

Preface

The reason why I wrote a book on volcanism in German (second edition published in 2000) rather than in English, the *lingua franca* of science, was simple. The intended users of this book were not only scientists and beginning students in the Earth sciences, but also school teachers and lay people interested in volcanoes. The updated English translation likewise attempts to strike a balance between providing enough science and a few up-to-date references for those who want to dig deeper, while at the same time remaining digestible for those who simply want to know more about volcanoes. Translation of the text by the author had the advantage that it allowed rewriting and updating of major sections of several chapters, within the constraints of the publication schedule.

The first edition of this book appeared at a time (1986) when a certain plateau had been reached in volcanology, following an almost explosive growth phase in the study of volcanic rocks and processes. The basic motivation to study volcanoes is the sustained curiosity about what happens beneath volcanoes, at the source of magmas, during their rise, their vesiculation, their many ways to erupt explosively or quietly and the transport of hot and cold materials along the Earth's surface or through the atmosphere. This book attempts to point out some of the major current issues in volcanology. Two fundamental goals for motivating research have recently been reinforced in national and international research programs. One goal is that of mitigating volcanic disasters. The other is concerned with the interaction of volcanic processes with the environment including the solid earth, groundwater and surface waters, as well as the atmosphere.

This book shares the fate of all books attempting a broad overview of a subject. Experts will not be content with the superficial account of their specialized fields. Yet there is a great need for broad-brush treatments in the face of ever-growing specialization. I have listed a few more specialized books below, some of which contain extensive lists of references for those who want to delve deeper into a subject.

The first chapters (Chaps. 1–9) are more general in nature and thus do not require detailed references. Most recent studies quoted are the sources of the figures. Hence, the list of papers

quoted is in no way representative. In view of the large amount of literature consulted when writing this volume, I have not been able to trace back some information to its primary source. I apologize to those colleagues whose

paper I have failed to quote. The 2000 German edition was also conceived to summarize some aspects of the research of our group and to represent a symbolic thanks to several research agencies that had generously funded our work for more than four decades. Many figures are sourced in these publications, which are thus greatly overrepresented in the list of references. The present text has been updated and some parts were rewritten to provide a more logical flow and to make reference to important recent eruptions. Some 35 graphs and 85 photos were added to the English-language edition or exchanged with previous illustrations.

About half of the roughly 450 references – generally indicated in the text by a number in parenthesis (the number of the chapter in which they are quoted is given in the list of references) but listed alphabetically at the end – were published during the past six years. Recent books that treat some aspects of volcanism in more detail include Francis (1993), Wohletz and Heiken (1992), McGuire (1995), Scarpa and Tilling (1996), Sparks et al. (1997), Gilbert and Sparks (1998), Heiken and Wohletz (1998), and Freundt and Rosi (1998). The monumental *Encyclopaedia of Volcanology* (Sigurdsson et al. 2000), published after the second German edition of *Vulkanismus* appeared, will remain the standard source of information for many years. Two older classic textbooks in volcanology, by Macdonald (1972) and Williams and McBirney (1979), are still informative introductions to the subject. Blong (1984) provides a detailed and comprehensive overview of the effects of volcanic eruptions. There are also many popular accounts of volcanology, particularly readable books being those by Decker and Decker (1994), of which there are several editions. Woods and Kienle (1998) provide a guide to many areas of volcanic interest in the United States. Volcanic

A volcano is not made on purpose to frighten superstitious people into fits of piety and devotion; nor to overwhelm devoted cities with destruction; a volcano should be considered as a spiracle to the subterranean furnace, in order to prevent the unnecessary elevation of land, and letal effects of earthquakes.

James Hutton, Theory of the Earth, Codicote, 1795

national parks in the United States are succinctly discussed and supplied with illustrative maps by Decker and Decker (2002). Planetary volcanology, a subject not treated in this book for simple space reasons, is discussed in several dedicated books such as Cattermole (1996). The history of man's attempt to understand volcanoes is discussed in some detail by Sigurdsson (2000).

There are two journals in volcanology: *Bulletin of Volcanology* and *Journal of Volcanology and Geothermal Research*. Publications treating various aspects of volcanology also appear in journals in geology, petrology, geophysics, geochemistry and geomorphology.

Details of current eruptions can be obtained from the Internet, especially www.volcano.si.edu/gvp, the Global Volcanism Network of the Smithsonian Institution (Washington, D.C.) and the US Geological Survey. They contain weekly and monthly activity reports where details of current eruptions and background data are summarized, as well as data on volcanoes of the world and various links to other volcano sites. The Internet site of IAVCEI, the International Association of Volcanology and Chemistry of the Earth's Interior (www.iavcei.org) also contains much useful information on volcano observatories, current courses and links to various volcano-related sites.

A list of common abbreviations and physical units is given at the end of this book along with SI units. Leading journals continue to use some of the old units. I have followed this practice and still use kb (kilobar) instead of Gpa (giga pascal). For density I mostly use g/cm^3 which is easier to visualize than kg/m^3 .

Several colleagues were kind enough to take out time from their busy schedule to critically scan

earlier versions of one or more chapters and make helpful suggestions. These include Colin Devey, Wendell Duffield, Jim Gardner, Martina Halmer, Jason Phipps Morgan, Chris Newhall, Jon Snow, Roland von Huene and, for the German edition, Armin Freundt and Matthias Hort. I am especially grateful to Shane Cronin, a volcanologist as well as a native English speaker. He did a trail-blazing review of first drafts of all chapters chopping over-long Germanic sentences and making the text easier to follow. Kathy Cashman did a final review of several chapters pointing out logical flaws and other inconsistencies. I owe much to Tad Ui, my host at Hokkaido University where the final drafts of the translation were prepared. He also looked over several chapters and made many useful suggestions. Several colleagues kindly provided me with files of figures from their publications. I was lucky to have been associated with many able students and some of our joint work is quoted throughout the book. I was advised on graphics by Conny Park. Much of the book owes its appearance to the graphic skills of Mari Sumita who prepared preliminary versions of many graphs and graciously helped completing the book in many other ways. Joachim Schreiber and colleagues prepared the final figures and mastered the layout. I am very grateful to Wolfgang Engel (Springer Verlag) who patiently paved the way for the English edition. Luisa Tonarelli (Springer Verlag) took care of the manuscript during the final stages and saw the book to the press. Many thanks to all of you. All the faults remaining are my own responsibility, and there are undoubtedly many. I encourage readers to point these out and also suggest more appropriate references or figures for future revisions.

Lisch, March 2003

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