

# PALEOENVIRONMENTAL ANALYSIS OF THE JOACHIM DOLOMITE (MIDDLE ORDOVICIAN) NORTH ARKANSAS

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## ABSTRACT

The Joachim Dolomite (Middle Ordovician) crops out in an east-west trending belt across north-central Arkansas. This formation is the oldest of four members composing the post-St. Peter Ordovician carbonate sequence, which was deposited during an overall marine transgression. These units prograded in response to progressively deeper epeiric conditions caused by a relative rise in sea level near the low relief, positive Ozark Dome.

The Joachim Dolomite ranges in thickness from 1 to 25 meters and contains four units in a shoaling upward sequence: the subtidal basal sheet unit, the subtidal bank unit, the sublittoral sheet unit, and the intertidal-supratidal veneer unit. These units represent an offlapping sequence of subtidal to intertidal to supratidal environmental zones. Marine sedimentation caused carbonate banks to shoal and prograde seaward, producing a local marine regression. Algal mat communities promoted carbonate-bank progradation by forming a cohesive mat that stabilized substrates and resisted wave scour. These algal mats created cryptalgal fabrics, cryptalgal columnar structures, and stratigraphic sequences analogous to those observed in Shark Bay, Western Australia.

The Joachim Dolomite is a dolostone intermixed with variable quantities of detrital quartz grains. Halite hoppers present in the intertidal veneer unit suggest that the initial dolomitization of the sediments was induced by evaporative pumping of metahaline and hypersaline water into the prograding carbonate banks. Later, successive influxes of mixed meteoric-marine and meteoric waters converted the marine protodolomite matrix into dolomicrite and eliminated the primary marine porosity.

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