

# Preface

Geothermics is a discipline concerned with the study of the heat transport and thermal conditions in the Earth's interior. In its applied aspects, it deals chiefly with the 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 could be extracted. In view of the growing interest for such problems, we perceived the need for a comprehensive and modern treatment of the background knowledge of the heat transfer processes in the lithosphere, by including also some techniques to explore the role of water circulation in its uppermost part. After a brief review of the global tectonics and of the structure of the crust and upper mantle, this book introduces the theory of heat conduction as well as the methods for the determination of thermal conductivity and radiogenic heat of rocks. 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 also reviewed. Finally, the text focuses on the analytical methods used for gaining information on heat and groundwater flow from the analyses of temperature-depth data. Most of the topics dealt with derives from the research papers screened by peer reviews and published in international journals, that, together with the co-authors of this book, I wrote during several years of work. Data and practical examples are supplied to facilitate the understanding of the different topics. The book is intended for Earth science graduates and researchers. Readers with different backgrounds have to refer to several classic textbooks on 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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