DOUBLE PRESENTATION—APRIL 27, 1988

WILLIAM E. GALLOWAY—Biographical Sketch

William E. Galloway, born in Waco, Texas, received his BS degree from Texas A&M University in 1966. He then attended the University of Texas at Austin where he received his MA degree in 1968 and PhD in 1971.

In 1970, Dr. Galloway became a Research Scientist Associate with the Bureau of Economic Geology. He then went to work for Continental Oil Company in Ponca City, Oklahoma, from 1970-1975 where he held the positions of Research Scientist, Senior Research Scientist, and Director of Geological Research.

Dr. Galloway rejoined the Bureau of Economic Geology in 1975 as a Research Scientist. He then became a Senior Research Scientist and was also honored as a Visiting Professor to the University of Oklahoma and the University of Bergen. In 1985, Dr. Galloway was named the Elliott Professor of the Department of Geological Sciences at the University of Texas at Austin.

Dr. Galloway has received several outstanding awards including the A. I. Levorsen Award in 1977 and 1986, the EMD Division of AAPG Best Paper Award in 1979, and the Wallace Pratt Memorial Award in 1984. He is a member of the AAPG, the SEPM, and the International Association of Sedimentologists.

Dr. Galloway is currently a Distinguished Lecturer for the AAPG Distinguished Lecture Tour.

FACIES MODELS, DEPOSITIONAL SYSTEMS, SEQUENCES, AND CORRELATION: DIMENSIONAL AND TEMPORAL RESOLUTION OF LITHOSTRATIGRAPHY

Basin fills consist of a hierarchial assemblage of genetic stratigraphic units that are bounded by or contain correlative stratigraphic surfaces, facies, or marker beds. Because most basins are filled episodically, regional stratigraphic units defined by hiatal surfaces provide fundamental elements for correlation and analysis. Depositional sequence analysis emphasizes the importance of erosional unconformities produced by fluctuating sea level. In contrast, the concept of depositional episodes and resultant depositional complexes (genetic sequences) emphasizes the stratigraphic importance of transgressions and subsequent hiatal surfaces or condensed intervals resulting from the interplay of sediment supply, subsidence, and base-level change. The two models suggest organized but somewhat different stratigraphic architectures and correlation of surfaces within the depositional framework. Correlation of sequences extends regionally within basins, and may encompass several basins, depending upon causal mechanism. Resolution is on the order of 10^6 years.

Each sequence typically contains the deposits of several depositional systems, which provide the three-dimensional building blocks of the basin fill. Major integrated depositional systems, in turn, consist of process-related facies assemblages deposited in more localized environments. Deposition within systems and their constituent environments is commonly punctuated by a series of depositional events. Such events may provide a relatively high resolution temporal framework, but extent of obvious correlatability is commonly limited to adjacent facies or to a single system. Causal mechanisms may be classified as (1) intrinsic, (2) tectonic/geomorphic, (3) climatic, and (4) eustatic.

Intrinsic mechanisms are autocyclic and include alternating channel incision and backfilling, channel avulsion, and delta/fan lobe switching. Time scales are on the order of 10^3 years. Tectonic/geomorphic events include tectonic triggering of large-scale gravity resedimentation, volcanism, and recurrent channel piracy. Time scales are more variable, but likely extend from 10^2 to 10^4 years. Climatic mechanisms include induced changes in runoff and sediment supply as well as periodic storm events. Suggested periods of climatic cycles range from 10^4 to 10^5 years. Storm events are more frequent but erratic, and stratigraphic resolution may be limited by physical correlatability of resultant beds or surfaces. Finally, eustatic "wobbles" may result in widely correlative shoreline shifts. However, correlation is complicated by the complex response of shorelines to modest base level changes and by the interplay of other variables.

Given the multiplicity of potentially correlative physical stratigraphic features, it is commonly possible to develop a highly detailed correlation framework. However, some depositional systems are more favorable for internal correlation, and areal extent of specific, event-defined stratal surfaces is likely limited to or within a single system. Perceptive analysis of contiguous systems may uncover logical coupling of events. For example, lobe switching within a large delta system may result in reduced sediment supply and transgression in an adjacent, strike-fed shorezone system as well as in excavation of an integrated submarine canyon complex. Thus autocyclic processes acting within a delta system may precipitate approximately contemporaneous events within adjacent shallow and deep water settings.

Correlation is highly interpretive. Correlations should always be tested against alternative hypotheses, including the hypothesis that physically correlative surfaces or strata do not exist. Further, correlations should be supportable in the context of the depositional process models applicable to the system(s) under analysis. ■