (West Virginia University)

Award: 1119266 Robinson (University of Alabama Tuscaloosa)

Post-6 Ma Tectonic Evolution of the Bhutan Himalaya

Award: 1049888 Whipple (Arizona State University)

Mechanical Deformation, Failure Mode and Permeability Evolution in Carbonate Rock

Award: 1044967 Wong (SUNY Stony Brook)

SG&T is on facebook!

SG&T Facebook page now has more than 5,000 fans! Everyone can access our page at www.facebook.com/GSA.SGT. This page will be used for announcements between newsletter publication times, and for the sharing of news, deadlines, and up to the minute updates on forthcoming conferences, workshops, and short courses that would be of interest to SG&T members. The Division web site will remain the place for all official SG&T information <http://rock.geosociety.org/sgt/index.htm>

Special Announcement

Structural Geology and Tectonics Forum in Williamstown, MA

When: Technical Program June 14-16, 2012

Fieldtrips and Workshops June 12-13 and June 17-18, 2012

Application Deadline: March 15, 2012

No Registration, Fieldtrip, or Workshop Fees!

The Structural Geology and Tectonic Forum follows a successful inaugural meeting in Madison, WI, in May 2010. It is an informal meeting focusing on research, following the model of the well-established "Tectonic Studies Group" meetings in the UK and Australia. The primary purpose of the meeting will be to identify and discuss important areas of research, but there will also be opportunities to discuss successful ways of integrating research with teaching. The Forum is aimed at professional geologists, although advanced graduate students are encouraged to attend, and funds are available to support student attendance. We anticipate offering short courses and fieldtrips during the two days before and after the meeting.

Website: www.geology.wisc.edu/~struct/mtg2012 Questions? Please contact Paul Karabinos (pkarabin@williams.edu) or Basil Tikoff (basil@geology.wisc.edu)

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