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Please fill in your abstract title.	Carbonate Diagenesis: Insights from Process-Based Forward Diagenetic Modelling

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Abstract

Objectives/Scope:
Understanding and predicting carbonate diagenesis and its impact on reservoir quality is considered to be a grand challenge in the petroleum industry. Compared to clastics, carbonates are especially susceptible to diagenetic modifications due to the high chemical reactivity of carbonate minerals. These modifications overprint the original depositional framework of a sediment, and can either create, modify, or reduce reservoir quality.

Methods, Procedures, Process:
Process-based forward diagenetic modeling is an emerging technology for simulating carbonate diagenesis. It has the ability to integrate subsurface geologic information (e.g., sediments, fluids, and temperatures) with rigorous chemical and flow simulations to make predictions of diagenetic reactions and products, honoring geologic processes.

Results, Observations, Conclusions:
In this study, we applied forward diagenetic modeling to investigate several carbonate diagenesis cases: (1) early marine carbonate cementation in upper Jurassic successions in Eastern Saudi Arabia, (2) reflux dolomitization in the same interval and same area, and (3) massive dolomite on the upper Jurassic to lower Cretaceous successions in Northeastern Saudi Arabia. The models integrate field, experimental, study and well log data as well as theoretical analysis to make comprehensive interpretations. Therefore, they provide a platform for generating, testing, and improving conceptual models and paradigms. In addition, they provide a quantitative estimate for the temporal-spatial distributions of diagenetic reaction rates and products, as well as their impact on the reservoir quality, which can provide a geological framework for reservoir simulation.

Novel/Additive Information:
This novel approach can provide valuable insights to explain observed diagenetic alteration and prediction of porosity distribution, as well as allow to evaluate the uncertainty resulting from different diagenetic scenarios for a given area.