

# Preface

Earth's magnetic field is currently changing dramatically. The dipole moment decreased by about 10% since the times of Carl-Friedrich Gauss. The most drastic change of the geomagnetic field is a polarity transition – an event during which the magnetic poles reverse their signs. During such a transition the field magnitude at the Earth's surface diminishes to about 10% of its normal value. The last reversal occurred about 780,000 years ago. Is the observed decrease of the dipole moment indicating a future polarity transition? What would be the effects of such a drastic change to system Earth? Can any positive or negative effects to our biosphere or even humans be expected?

Between 2000 and 2006 the Deutsche Forschungsgemeinschaft (DFG) conducted a special priority programme *Geomagnetic Variations: Space-Time Structure, Processes, and Effects on System Earth* to unravel some of the open questions related to geomagnetic field changes. The launch of the satellite CHAMP in the year 2000 with its magnetometer systems on board and the much improved ability to analyse the global magnetic and its temporal variation was one of the reasons to initiate this DFG research programme.

Almost all research groups in Germany with interest and experience in problems of geomagnetism and related fields were involved. The programme was coordinated by the editors of this book and guided by a board of referees of the DFG consisting of a group of highly esteemed scientists from various countries, who accompanied the project from the beginning in 2000 to its final symposium in October 2006 in Braunschweig.

The overall programme was very successful in bringing together a large number of scientists from very different disciplines such as geomagnetism, paleomagnetism, geology, theoretical physics, solar physics, astrophysics, applied mathematics, magnetospheric physics, and atmospheric physics. The results of the programme have been published in some 150 refereed publications and numerous oral presentations.

We are very grateful to the Deutsche Forschungsgemeinschaft for the financial support of this research programme and, in particular, to Dr. Johannes Karte, for his professional guidance. Special thanks are to our national and international colleagues in the group of referees, Eigil Friis-Christensen, Rainer Hollerbach, Gauthier Hulot, Andy Jackson, Dominique Jault, Cor Langereis, Bob McPherron,

John Shaw, Jürgen Untiedt, Kathy Whaler, and Helmut Wilhelm for their continuous support and constructive advice.

The intention of this book is not to be a textbook in geomagnetism, but to review major results of the above mentioned programme and other ongoing international activities aiming at understanding the causes and effects of geomagnetic variations. As the topic of the book covers a wide range of scientific disciplines, the first chapter aims at summarizing basic principles of geomagnetism and related fields in order to ease the reading of the later, more specialized chapters reviewing current scientific knowledge. These later chapters have been written by key people in the respective research areas, supported by a large number of other experts in the field. In particular contributions by Valerian Bachtadse, Ulrich Bleil, Jan-Philipp Bornebusch, John P. Burrows, Martyn Chipperfield, Charles H. Jackman, Kumar Hemant, Anne Hemshorn, Christoph Heunemann, Daniela I. Hofmann, David Krása, Klaus F. Künzi, Stefan Maus, Justus Notholt, Norbert Nowaczyk, Nicolai Petersen, Jens Poppenburg, Patricia Ritter, Martin Rother, Jens Schroeter, Anja Stadelmann, Friedhelm Steinhilber, Claudia Stolle, Christian V  rard, Holger Winkler, Michael Winklhofer, Ingo Wardinski, Jan Mark Wissing, and Bertalan Zieger are acknowledged.

Braunschweig  
June, 2008

*Karl-Heinz Gla   meier*  
*Heinrich Soffel*  
*J  rg Negendank*

Geomagnetic Field Variations

Glaßmeier, K.-H.; Soffel, H.; Negendank, J. (Eds.)

2009, XII, 213 p., Hardcover

ISBN: 978-3-540-76938-5