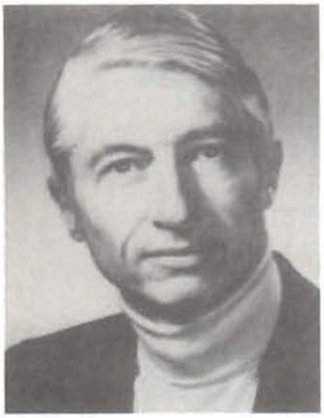
EVENING MEETING—JANUARY 14, 1985

ROBERT H. DOTT, JR.—Biographical Sketch



Robert H. Dott, Jr. received his B.S. degree in 1950 and his M.S. degree in 1951 from the University of Michigan. He received his PhD from Columbia University in 1955.

Dr. Dott worked as a Subsurface Geologist for Magnolia Petroleum Company during the summer of 1951 and as an Exploration Geologist for Humble Oil and Refining Company from 1954-58. He was a First Lieutenant for the United States Air Force at its Cambridge Research Center in Bedford, Massachusetts, from 1956-57. He left Humble in 1958 to join the University of Wisconsin in Madison where he is currently a Professor of Geology.

Dr. Dott received the AAPG President's Award in 1956 and the Wisconsin Student Association Teaching Award in 1969. He was named a Visiting Professor to the University of California at Berkley from 1969-70. He was awarded a National Science Foundation Faculty Fellowship to Stanford University, U.S.G.S. (Menlo Park) and the University of Colorado from 1978-79. This year he has been awarded a Distinguished Professorship at the University of Wisconsin.

Dr. Dott is a member of the American Association of Petroleum Geologists, the Society of Economic Paleontologists and Mineralogists (President, 1981-82), the Geological Society of America, the International Association of Sedimentologists, Sigma Xi and the History of Earth Sciences Society.

Dr. Dott is currently participating as a Distinguished Lecturer in the 1984-1985 AAPG Distinguished Lecturer Tour.

EPISODIC SEDIMENTATION OF ANCIENT SHELF SANDSTONES

At casual glance, modern shelves dominated by clastic deposits seem exceedingly dull, especially as compared to carbonate-dominated shelves. During the past 10,000 years, the Holocene transgression has resulted in modest reworking of relict, pre-Holocene material and only trivial additions of new material. Instead, most new clastic sediment has been trapped in estuaries formed by Holocene drowning of rivers. Thus, clastic shelves appear to be boring because 10,000 years is too short a time for estuary filling and significant new shelf sedimentation, and also because knowledge of modern shelf processes is biased toward bland, fair-weather conditions. Such a dismal view is dispelled, however, by a second glance at either outcrops or cores of ancient shelf sequences. Abrupt changes of lithology attest to countless changes of process types, magnitudes, and rates. This, coupled with a large share of petroleum reserves trapped in shelf clastics, offers ample reason for a more positive view.

What is needed is a fresh perspective of one of the longest studied of all sedimentary realms. Once the constraints of Lyellian constancy and of the fair-weather bias are broken, we can appreciate the great importance of episodic processes on both modern and ancient shelves. Episodic events are so common on a geologic time scale, in fact, that it is a mistake to refer to them as catastrophic, which has become increasingly popular in recent years. The ancient record provides important insights especially by allowing us to penetrate the 10,000-year Holocene barrier and to assess the important question of preservation potential; i.e., can everyday processes obliterate the evidence of an episodic event? Episodic sedimentation may result from any event whose magnitude deviates significantly from the norm. Both positive deviations, such as storms and tsunamis, and negative deviations, such as nondeposition, constitute episodes. Of most interest to the sedimentary geologist are events recorded at the spatial scale of cores and outcrops and whose recurrence frequencies range on a temporal scale from decades to millenia. Excluded at one extreme are regular annual processes (such as varve formation), and, at the other extreme, phenomena with time scales on the order of at least a million years (such as Vail curve cycles). Important questions concern assessment of recovery time, preservation potential, and determining whether recurrences are periodic or episodic. Also, we must distinguish instantaneous depositional rates from net accumulation (or preservation) rates.

Some preserved features that attest to episodic sedimentation include conglomerate lenses resedimented by storm surges; intraclast, shell, or glauconite concentrations, as well as rare graded sandstone and shelly beds produced by scour and winnowing; and hummocky stratification resulting from abnormally large waves. All of these reflect positive deviations from normal process intensities. Negative deviations typically result in surfaces of nondeposition, such as mineralized hardgrounds and polygonally cracked emergence surfaces. Bioturbated zones alternating with unburrowed intervals also attest to important episodic deviations, and provide insight into relative process rates. The former reflect fair-weather conditions with slow accumulation, whereas the latter reflect episodic rapid accumulation that outpaced burrowing activity. Both physical and biologic processes can produce complex amalgamation patterns through the overprinting of effects of multiple events, resulting in records that are challenging to decipher.

Association among episodically produced features can provide important tools for basin analysis—for example, clues to relative proximality of shelf clastics analogous to those for deep-water turbidites. Relative proximality diagnosis in turn allows prediction of sandstone thickening and possible permeability trends, which could enhance exploration success. Some puzzling sandstone bodies encased in shale and isolated from any paleoshorelines (i.e., distal) seem explicable only by episodic emplacement; they are ready-made petroleum reservoirs. Thus, ancient shelf deposits are not so boring after all, and sharper tools for basin analysis should enhance our ability to explore for new petroleum reserves trapped within them.