Kevin M. Bohacs & Jack E. Neal,
Exxon Production Research Company,
Houston, Texas

Balanced-Filled Lakes Worldwide: Insights for Optimum Source Character and Distribution in Brazilian Continental Margin Basins

Exxon has developed the concept of lake-basin type, which is useful for sorting out the complexities of lacustrine deposition to derive a predictive framework. Balanced-filled lakes are one of three lake-basin types recognized from recurring lithofacies associations and stratal stacking patterns. Balanced-filled lake systems contain the most prolific lacustrine source rocks and beneficent facies juxtapositions for hydrocarbon accumulation, based on observations of lacustrine strata of many different ages and basins (e.g., East Africa Quaternary, USA Tertiary, China and Africa Cretaceous).

Balanced-filled lakes can be shallow or deep with thick or thin sequences, but they share similar geochemical and sequence-stratigraphic attributes. Parasequences and sequences are meters to tens of meters thick, distinctly expressed in seismic, logs, and geochemistry, and formed by a combination of progradation and desiccation. Lake-water chemistry varies systematically from fresh to saline/alkaline. Most organic-rich rocks are deposited in the profundal zone, with subordinate amounts in the lake plain behind mixed biogenic-clastic shorelines. Organic matter is dominantly algal Type I, typically with TOC ≤ 30% and HI ≤ 650 mgHC/g C. Organic facies are relatively constant laterally, changing only relatively close to shore. Sequence boundaries are formed by a mix of erosion and desiccation—erosion may be best developed during transgression.

Comparison of geochemical, geological, and geophysical data from balanced-filled lakes worldwide with Brazilian basins provides a greater understanding of source rocks in the lacustrine systems responsible for most of the giant oil accumulations in offshore Brazil and suggests strategies for successful exploration and exploitation.

Biographical Sketch

Kevin M. Bohacs is a sedimentologist and stratigrapher with the petroleum geochemistry section of Exxon Production Research Company. He received his B.S.(Honors) in geology from the University of Connecticut in 1976 and his Sc.D. in experimental sedimentology from M.I.T. in 1981. At EPR, he leads the application of sequence stratigraphy and sedimentology to organic-rich rocks from deep seas to swamps and lakes, in basins around the world. As a research associate, his primary focus is to keep the *geo-* in geochemistry. He has written many papers on the stratigraphy and sedimentology of hydrocarbon source rocks. He was co-recipient of the AAPG Jules Braunstein Memorial Award for best poster session paper in 1995 for work on coal sequence stratigraphy and of the AAPG Best International Paper in 1998 for work on lakes. □