# 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.