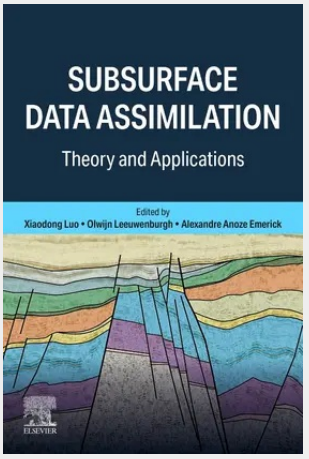
Luo / Leeuwenburgh / Emerick

Subsurface Data Assimilation

Theory and Applications



Subsurface Data Assimilation: Theory and Applications provides a comprehensive exploration of data assimilation algorithms applied to subsurface characterization and monitoring. The book begins with data assimilation methods, including multilevel data assimilation, coupled data assimilation with machine learning, and generative neural networks for geological parameterization. It also introduces Latent-Space Data Assimilation (LSDA), leveraging deep learning for feature-based analysis and forecasting, and geostatistical seismic inversion techniques. The second part of the book looks into the practical applications of data assimilation in various subsurface problems. Chapters explore CO2 monitoring, geologic CO2 sequestration, and the use of data assimilation for earthquake or CO2 storage scenarios. Hierarchical data assimilation procedures for carbon storage with uncertain geological scenarios are discussed, along with applications of data assimilation in geothermal energy contexts. The book also addresses practical uncertainty management practices and challenges related to CO2 storage and geothermal energy projects.

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