SIGNIFICANCE OF FRESH-WATER LIMESTONES IN MARINE CARBONATE SUCCESSIONS OF PLEISTOCENE AND CRETACEOUS AGE

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ABSTRACT

Fresh-water lime sediments may be deposited over tens of thousands of square kilometers during subaerial exposure of marine carbonate platforms. Such deposits, only slightly above sea level, are presently found covering portions of the Florida-Bahamas carbonate platform. Analogous ancient fresh-water limestones can be identified in Pleistocene limestones of the south Florida platform and Cretaceous limestones of the central Texas platform.

The co-occurrence of a variety of features provides a guide for the identification of fresh-water limestones in marine carbonate sequences. These include: (1) exceptional color (grey or dark grey); (2) lime mudstone lighology; (3) single, isolated 1 to 2 meter thick homogeneous beds; (4) mottled or burrowed internal structures; (5) irregularly cracked and void-riddled fabric; (6) rare fossils, usually gastropods and ostracods, exceptionally rare marine fossils; (7) evidence of early lithification and (8) position at disconformities in carbonate sequences as evidenced by subaerial exposure criteria (leached fossils, caliche, erosional surfaces, etc.)

Recognition of fresh-water limestones in carbonate sequences provides the stratigrapher with evidence of disconformities that might otherwise be overlooked. Occurrences of fresh-water limestones also imply paleo-fresh-water diagenesis, knowledge of which may help the stratigrapher understand or predict the occurrence of porosity related to subaerial exposure and stratigraphic-type hydrocarbon accumulations.

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DEPOSITION AND DIAGENESIS OF THE FORT TERRETT FORMATION (EDWARDS GROUP) IN THE VICINITY OF JUNCTION, TEXAS

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ABSTRACT

Excellent exposures of Fort Terrett Formation (Edwards Group) carbonates occur along new roadcuts of Interstate 10 in the vicinity of Junction, Texas. The Fort Terrett contains well-developed depositional cycles, most of which consist of supratidal, intertidal, and subtidal facies. The Fort Terrett also exhibits complex diagenetic cycles that include calcitization, dolomitization, sulfate emplacement and dissolution, silicification, and, in some cases, dedolomitization. Depositional and diagenetic patterns reflect superimposition of the following processes: (1) eustatic changes in sea level and associated climatic fluctuations, (2) seaward progradations of supratidal, intertidal, and subtidal facies, and (3) subsidence.

Limestone intervals exhibit abundant evidence of having stabilized in fresh-water diagenetic environments. Supratidal deposits represent sabkhas and were penecomtemporaneously dolomitized according to the Persian Gulf model. In many cycles, portions of subtidal facies have also been dolomitized, possibly in zones of mixing at the bases of fresh-water lenses.

Primary porosity was formed in grainstones but very little was preserved. Much secondary porosity was formed in limestone intervals through selective dissolution of crystalline aragonitic shells and ooids. Most secondary porosity in limestones has been occluded by calcite cements, but some has been selectively preserved within hollow micrite envelopes, on micritized foundations, and in large micrite-walled solution vugs. Secondary intercrystalline and moldic porosity were formed and extensively preserved in dolostone intervals.

Much porosity was created within collapse breccias which were formed through dissolution of sulfates. In thin collapse breccias most porosity has been occluded by deposition of internal sediment and meteoric cements. Considerable porosity still exists in a thick collapse zone in the upper Fort Terrett.

Tertiary porosity is very well developed and extensively preserved in most dolostone intervals and in many limestone units. Tertiary porosity was created through dissolution of sparry anhydrite which extensively replaced limestones and dolostones after secondary voids had been formed and filled by cements. Pulverulent limestones and dolostones represent soft, powdery materials which once contained exceedingly high concentrations of sparry replacement anhydrite.

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