

# Influence of Long Term Exposure Surfaces on the Origin, Preservation and Distribution of Microporous Fabrics in Shallow-Water Carbonates: The Barremian-Aptian Platform from SE France

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## Abstract

The Urgonian limestones (Late Barremian / Early Aptian) from SE France, have been studied to estimate the influence of the regional Durancian subaerial exposure event (Albian to earliest Cenomanian) and the related diagenetic processes on the genesis, the preservation and the evolution of micritic microfabrics. A high-resolution characterization of the vertical and lateral evolution of porosity at different magnifications (polarized microscope and SEM) and diagenetic attributes has been performed. The variation of micritic microfabrics results from a complex interaction between early marine diagenesis, stratigraphic stacking pattern, early structuration of the reservoir and fluid circulation during long-term exposure events. Petrographical (sediment texture, facies) and diagenetic analysis (cement stratigraphy, porosity, permeability and isotope geochemistry) of more than 100 limestone samples revealed that early meteoric cementation during repeated subaerial exposures in autocyclic, peritidal parasequences led to the occlusion of intergranular and intragranular pore space (=tight limestones) preventing the formation of porosity and generated tight micritic microfabrics. In contrast shallow water carbonate sediments that were not exposed during repeated subaerial exposure events, have kept a significant fraction of the intergranular macroporosity during burial. Such porous carbonates were subject to micrite neomorphism during meteoric shallow burial diagenesis during the regional Durancian uplift and associated subaerial

exposure event (Albian-earliest Cenomanian). Such a diagenetic evolution resulted in a significant development of intragranular microporosity associated with loose and coarse micritic microfabrics. Cementation of the intergranular space occurred during later burial diagenesis and/or telogenesis (late Cretaceous and Tertiary). The results from the studied outcrop could be used as analogs for Middle East microporous reservoirs that developed below major unconformities.

*Key words: Micritic Microfabrics, Unconformity, Meteoric diagenesis, Cretaceous*