

JURASSIC GRAINSTONES AND TYPES OF CARBONATE SHELF CYCLES

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ABSTRACT

Carbonate shelf and shelf margin strata commonly consist of hemicyclic deposits following three upward shoaling patterns: (1) a shelf to shelf margin sequence containing a prominent grainstone unit capped either by a hard ground or by a thin restricted-marine peloidal micritic unit, (2) shelf interior low energy sequences with almost all phases of the cycle highly micritic, or (3) a cycle common in well-drained offshore banks and margins of large platforms, containing a major unit of peloids, onkoids, and grapestones and showing considerable syndepositional diagenesis by marine splash zone and/or vadose meteoric waters.

Jurassic strata of Europe, Arabia, Gulf of Mexico, and the northern Rockies all contain cycles of the first type. The oolitic grainstone units are developed at shelf margins and uniformly across wide shelves indicating either extremely high tidal ranges or deposition under continuous widespread progradation.

Why is Jurassic sedimentation commonly oolitic? Oolite forms best when tidal and wind induced currents on bank and platform edges are not inhibited by abundant organic buildups. The latter are prevented by seaward flow (in places channelized) of hypersaline or nutrient depleted water from off wide shelves or by lack of framebuilding corals and stromatoporoids in certain parts of the geologic record. Thus the combination of wide shelves and evaporitic climate offer a possible explanation for the reciprocal relationship between reefs and oolite both geographically and in the geologic record.

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