Preface

Geological storage of carbon dioxide in deep geological formations is considered a key transitional technique for reducing atmospheric emissions of greenhouse gases and thereby their inverse effects on climate. The technique as such has been in use for several decades in applications related to enhanced oil recovery, while the first industrial-scale project with purely environmental objectives of reducing atmospheric emissions of greenhouse gases was started in 1996, at Sleipner, Norway. Since then, a number of industrial, demonstration and pilot-scale projects have been and are being carried out around the world and processes and methodologies related to geological storage of carbon dioxide have been studied, theoretically and experimentally. The results have been presented in numerous papers, in scientific and professional journals and in books. The work is actively ongoing.

Deep saline formations are the geological formations evaluated to hold the highest storage potential, due to their abundance worldwide. Previously, such formations have been relatively poorly characterized, due to their low economic value and, therefore, they still need to be better quantified. Methods for characterizing, modeling, and monitoring of CO_2 storage in them are rapidly evolving in many parts of the world.

In Europe, the European Commission has included this topic in the framework of their research programs. Within these efforts, a large-scale integrating project MUSTANG,[1] with the focus on quantifying saline aquifers for geological storage of CO_2, was started in 2009. The project involved a team of 19 partners from universities, geological institutes, and companies as well as 24 affiliated parties from industries, regulators, and overseas expert organizations. The project was followed

[1]MUSTANG (2009–2014) coordinated by Auli Niemi, Uppsala Unversity, Sweden (www.co2mustang.eu).

by subsequent EU projects, PANACEA,[2] TRUST,[3] and CO2QUEST,[4] addressing various additional aspects of CO_2 geological storage. Many of the experts involved in these projects, especially the MUSTANG project, contributed to this book. Additional world-leading experts were invited to contribute material on specific topics to ensure a balanced coverage of the various subjects.

The book's objective is to present a comprehensive overview, as well as an in-depth understanding of appropriate methods for quantifying and characterizing saline aquifers that are suitable for geological storage of CO_2. It starts from a general overview of the methodology and the processes that take place when CO_2 is injected and stored in deep saline water containing formations. This is followed by presentations of mathematical and numerical models used for predicting the consequences of CO_2 injection. A description of relevant experimental methods, from laboratory experiments to field-scale site characterization, and techniques for monitoring the spreading of the injected CO_2 in the formation is presented next. Experiences from a number of important field injection projects are reviewed as are those from CO_2 natural analog sites. Finally, relevant risk management methods are presented. The book should be of interest to anyone working or planning to work or research on the topic of geological storage of CO_2.

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We hope that this book will serve all those who are working or exploring the possibility of working in the field of geological storage of CO_2 in geological formations.

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[2]PANCEA (2012–2014) coordinated by Jacob Bensabat, EWRE, Israel (http://panacea-co2.org/).

[3]TRUST (2012–2017) coordinated by Jacob Bensabat (http://trust-co2.org/).

[4]CO2QUEST (2013–2016) coordinated by Haroun Mahgerefteh, UCL, England (http://www.co2quest.eu/).

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