**Geological Society of America**

**Structural Geology & Tectonics Division**

## 2012

# Career Contribution Award

### Presented to Richard W. Allmendinger

*Response by Richard W. Allmendinger*

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

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

I returned to Cornell, first as a post-doc, and then worked my way up the academic ladder: research associate, professor, and most recently associate dean for diversity and faculty development in engineering. It was at Cornell that I began to apply geophysical methods to structural geology problems via the COCORP project and by working with earthquake data. Thanks to Bryan Isacks and Terry Jordan, I also started a life-long love affair with the Andes and formed many deep and abiding friendships with South American geologists such as Victor Ramos, Constantino Mpodozis, Betty Coira, Rene Manceda, Roberto Hernández, Ernesto Cristallini, Gabriel González, and José Cembrano. As a professor at Cornell, I learned early on that your graduate students will make or break your research program, and I have been exceedingly fortunate to have

had an extraordinary group, of which Randy is just one example. From most, I have learned more than I ever taught them and they are the ones who have kept my research program moving in new directions throughout the years.

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

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

It is true that I am more widely known for my computer programs than I am for my scientific research, a conclusion one can glean from the fact that, for my career to date my citation count is about 4500, and my impact factor is somewhere between 33 and 39, but my Stereonet program download page had 20,000 hits this past year, alone. Some of the most gratifying emails I get come from students somewhere in the world who have taken the time to write "I just want to say thanks for making the program available." All of the programs, though, were written to solve the research problems on which we were currently working and were, ultimately a vehicle by which I learned new things. One might question why I put so much time into developing spiffy, easy to use interfaces, but even then there was method in my madness: Ease of use encourages experimentation which leads one to explore a wider parameter space. If you develop a new algorithm, approach or analysis, others are more likely to experiment with it if an easy to use tool is available. Finally, like woodworking, painting, etc, computer programming is one of the few things in life over which one has total control. You can't control your kids, spouse, or graduate students, but damn you can craft a decent user interface!

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

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

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

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