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Sommario/riassunto

This book addresses two distinct, but related and highly important geoenvironmental applications: CO2 sequestration in underground formation, and Compressed Air Energy Storage (CAES). Sequestration of carbon dioxide in underground formations is considered an effective technique and a viable strategy for the mitigation of global warming and climate change. However, the short-term and long-term consequences of such an operation might be catastrophic if the involved hydro-chemo-physical and mechanical processes at the regional level are not properly addressed. Compressed air energy storage is a relatively new field of geoenvironmental application, but gaining a lot of momentum due to its effective utilization for energy storage. Renewable energy sources, such as wind energy, can be efficiently stored in the form of a compressed air in underground formations at off-peak times, and re-utilized upon demand. However, pumping and releasing compressed air can cause hydromechanical effects on the region, causing subsidence, upheaving and minor earthquakes. Considering the great potentials of these two geoenvironmental applications and their consequences, it is vital to model the involved flow processes and develop numerical tools, which are capable of describing such processes in an accurate, stable and computationally efficient manner. This book aims at attaining such models and numerical tools.--