

# **Salt Tectonics and Fluid Flow on Morocco Offshore: Insights from Seismic Interpretation and Discrete-Element Modelling**

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## **Abstract**

Salt-related deformation plays an important role for the geological evolution and structural style of the Moroccan continental margin and is a critical factor controlling reservoir distribution, migration pathways and trap formation. A recent surge in interest from the petroleum industry has provided a wealth of new data and some surprising results necessitating a new look at the geology of the region. This study adopts an interactive seismic stratigraphic and forward modelling approach, using the Discrete Element Technique, to the study of salt-related deformation with the aim of characterizing and modelling the salt tectonics and associated sedimentation and fluid flow. It was possible to define and characterize the evolution of different structural scenarios for two segments of the Morocco margin, the Talfeney Plateau, characterized by large allochthonous salt sheets, tongues and canopies, with associated counter-regional systems, which are landward-dipping expulsion faults, and roho-systems, which are seaward-dipping listric faults detaching on the allochthonous salt, as well as salt-cored fold-thrust belts at the seaward edge of the salt basin; and the Safi Haute Mer, with smaller allochthonous salt features, a well-defined extensional, transitional and contractional domain, with salt rollers, pillows, rafts and turtle anticlines updip passing downdip to squeezed salt tongues and allochthonous sheets, which were influenced by the occurrence of paleovolcanoes that acted as a buttress for the seaward migration of the salt favouring its movement upward in the stratigraphy. The integration with forward modelling of salt deformation affords better constraints on back-stripping the margin evolution and allows for more confident input into petroleum system models, allowing a spatial and temporal reconstruction of fluid expulsion, migration and accumulation which helps support future exploration offshore Morocco.