



## From the Editors

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On the occasion of his 65th birthday and retirement as Director of the Institute of Mineralogy of the Museum of Natural History, Humboldt-University at Berlin, Germany, in the year 2004, colleagues, friends, and former students honor Dieter Stöffler by dedicating this issue of *Meteoritics & Planetary Science* to him. Dieter has been scientifically active in the field of planetary sciences for over 40 years, in particular in impact cratering studies. He advanced the scientific community not only in his capacity as an outstanding scientist but also as President of the Meteoritical Society, the founder and head of the Institute of Planetology at the Westfälische Wilhelms-University at Münster and scientific advisor during the development of the Ries Crater Museum in Nördlingen, as Director of the Museum of Natural History in Berlin and its Institute of Mineralogy, as well as the initiator and leader of a host of international scientific projects—just to mention a few of his dedicated services to the community.

Dieter started his scientific career with studies of terrestrial impact structures, notably the Ries crater in Germany, under the supervision of Prof. Wolf von Engelhardt. As early as this, he developed a keen and never-ending interest in the mineralogy of impact-produced phases and shock deformation. This was followed by research on lunar impact breccias and led to his endeavour into planetary topics, first the Earth-Moon system, and then, generally, the evolution of our solar system (mostly from the impact cratering perspective). A particular strength of his research activities has always been a multidisciplinary approach, whereby he at times took the lead regarding the application of state-of-the-art techniques. This is quite apparent in numerous studies where Dieter combined geological ground truth with laboratory experimentation and analysis, as well as in more recent years, with numerical modelling efforts. Milestones of his many scientific accomplishments are, for example, the development of techniques such as optical and TEM studies for the application to shock metamorphic analysis and the utilization of radiometric age dating in investigating lunar and terrestrial impact breccias. He has contributed fundamentally to the development of progressive shock metamorphic schemes for important rock-forming minerals and meteorites, and has been a driving force behind the establishment of an impactite nomenclature. Throughout his career, Dieter has closely collaborated with many scientists world-wide. During his chairmanships at Münster and Berlin, these institutes hosted many renowned impact and meteorite scientists.

This special issue in the honor of Dieter Stöffler is divided into three parts and reflects his principal topics of research activity. Following “An appreciation of Dieter Stöffler,” in which Klaus Keil reviews highlights of Dieter’s career, the first part addresses shock metamorphism and associated methodology. The articles by Thoma et al., Kenkmann et al., Turner et al. and Hörz et al. focus largely on shock experiments and are a tribute to Dieter’s extensive experimental work. Thoma et al. discuss the current state of shock experimentation, with ample reference to Dieter’s long and productive collaboration with the Ernst-Mach-Institut at Freiburg, Germany. Kenkmann et al. report on the first successful shock synthesis of micro-diamonds generated in shock recovery experiments with graphite gneiss. Farrell-Turner et al. apply Raman spectroscopy to experimentally shock-deformed olivine in dunite; this technique has been pioneered, inter alia, by Dieter for application to impactites. The study by Leroux et al. addresses the alteration of shocked quartz from the Ries crater and thus is dedicated to the beginnings of Dieter’s career; the Ries has been a personal interest throughout Dieter’s long career. The TEM studies by Vernooij and Langenhorst and Sandbakken et al. honor Dieter for recognizing the importance of this technique for identifying and characterizing shocked mineral phases.

The second part of the issue focuses on meteorites and includes various analytical approaches, including detailed petrographic and TEM studies, and chronological analysis. The first two articles by Meibom et al. and Fritz et al. address impact-induced effects in meteorites, more specifically, the significance of shock melting and shock-metamorphic deformation structures. This is followed by a TEM study by Greshake et al. on the alteration on meteorite parent bodies inferred from the recent Tagish Lake meteorite fall. The geochronological study by Korochantseva et al. highlights Dieter’s accomplishment in applying geochronometers such as the  $^{40}\text{Ar}$ - $^{39}\text{Ar}$  method in solving planetological problems.

Characteristics of individual impact structures are addressed in the third part of this special issue. Koeberl et al. present new geochemical and shock-metamorphic data as well as a morphometric analysis based on new SRTM data of two impact structures in Chad, Central Africa. Target rock and melt rock characteristics are reported from the Lonar impact structure, India, by Osaie et al. and from the Bosumtwi impact structure, Ghana, Central Africa, by Dai et al. Dieter has also worked on two of the largest impact structures known on Earth, Sudbury and Chicxulub. As Principal Investigator, he spearheaded the recent deep drilling project of the

International Continental Scientific Drilling Program at Chicxulub, Mexico. Tuchscherer et al. relate to this aspect of Dieter's career with a contribution that addresses the geochemical characteristics of impactites from the ICDP Chicxulub borehole, in an attempt to constrain the precursor materials to these melt rocks. Finally, the structural evolution of large terrestrial impact structures remains one of the least understood topics in impact geology, an aspect that Dieter, by training a mineralogist, tackled through his long-standing collaboration with colleagues in the Department of Geology at the University in Münster, and later in his own multidisciplinary department in Berlin. Structural analysis of large impact structures is covered by Wieland et al., who provide a detailed account of the structural inventory of the collar rocks from the Vredefort Dome, South Africa.

The special issue closes with an article by Gisela Pösges on the Ries Crater Museum in Nördlingen, Germany, highlighting Dieter's tremendous efforts and success in communicating science to the public. Dieter was instrumental in establishing this unique museum and its outstanding exhibitions. The colleagues and students of Dieter, who contributed to this issue, and the Meteoritical Society would

like to take this opportunity to congratulate him on his scientific achievements and to thank him for his guidance, leadership, and collaboration. We all wish Dieter the very best for his continuing research but also for his interests unrelated to science.

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