

Preface to the Second Edition

In the light of the success of the first edition, this book has been thoroughly revised, even if its general approach has not been changed. Minor additions and modifications, corrections of a few misprints have been included. Moreover, the book has been enriched with a new chapter on geothermal methods for the inference of past climate changes from the subsurface temperature field.

The geothermal method, unlike proxy methods for climate reconstruction, provides a direct assessment of past temperature and can extend the areal range to regions poorly covered with meteorological observations. We show how the ground surface temperature variations can be reconstructed by inverting the borehole temperature and underground thermal data, combined with surface air temperature time series, allowing the inference of the recent climatic change.

Genoa, Italy

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Preface to the First Edition

Geothermics is a discipline concerned with the study of heat transport and thermal conditions in the Earth's interior. Its applications deal chiefly with geothermal resource assessment, which implies the determination of how the heat is distributed in the outer layers of the Earth and the evaluation of how much heat can be extracted. In view of the growing interest in such problems, I perceived the need for a comprehensive and modern treatment of the background knowledge of the heat transfer processes in the lithosphere.

Starting with a brief review of global tectonics and the structure of the crust and upper mantle, this book introduces the theory of heat conduction as well as the thermal properties and the methods for the determination of thermal conductivity and radiogenic heat. The geothermal flow and the thermal state of the lithosphere and deep interior are then analyzed. The formation, upwelling mechanisms, solidification and cooling of magmas, which can be a fundamental heat source in many geothermal systems, are reviewed. Analytical methods used to gain information on heat and groundwater flow from the analyses of temperature-depth data are also presented.

Most of the topics that are covered in this book are derived from research articles published in peer-reviewed international scientific journals together with the co-authors of this book. Data and practical examples are supplied to facilitate the understanding of the different topics. The book is intended for graduate students and researchers in Earth sciences. Readers with different backgrounds are being referred to several classic textbooks in geology and geophysics. Finally, I would like to mention with gratitude Mario Pasquale Bossolasco, who many years ago at the University of Genoa kindled my interest in the physics of the Earth.

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Geothermics

Heat Flow in the Lithosphere

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