

2013 MEDALS & AWARDS

DISTINGUISHED GEOLOGICAL CAREER AWARD (MGPV DIVISION)

Presented to
Gerhard Wörner



Gerhard Wörner
Georg August Universität Göttingen

Citation by Russell S. Harmon

The recipient of the Mineralogy, Geochemistry, Petrology, and Volcanology Division Distinguished Geological Career Award is Professor Gerhard Wörner, Director of the Department of Geochemistry of the Geosciences Center in the George August University in Göttingen, Germany. This honor is richly deserved as Gerd, more than anyone else I know practicing in the profession today, has put into practice the all of criteria for this award. Not only has he made important contributions in each of the research fields of the Division - mineralogy, geochemistry, petrology, and volcanology, the very broad and sophisticated analytical approaches that he has employed to address specific questions of geologic importance have always been based on a multidisciplinary, field-based foundation in which the problem under consideration is cast in the framework of the Earth as a natural laboratory. Back in 1986, Gerd joined our NSF project to study the effects of thickened continental crust on the subduction zone magmatism of the Central Andes. I quickly learned that he has the particular knack of 'reading the rocks' – the essential talent for a field geologist, and his approach to any geological problem or project is to quickly develop a working conceptual model that is then tested by rigorous

fieldwork, evaluated from the perspective of all available geological information, and examined through the lenses of geochemical and isotopic analysis. This was demonstrated to me again over the past decade in the more challenging environment of the vegetation-covered humid tropics when Gerd joined an effort to map and understand the arc magmatism of central Panama.

Gerd received his geological training in Germany, studying with two of the most eminent earth scientists of the country – petrologist Werner Schreyer and volcanologist Hans Ulrich Schmincke. From 1979 to 1980, as recipient of a scholarship from the Study Foundation of the German People, he studied in the United States with the USGS, briefly visiting MIT and the Lamont Doherty Geological Observatory. He was working with the USGS volcanology group at Mt. St. Helens at the time of the May 18 eruption in 1980. Following his PhD on the Laacher See magma chamber, Gerd received post-doctoral fellowships from the Heinrich Hertz Foundation and later the German Science Foundation that provided the opportunity to learn radiogenic isotope geochemistry with Alan Zindler at Lamont. In between, as a researcher at Bochum University, Gerd was responsible for the German Science Foundation 'Mt. Melbourne Project', during which he led a small field party that mapped and subsequently undertook a mineralogical, petrological, and geochemical study of the Mt. Melbourne Volcanic Field in North Victoria Land, Antarctica. Following a faculty appointment at the University of Mainz, Gerd was selected in 1993 to be the Professor of Geochemistry and Director of the Geochemistry Institute of the Georg-August University of Göttingen, a position previously held by V. M. Goldschmidt and K.-H. Wedepohl amongst others. Gerd's research has been honoured with the V.M. Goldschmidt Prize of the German Mineralogical Society in 1988, the Albert Maucher Prize of the German Science Foundation in 1989, the Leibniz Prize of the German Science Foundation in 1997 - which is the highest science award in Germany, and induction as a member of the Academy of Sciences of Göttingen in 2006.

Over the course of his career, Gerd's research has focused on physical volcanology; magmatism in continental rifts and at convergent plate boundaries in the Andes, Central America, and Kamchatka; the evolution of magmatic systems - from the crystal to the orogenic scale; and the interaction between tectonic and magmatic processes in orogenic belts. This breadth of

Gerd's research is demonstrated in the diverse set of his current research projects, which include studies of the time-space variation in magma composition during the evolution of magmas in convergent plate margin settings; the interplay between tectonics, climate, geomorphology, and magmatism in the Central Andes; and trace element and parent-daughter isotope fractionation during ultra-high pressure metamorphic dehydration.

But, it has been the High Andes of South America that has been Gerd's primary field area and geological laboratory for most of the last 30 years, resulting in more than 35 published papers on Andean volcanology, geology, geomorphology and climatology, and it is this body of research which forms the foundation for this well-deserved award. Congratulations Gerd!

As a footnote, it also must be said that Gerd is simply an all-out "nice guy". He is truly collaborative at all levels. He is also supportive and generous with his time, particularly with young researchers, and his contribution to mentoring the next generation of earth scientists should not be overlooked.

Response by Gerhard Wörner

This award came as a complete surprise and the citation leaves me totally flattered. Being surrounded by many colleagues and friends that would have equally deserved such distinction is a humbling experience and makes you ask : How did I get here, what could it be to have been considered for such merit, and who helped you to become what you are ?

Russ mentioned that the Central Andes and the Atacama Desert are my favourite geological playgrounds. He is right, and he is also the person whom I owe everything to have been invited and introduced to this marvellous place of geological wonders.

When I do field work in the Central Andes, climbing and sampling volcanoes sometimes close to 6000 meters, crossing rivers down in some of the deepest canyons in the world , supported only by a rope, to sample Tertiary sediments for their provenance, or taking sections through Miocene lake sediments to understand the interplay of uplift and volcanism I still feel like the little boy that I was in small-town Germany. My parents allowed me to explore the forests and mountains before I was even able to ride a bicycle, I could not have been older than six years. Yet, my forested and pastured playground at that time was already some 25 km² in size. Today, counting just the Central Andes, this playground has increased

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significantly to something like 200,000 km². Apparently, I have made some progress. The first times, however, I got to see some real rocks was during summer holidays in the Alps with my parents when I was seven. The car returned home filled with my first samples, against my father's concerns not to overload the vehicle but secretly allowed to be placed below the seats by my mother. So I started my rock collection, which also has grown significantly over the years.

This early interest, much supported by my parents, resulted in my choice to study mineralogy. This is a major that until a decade ago has been kept well separate from the geology curriculum in German university education, a separation that I never understood and later tried helping to overcome.

Hans-Ulrich Schmincke became my PhD supervisor in Bochum and that choice has put me on a track towards field-based volcanology and igneous petrology that I still follow today. Hans supported me in many ways and I can still feel the momentum that I gained from him. The study of Laacher See volcano that Hans Ulrich offered me to do as a PhD project turned out to be an important step into the scientific arena for me. At the time, research in zoned magma systems was a hot topic and I found myself and my work in the middle of a lot of attention. This I realized during my first visit to the US in 1979/1980 working at the USGS with Tom Wright. There I met and was very impressed by Bob Smith and it was when he got all excited about my first PhD results on chemical zonation that I realized that I was after something really interesting.

As in real life and in any career, chance and fortune is a decisive factor, but these early advisors and many others, from which I learned my trade, have put me in the position to take chances and to benefit from fortune.

One of these chance moments came an evening over beers near the Laacher See Volcano with Russ Harmon. I had been to Antarctica and I had told him that this had been one of my dreams. "So, what's your new dream?", he asked. "To go to the Central Andes and study volcanoes", I replied. Next thing was that he invited me to join field work the following year. I had no idea that he was involved in the Andes nor did I realize what promise this offer would hold for my further career.

I really enjoyed working in Central America, Kamchatka, and—of course—Antarctica. All these field regions have been attractive to me for a particular scientific issue and have proven to result in interesting studies with other colleagues. However, much more than any of these other field areas, the Central Andes and the Atacama Desert have

caught my fascination, scientifically as well as for the aesthetical volcanoes and desert landscapes. This part of the world is an open book of geological wonders and exciting research. I found myself comfortable to explore the desert, the volcanoes more than 5000 m high and valleys 3000 m deep. Living and working in such a field area for many weeks at a time, and almost every year, since this first field campaign in 1986 led by Russ, gives you a unique perspective on how the Earth works. That is also why I myself tried to invite many colleagues and friends to join me in later years. These colleagues provided their insights from their own research fields. Every year, we would return with students to the area, equipped with more insights from our laboratory results on composition, origin and evolution of the magmas, more radiometric ages, and more ideas what to investigate next. This combination of a fascinating field area, many excellent colleagues and quite a number of good students was the ferment from which I could extract more and more insights for myself about the geological evolution of the Andes. We started with reconstructing the history and magma evolution of Andean volcanoes at Parinacota in a project led by Russ. With Jon Davidson I did most of the high altitude work and with him I shared my first experiences working in this environment. It became obvious very early, that the thickening of the Andean crust through time and its compositional variation through space had a major impact on the evolution and composition of Andean magmas. Isotopic data were instrumental in constraining assimilation and here Steve Moor bath has played an important role in the early days. A major „milestone“ was reached with Mirian Mamani's thesis, published in 2008 and 2010 and our Andean Data Base that gives an easy, map-based access to the compiled data, and which can be found on our website (<http://andes.gzg.geo.uni-goettingen.de/>). But we haven't finished yet, and this gives me an excuse to return to northern Chile and Southern Peru as often as I possibly can. Trying to understand the magmatic evolution in the Andes you cannot help start looking into the history of crustal thickening, tectonic uplift, valley incision and the record of orogenic uplift and denudation that can be found in lake sediments and the hundreds of meters of conglomerates on the western Andean margin. On the other hand, small scale chemical zonation in phenocrysts caught my attention in order to understand the architecture and history of magmatic systems and the processes occurring just prior to eruption. Through this we also hope to address

the question of what causes the changing magmatic regimes in Andean volcanoes. Catherine Ginibre was the PhD student that opened this avenue of study for us.

On all these and other aspects I was privileged to collaborate with several additional colleagues, including cheerful Leo Lopez-Escobar in the field, Brad Singer for dating, Alan Zindler for isotope analyses, Hartmut Seyfried, Reinhard Gaupp, Hilmar von Eynatten, and Thierry Sempere to understand the sedimentary archives of uplift, Jean Claude Thouret introduced me to southern Peru, increased my playground significantly, and was instrumental in reconstructing the valley history in the deepest canyons of the world. I have had many good students and I am happy to see them and others to take off in different directions, ask new scientific questions, apply more sophisticated analytical tools, and thus helping me to learn more about my favourite field area. John Hora is the present post doc in my group, working on Parinacota. He is producing new and exiting ideas and insights into its evolution. It seems that I can't stop loving this volcano. Now, a new PhD student is applying state-of-the-art remote sensing tools to trace out ignimbrites and alteration zones, all in GIS. Another is digging into the P-T evolution of Andean magmas. It is actually a surprisingly pleasant experience to see your students and postdocs do something that you couldn't possibly do yourself. My benefit is to learn more about my favourite field area the easy way.

Learning more is what it is all about. One day, after already 20 years of study, I found myself after a few days of field mapping standing alone on a high cliff. I had a view past the Coastal Cordillera to the Pacific Ocean some 3000 m below and the High Cordillera with its volcanoes peaking 6000 m behind. This is the best place musing about the past 25 Million years that had shaped this magnificent landscape and its geological history. What great a fortune I have had to study and understand it well with all its details and facets. This is also a place to which I take my students to share this unique experience.

It is a great privilege to be a geologist and to have supportive colleagues, good students and the analytical means to investigate rocks and minerals (all funded by tax payer's money) and to study the evolution of our Earth. Since this is also so much fun, adventurous and greatly satisfying, the honour of this award comes as a very thick icing on that cake. The award leaves me humbled and grateful to my teachers, colleagues, students, and friends that have supported me so much over these years.