AAPG Annual Meeting
March 10-13, 2002
Houston, Texas

A. R. Sprague[1], M. D. Sullivan[1], K. M. Campion[1], G. N. Jensen[2], F. J. Goulding[2], T. R. Garfield[2], D. K. Sickafoose[2], C. Rossen[1], D. C. Jennette[3], R. T. Beaubouef[1], V. Abreu[1], J. Ardill[2], M. L. Porter[1], F. B. Zelt[2] (1) ExxonMobil Upstream Research Company, Houston, TX (2) ExxonMobil Exploration Company, Houston, TX (3) Bureau of Economic Geology, Austin, TX

The Physical Stratigraphy of Deep-Water Strata: A Hierarchical Approach to the Analysis of Genetically Related Stratigraphic Elements for Improved Reservoir Prediction

Deep-water reservoirs are deposited in a wide range of depositional environments, and occur at a variety of temporal and spatial scales. Prediction of net-to-gross, continuity, architecture, and quality of these reservoirs for play assessment, prospect evaluation, and development- well planning purposes, requires integration of seismic, well, and core data with appropriate outcrop and subsurface analogs. In such a comparative analysis, it is critical that similar stratigraphic elements are compared to one another.

It is proposed herein that deep-water reservoirs can be systematically described within a hierarchical framework that is based solely on the physical stratigraphy of the strata. This framework comprises both genetically related stratigraphic elements and their associated bounding surfaces. These hierarchical elements are thickness and time independent. They show a progressive increase in scale from the deposit of a single sediment gravity flow (bed) to the accumulated deposits that comprise entire slope or basin floor successions (complex system set). These hierarchical elements also relate directly to stratal units defined on the basis of sequence stratigraphy. Direct comparison can therefore be made to shallow-marine and non-marine sequences and their related units. In addition, integration of biostratigraphic data allows an independent time framework to be developed, and correlation made to cycles of base level rise and fall.

The description of deep-water sedimentary rocks utilizing such an approach provides a powerful means to directly compare similar stratigraphic elements, regardless of data type, basin type, basin location, or age. Thereby, geoscientists concerned with reservoir prediction can use such a hierarchy to more effectively integrate all the subsurface data available, and more confidently select appropriate analogs.