AAPG Studies in Geology #35 "Mississippian Oolites and Modern Analogs"

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This book is a compilation of seventeen papers. In most cases these were presented at the 1989 Annual Meeting of the Eastern Section of AAPG held in Bloomington, Indiana.

First paper describes Mississippian oolites and their relationship to petroleum reservoirs in the United States. It provides an overview which lists which basins contain Mississippian rocks, and of these which have Mississippian oolites and hydrocarbon production.

Next is a paper which investigates possible flexural controls on the origins of extensive, ooid-rich, carbonate settings in the Mississippian of the United States. This is followed by a paper on the eolian facies in the Ste. Genevieve limestone of Southern Indiana showing how the sedimentary character of oolites here contains fabrics reminiscent of eolian carbonates, and that, in many cases, the Mississippian carbonates of the central USA may be of an eolian dune origin. At the same time the authors also note that there are interbedded marine carbonate beds which include oolites. They feel this mix of eolian and shallow marine carbonates is probably related to variations in the eustatic of sea level. This paper is probably the most important contribution to this volume and it forces geologists to consider re-examining many cross-bedded sheet and trough bedded grain carbonates. Previously these may have been thought to be extensively marine, but in fact may be eolian. Probably eolian carbonates will now be in high fashion, and an eolian interpretation will be stretched to the limit, but I guess this is a measure of progress in science!

Next is a paper on a petrologic method for distinguishing eolian and marine grainstones of the Ste. Genevieve limestone in Indiana. The authors recognize eolian ooids on the basis of grains with high sphericity, laminations and coarsening upward cycles within the laminations, a lack of vadose cements in carbonate grainstones, which have diverse assemblages of grain types, including sketal material, peloid, intraclasts etc. In the marine oolites there is no systematic grading of the thin beds, fossils tending to be larger than 4 mm are not abraided and so do not acquire a high sphericity, while the cements which occur are interpreted as marine in origin.

This is followed by a paper on the recognition of oolitic facies, using wireline logs to map the carbonate sequences of the Ste. Genevieve limestone in the Illinois basin. The authors describe the successful use of resistivity logs to differentiate oolitic grainstones and dolomites and dense non-reservoir limestones. They point out that maps of lithology and porosity can be developed strictly from electric logs, though in fact, oolites and dolomites are easier to differentiate using gamma ray and porosity logs rather than electric logs, but the former are less commonly available.

Next is a paper on complex oolite reservoirs of the Ste. Genevieve Limestone at Folsomville Field. This paper shows that six relatively thin, stratigraphically complex, dolomitic oolitic porosity zones developed in this field. Their porosity was enhanced by dolomitization. This paper supports the general view that oolites are associated with the margins of topographic highs and suggests where localized concentrations of potentially hydrocarbon rich oolite bodies may occur.

There follows a paper on the paleogeography and cementation in a Mississippian oolite shoal complex of Ste. Genevieve Formation, in the Willow Hill Field of Southern Illinois basin. This describes lenticular bodies of porous, permeable oolitic limestone which form small oil reservoirs in the Willow Hill field of Jasper County, Illinois. The depositional setting of the oolitic bodies is interpreted to be largely marine with these grains collecting along a bioclastic carbonate-sand shoal of low relief. Meteoric cementation has prevented the compaction of these carbonates and enhances their early porosity. Next is a paper on benthic assemblages which suggest which grainstones of the Herodsberg and Salem limestones of Indiana were stable at deposition and which were not. In fact, these sediments were thought to have accumulated in tide and wave dominated shallowing upward sequences. This interpretation is supported by a lack of faunal diversity

Next is a paper on the depositional aspects of Golconda Group (Chesterian) oolite bodies of the Southwestern Illinois Basin. These limestones are thought to be very similar to those of the Ste. Genevieve though only thin isolated oolite bodies occur in the Golconda. The authors recognized that the rates of oolitic production, shoal migration, terrigenous influx into the depositional environment affected ooid production. The oolites are largely restricted to the basin margins where terigenous influx was low and mechanical energy was sufficient to keep carbonate muds in suspension.

Other papers in the text include: The drowning of ooid shoals: Mississippian Greenbrier limestone near the West Virginia dome; The tidal origins at the Mississippian oolite of West Virginia Dome; Oolitic Tidal-Bar Reservoirs in Mississippian Greenbrier formation of West Virginia; The ooid mineralogy and diagenesis of the Pitkin formation of north central of Arkansas; Oolite shoals of the Mississippian St. Louis formation, Gray county, Kansas; and Comparison of oolitic sand bodies generated by tidal vs. wind-wave agitation.

In this latter paper the authors discuss the wave agitation of the wind tidal belts of South Eastern Bahamas and compare these products to those of the tidal bars of the Northern Bahamas. In the South Eastern Bahamas stratified prograding strand plains undergo early meteoric and brine diagenesis and are dominated by micritized mixture of ooids and peloids. These ooids are forming local banks and wide spread subtidal sheets which are subject to intermittent wind wave agitation across the platform interior.

Next is a paper on a Quaternary analog to the Mississippian oolites which uses as examples the tidal bars associated with Joulter Cays and the Andros ooid shoal. Finally there is a paper on Eolian structures and textures in oolitic-skeletal calcarenites from the Quaternary of San Salvador Island in Bahamas.

This book is well illustrated with beautiful cross-sections, diagrams, maps, and numerous photomicrographs of oolites. The main question this book addresses is the occurrence of eolian oolites vs. tidal oolites in the various Mississippian settings of the United States and some occurrences in the eastern United States. The papers are well written, the type is clear, the diagrams and maps are well drawn, and photographs are excellent. Most of the papers are concentrated on the central United States, some are on the Eastern United States, and some deal with the Quaternary and Holocene, emphasizing the importance of analogs to the Mississippian oolites. This a nice book, though I felt it would have been helped by a series of tables which highlighted the difference between the eolian oolites and subtidal oolites. The book is aimed at audience of carbonate experts but those geologists and geophysicists working with Mississippian in the Central of the United States and their hydrocarbon potential will find that this book will help them. I am glad to have this book on my shelves and once again AAPG has produced a great text.